

COMPARISON OF INTERNET AND TRADITIONAL CLASSROOM INSTRUCTION IN A CONSUMER ECONOMICS COURSE

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The purpose of this study was to compare students enrolled in an introductory family and consumer sciences undergraduate consumer economics course on selected academic, perceptual, and demographic characteristics by whether they received instruction in a traditional classroom setting or through an electronic classroom format (specifically the Internet). Students enrolled in the online section of the course scored higher on the achievement posttest after controlling for pretest differences in the groups. In addition, students in the online section self-reported that they spent more time working on the course assignments. Researchers recommended that future research incorporate more extensive demographic characteristics to determine if they interact with the type of instruction received. In addition, experimental methods were recommended for further studies to more effectively remove the effects of extraneous variables.

In the past decade there has been a dramatic increase in the number of distance education courses offered at the post-secondary level. Technology-supported distance education is “the delivery of instruction over a distance to individuals located in one or more venues” (U.S. Department of Education, 1999). Distance learning in the American higher education system has become a significant delivery mechanism due to rapid advances in technology and increasing affordability (Bower, 2000, p. 4)

According to the National Center for Education Statistics, in 1997-1998 one third of 2-year and 4-year post-secondary education institutions offered some type of distance education courses with approximately 1,363,670 enrollments in college-level, credit-granting distance education courses (U.S. Department of Education, 1999, p. 17). Of these institutions that offered distance education courses, Internet technologies were used by various types of institutions with numbers ranging from 16% to 22% for synchronous Internet instruction and from 57% to 61% for asynchronous Internet instruction.

In a study conducted by International Data Corporation, it was predicted that the number of college students enrolled in distance-learning courses will reach 2.2 million in 2002 (as cited in Aase, 2000). The National Center for Education Statistics (U.S. Department of Education, 1999, p. 39) reports that 82% of post-secondary institutions plan to start using or increase their use of Internet instruction. Online instruction offers students and instructors flexibility in regard to time, place, and programs offered (Brown, 2000; Cooper, 2001; Gray & Palmer, 2001; Robertson & Stanforth, 1999; Ryan, Carlton & Ali, 1999).

As online programs proliferate, questions of accuracy, quality, and comparability of

online instruction with traditional methods arise (Borland, Lockhart, & Howard, 2000; Busacco, 2001; Schulman & Sims, 1999). Researchers disagree on which is better, distance learning or traditional instruction. Russell (as cited in Caudron, 2001) examined 365 studies of distance-education methods and found that most studies showed "no significant difference" in quality of education received through distance learning versus the classroom. Not all researchers agree with Russell. In the report commissioned by the American Federation of Teachers and the National Education Association (Institute for Higher Ed Policy, 1999), research on distance education is criticized for being questionable and, therefore, inconclusive.

Family and Consumer Sciences as a profession has recognized the need to study the effectiveness of technology in the educational process. At a distance education, capacity-building LearnShop held by the Great Plains Interactive Distance Education Alliance, it was recognized that faculty members are "interested in hearing the experiences of students who have participated in distance education" (Draper, Laughlin, Stammen, & Gregory, 1999, p. 107). Ehrmann (1999) recommends that Family and Consumer Sciences study "how, how much and how well technologies are being used" (p. 39).

With the increase in internet courses comes the need to assess the effectiveness of as well as the student satisfaction with these courses. The primary purpose of this study was to compare students enrolled in a family and consumer sciences undergraduate course on selected academic, perceptual, and demographic characteristics by whether they received instruction in a traditional setting or through an electronic classroom format (specifically the Internet). Specific objectives established to guide the researchers included:

1. To describe and compare students enrolled in an introductory family and consumer sciences undergraduate consumer economics course on their achievement in the course as measured by scores on an instructor developed end-of-course examination by whether they received instruction in a traditional classroom setting or through an electronic classroom format (specifically the Internet).
2. To describe and compare students enrolled in an introductory family and consumer sciences consumer economics undergraduate course on their perceptions of the course and the effectiveness of the instructional delivery by whether they received instruction in a traditional classroom setting or through an electronic classroom format (specifically the Internet).
3. To describe and compare students enrolled in an introductory family and consumer sciences consumer economics undergraduate course on the following selected characteristics by whether they received instruction in a traditional classroom setting or through an electronic classroom format (specifically the Internet):
 - a. the self-reported number of hours that they were employed while enrolled in the course and;
 - b. the self-reported time spent weekly in preparation of course activities and assignments.

Method

The target population for this study was defined as students currently enrolled in a family and consumer sciences curriculum at a public-funded university in the southern portion of the United States. The sample consisted of students currently enrolled in a section of one family and consumer sciences undergraduate course of which sections were being taught both through

traditional means and through electronic media (specifically Internet). The course selected was a Consumer Economics course taught during the Spring 2001 semester. The basis for selection of this course was that there were two sections of the course taught during the same semester, one of which was taught in a traditional format and the other taught in an online format. In addition, the same instructor taught both sections of the course, which removed the potential instructor effects on the outcome measures. Both the traditional and online courses consisted of an instructor's outline, problems to be completed, and various tests. The instructor developed the course materials utilizing the various teacher resources developed for the traditional lecture course. The number of students enrolled in the two sections of the course for whom complete useable data was available was 25 in the traditional section of the course and 13 in the online section of the course. Two of the 13 students in the online course section declined to provide responses to the course survey.

Measurement of the variables of investigation in the study was accomplished using two instruments. The first of these was an instructor-designed, 70-item multiple-choice achievement test which was administered to both groups as a pretest and a posttest. The second instrument was a survey designed to measure the student's perceptions regarding the influence of the course format on their learning, problems encountered, and satisfaction with the course. This survey was developed as a modified version of an instrument designed by Carter (2001). Content validity of the survey was established through a review by a panel of experts consisting of three university faculty members with expertise in the content of Family and Consumer Sciences and research design.

Data collection was conducted in the traditional course section by administering the achievement test to the students enrolled at the first class session and again as a posttest at the last regularly scheduled class session. In the online section of the course, the same general time frame was used for administration of the instruments; however, each of the instruments was completed online.

Findings

The first objective of the study was to describe and compare students enrolled in an introductory family and consumer sciences undergraduate consumer economics course on their achievement in the course as measured by scores on an instructor-developed, end-of-course exam by whether they received instruction in a traditional classroom setting or through an electronic classroom format (specifically the Internet). The achievement test was administered to the subjects in the study as a pretest in an attempt to establish the equivalence of the groups in the study on this outcome measure. Both the traditional group and the online group had a time limit of 1 hour and 15 minutes. The traditional group was found to have a mean achievement pretest score of 38.28 ($SD = 7.41$), and the online section of the course had a mean pretest score of 45.62 ($SD = 6.42$). When the groups were compared on their pretest achievement scores, the online group was found to have significantly higher achievement levels prior to the beginning of the course ($t_{27.73} = 3.16, p = .004$) (See Table 1).

Because of the identified preexisting differences between the study groups, the analysis of covariance procedure was used to compare the posttest scores of the groups. The unadjusted group means were 54.15 ($n = 13$) for the online group and 44.20 ($n = 25$) for the traditional group. The pretest was found to be a significant covariate ($F_{(1,35)} = 132.013, p < .001$) in the analysis (See Table 2) and the adjusted group means based on this covariate were 49.89 ($SD = 2.08$) for the online group and 46.42 ($SD = 1.48$) for the traditional group. Based on this analysis,

students in the online group were found to have significantly higher levels of performance on the end-of-course achievement test ($F_{(1,35)} = 4.971, p = .032$) than the students in the traditional group.

Table 1
Comparison of Pretest Achievement of Students Enrolled in an Undergraduate Consumer Economics Course by Method of Instructional Delivery

	Online Group ^a		Traditional Group ^b		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Pretest	45.62	6.42	38.28	7.41	3.16	.004

^a*n* = 13; Range of scores: 36-56

^b*n* = 33; Range of scores: 20-51

Table 2
Comparison of Posttest Achievement of Students Enrolled in an Undergraduate Consumer Economics Course by Method of Instructional Delivery Controlling for Pretest Differences

Factor	<i>df</i>	Mean Square	<i>f</i>	<i>p</i>
Covariate Pretest	1	2182.32	132.01	<.001
Group	1	82.17	4.97	.032
Error	35	16.53		

Note. Unadjusted means: Online group = 54.15 (*SD* = 2.08), Traditional Group = 44.20 (*SD* = 1.48) Adjusted means: Online group = 49.89 (*SD* = 2.08), Traditional Group = 46.42 (*SD* = 1.48)

Student Opinion Survey

The second objective was to describe and compare students enrolled in an introductory family and consumer sciences undergraduate consumer economics course on their perceptions of the course and the effectiveness of the instructional delivery by whether they received instruction in a traditional classroom setting or through an electronic classroom format (specifically the Internet). A survey was administered to measure student perceptions of the instruction at the end of the course. The survey consisted of 15 questions that were measured using appropriate 5-point anchored scales. Items 1 through 5 included questions concerning "How did you learn?" had response values of 1 to 5 with 1 = No Value, 2 = Some Value, 3 = Average Value, 4 = Much Value, 5 = Great Value. Item 6 was a question relating to the concept of "What problems did you encounter?" and had response values of 1 to 5 with 1 = None, 2 = Some, 3 = Average, 4 = Much, 5 = Great. Items 7-16 included questions about "How satisfied are you with the course?" and had a response scale of 1 = Poor, 2 = Fair, 3 = Average, 4 = Good, 5 = Excellent (See Table 3).

The online course survey responses to the 15 questions from the online group were compared with the traditional group using independent samples t-test with an a priori established alpha level of .05. Since the objective was primarily exploratory in nature, two-tailed tests were utilized. The only item for which a significant difference was found between the groups was "Rate the value of interaction using e-mail in learning concepts and principles covered in the course." The t-test results indicated that the online students scored significantly higher than the traditional classroom students on the question ($t_{(34)} = 3.352; p < .05$). However, this difference might logically have been expected given the increased emphasis on e-mail in the electronic

group.

Table 3
Mean Scores for Survey Questions Internet Versus Traditional Instruction

Question	Internet <i>M^a</i>	Traditional <i>M^b</i>	t value
How did you learn?			
Rate the value of the Instructor's Outline in learning concepts and principles covered in this course.	4.36	4.24	0.455
Rate the value of the Textbook in learning concepts and principles covered in this course.	3.63	3.28	1.037
Rate the value of interaction using e-mail in learning concepts and principles covered in the course.	3.82	2.17	**3.352
Rate the value of the Internet links to external resource in learning concepts and principles covered in the course.	3.82	3.12	1.740
Rate the value of the course assignments in learning concepts and principles covered in the course.	4.36	3.88	1.432
What problems did you encounter? ^d			
Rate the extent that computers and software caused you difficulty in completing the course.	1.91	1.68	0.630
How satisfied are you with the course? ^e			
Was the course content challenging?	4.45	4.28	0.930
Did the course meet your expectations?	4.55	4.32	0.869
Was grading clear and fair?	4.73	4.83	-0.531
Were course requirements relevant?	4.64	4.44	1.008
Were course requirements realistic?	4.55	4.72	-0.630
Were you satisfied with the role of the instructor teaching the course?	4.82	4.88	-0.467
How would you rate the course overall?	4.55	4.52	0.111
How would you rate the instructor's interest and enthusiasm?	4.82	4.92	0.086
How would you rate the instructor?	5.0	4.92	0.950

^an = 11

^bn = 25

^cRange 1 to 5, 1 = No Value, 5 = Great Value.

^dRange 1 to 5, 1=None, 5 = Great.

^eRange 1 to 5, 1 = Poor, 5 = Excellent

Demographics of Classes

The third objective was to describe and compare students enrolled in an introductory family and consumer sciences undergraduate consumer economics course on the following selected characteristics by whether they received instruction in a traditional classroom setting or through an electronic classroom format (specifically the Internet):

- a. the self-reported number of hours that they were employed while enrolled in the course;
- b. the self-reported time spent weekly in preparation of course activities and assignments.

Seventy-three percent (n = 8) of the online students had not taken an online course prior to this course. Three of the responding students in the online course section (27%) indicated that they had previously taken an online course. Data from the traditional group indicated that 76% (n = 19) had not previously taken an on-line course while 24% (n = 6) indicated that they had been previously enrolled in an online course. When the groups were compared on this characteristic, the computed Chi Square valued ($X^2 = .036$) was not significant, indicating that the treatment group and whether or not the students had been previously enrolled in an online course were independent.

Students were asked to indicate the average number of hours per week they worked at a paying job. Twenty-seven percent (n = 3) of the students in the online course averaged 21-25 hours of work per week with another 27% (n = 3) averaging more than 40 hours of work per week. In the traditional classroom, 32% (n = 8) worked an average of 26-30 hours per week with 16% (n = 4) working an average of 16-20 hours per week. Sixteen percent (n = 4) of the traditional classroom students worked more than 40 hours per week (See Table 4).

Table 4

Average Number of Hours Per Week Worked at a Paying Job

Number of Hours Worked	<u>Online Students^a</u>		<u>Traditional Classroom Students^b</u>	
	n	%	n	%
0	1	9	2	
1-5	0	0	1	4
6-10	0	0	0	0
11-15	1	9	2	8
16-20	1	9	4	16
21-25	3	27	2	8
26-30	1	9	8	32
31-35	1	9	0	0
36-40	0	0	2	8
More than 40	3	27	4	16

$p > .05$

^an = 11

^bn = 25

In addition to describing students in the groups on the variable number of hours worked, this objective also sought to compare the groups. However, because the number of categories of response was too large for the number of subjects and this situation would cause large numbers

of empty cells in the analysis, the researchers collapsed the response categories into three groups including 10 hours or less, 11-25 hours, and 26 hours or more. The frequencies in these reformed categories were then used to compute a Chi-square analysis to determine if the variables, number of hours employed per week, and group (traditional or online instruction) were independent. The results of this analysis revealed that the variables were independent ($X^2 = 0.726, p > .05$).

When asked “How much time did you spend on this course per week?” 64% (n = 7) of the online students indicated they spent 6-10 hours per week, and 36% (n = 4) indicated they spent less than 5 hours per week. Seventy-eight percent (n = 19) of the traditional classroom students indicated they spent 5 hours per week or less, and 20% (5) indicated they spent 6-10 hours per week (See Table 5).

Table 5
Time Spent on Course Per Week

Hours per Week	<u>Online Students^a</u>		<u>Traditional Classroom Students^b</u>	
	n	%	n	%
5 hours per week or less	4	36	19	79
6-10 hours per week	7	64	5	21
11-15 hours per week	0	0	0	0

Note. $X^2 = 6.211, p < .05$

^an = 11

^bn = 25

In addition to describing all students on the number of self-reported hours spent on the course, the researchers also compared the students in the traditional and online groups on the reported number of hours spent on the course. The most appropriate analysis technique to accomplish this portion of the objective was determined to be the Chi-square test of independence. The calculated Chi-square value ($X^2 = 6.211, p < .05$) was found to be significant indicating that the variables number of self-reported hours spent on the course and group (traditional or online) were not independent. The nature of the association between the variables was such that the majority of the students in the online group (64%) indicated that they spent 6 to 10 hours per week working on the course while the majority of the students in the traditional group (79%) indicated that they spent 5 hours or less working on the course (See Table 5).

Discussion

The findings from this study present several issues. The results of the study indicate that the online students scored significantly higher than those students in the traditional classroom setting on the posttest, even after controlling for significant pretest differences. One reason might be that the students in the online course reported that they spent 6-10 hours per week working on the course while the traditional classroom students reported working only 5 hours per week or less. The novelty of the Internet may be one reason that students in the online section spent more time on the course. If this is the reason for the greater number of hours spent on the course, the difference would probably be diminished as the student use of the Internet became routine.

Another possible reason for the differences in both the students' achievement levels and the number of hours spent on the course is that the difference in the online method of instruction places more of the responsibility for learning on the student. This concept could be referred to as psychological independence, and the experience of the researchers has shown that if higher levels of psychological independence can be achieved, students not only learn more in the course, but they also develop a sense of ownership for their learning which enhances their involvement in continued learning after their formal education is completed.

Demographic differences in students may also be a factor. The researchers could have attempted to collect further demographic information, but the concern was that students in the online section of the course would become reluctant to participate with large amounts of personal data because the numbers were very limited. The pretest differences that existed in the groups could have been related to group differences that are historically related to academic achievement, such as age (traditional versus nontraditional students), previous academic achievement, and educational goals.

The researchers recommend that further research be conducted to ascertain if these findings can be confirmed as well as to examine a more extensive set of demographic comparisons. In addition, if possible, research should be conducted using a true experimental design. With this design, researchers could remove the effects of the pre-existing differences through full randomization, and the problem of unequal group sizes would also be removed since equal numbers of subjects would be randomly assigned to each treatment group. It should be noted, however, that mortality could create inequalities in the groups at the time of measurement of the posttest. In addition, further research is needed to determine if and why additional groups of students spend more time on the online course.

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