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ABSTRACT

This paper argues that--with the increasing use of enhanced, computer-based instructional technologies in education--studies that examine differences between distance and traditional classroom instruction by comparing a distance course with a regular classroom section of the same course are no longer appropriate. The author proposes methods that compare distance classes with face-to-face instruction enhanced with instructional technology. The study used data from spring and fall 2001 online and enhanced courses at the Borough of Manhattan Community College (BMCC) in New York. In total, there were 30 classes--18 online and 12 technology-enhanced--all of which were credit-bearing, college-level courses. The study found that students in both types of classes are similar, and are reflective of BMCC's student body. The majority of both groups are continuing students majoring in career programs. Both groups are enrolled in an average of nearly four courses, with online students typically taking one online course and three on-campus courses. Grades in the online courses approximate a bimodal distribution, with a large percentage of As (47%), very few Cs, and a substantial share of failing grades (21%). Grades in the enhanced courses are much closer to a normal distribution. (NB)

Online and Technology-Enhanced Classroom Instruction: A Comparative Study of Student Achievement

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In his influential book (1999) and website, Thomas Russell has compiled a voluminous list of studies indicating that there is no significant difference in distance and traditional classroom instruction, as measured by indicators such as grades, achievement test scores, and course satisfaction. These studies typically examine these outcomes by comparing a distance course with a regular, classroom section of the same course. However with the increasing use of enhanced, computer-based instructional technologies in distance education, this research design is, at best, no longer appropriate and, at worse, seriously confounded. Computer-based instructional technologies do not simply provide the same instruction through a different medium, but rather promote a transformation of the teaching and learning process in which faculty revise their pedagogy from a teacher-centered, typically didactic lecture format to one that is more student-centered and based on active learning strategies (Doucette, 1994; Oblinger and Rush, 1997; Weiss, Knowlton, Speck, 2000). Therefore to adequately gauge the efficacy of distance instruction, it should be compared to classroom courses that also use instructional technology. In effect, the comparison is of distance versus face-to-face instruction controlling for the influence of advanced instructional technologies on the teaching and learning process.

The online and technology-enhanced course initiatives at Borough of Manhattan Community College (BMCC) of The City University of New York provide an ideal opportunity to conduct such as assessment. In fall 2000, BMCC began an extensive faculty development initiative to assist faculty in developing Web-based, online courses. With the support of a U.S. Department of Education Title III grant, the college also began training a different group of faculty to teach classroom-based courses that utilize advanced instructional technologies. In both initiatives, faculty participants, who are selected on the basis of a competitive application process, are introduced to pedagogical theory with respect to teaching with technology. In addition they receive extensive training in using various instructional technologies and receive expert guidance and technical assistance in redesigning the course they have chosen to teach in the new format. BMCC's online and enhanced courses were offered for the first time in spring 2001.

Because BMCC introduced these courses at the same time, we were able to control for the 'novelty effect' – the increased interest and motivation among faculty and students simply because they were involved in a new endeavor. The novelty effect has been identified as one of the serious shortcomings of research that compares distance to traditional courses (National Education Association, 1999).

Data and Methods

The data for this study are drawn from spring and fall 2001 courses. In total there are 30 classes, 18 online and 12 technology-enhanced, all of which are credit-bearing, college-level courses. There are four types of data: (1) Course GPA and grades, including the number of incompletes and withdrawals; (2) Student demographic and collegiate /academic information, including age, gender, race/ethnicity, full-time/part-time status, class standing, major, performance on the mathematics placement test, and cumulative credits and GPA prior to taking the course; (3) Student survey data, collected during the last week or two of class, providing information about students' satisfaction and perception of course-related benefits; (4) Faculty survey data, collected shortly after the term, providing information about the effect of the course format on student engagement and learning. Web-based questionnaires were used to collect all survey data.

Data have been aggregated by course type. The analyses describe overall differences between online and enhanced courses on student performance, satisfaction and perceptions of course benefits, as well as instructors' appraisals of student engagement and learning. Tests of significance were conducted on the key academic outcomes: course GPA, pass rates and withdrawal rates.

Results

Comparative Student Profile

Using official academic record information, Tables 1 and 2 present a comparative profile of the online and technology-enhanced students. With respect to demographic characteristics, online courses enroll a greater proportion of women, white and Hispanic students. For the most part, students in these courses are fairly similar and are reflective of BMCC's student body. Turning to the academic indicators, we see that the two groups share a number of the same characteristics. The majority of both groups are continuing students majoring in career programs. Both groups are enrolled in an average of nearly four courses, meaning that online students typically are taking one online and three on-campus courses. The groups do differ in some important respects. Online students typically have earned more credits and compiled higher cumulative GPA's (these indictors are based on academic performance in prior terms). These academic differences lead one to suspect that online students would tend to outperform their counterparts in enhanced courses.

Table 1
Comparative Demographic Profile

	Online	Enhanced
Enrollment	412	328
Age	25.6	24.8
Gender		
Males:	25%	40%
Females:	75%	60%

	Online	Enhanced
Race/Ethnicity		
White:	17%	6%
Black:	33%	37%
Hispanic:	27%	22%
Asian:	12%	20%
Am-Indian:	0%	0%
Other:	12%	15%

Table 2
Comparative Academic Profile

	Online	Enhanced
Status		
Full-Time:	64%	75%
Part-Time:	36%	25%
Student Type		
Freshman:	1%	2%
Continuing:	82%	88%
Transfers:	7%	3%
Re Admit:	8%	6%
Non Degree:	3%	2%
Class Standing		
Freshman:	42%	54%
Sophomore:	58%	46%

	Online	Enhanced
Major		
A&S:	38%	35%
Career:	59%	63%
Non-Degree:	3%	2%
# Courses	3.7	3.8
Math Placement	24.1	24.7
Cum Credits	34.8	28.5
Cum GPA	2.82	2.73

Comparative Academic Performance

Table 3 compares students' academic performance in online and enhanced courses. The overall GPA's are virtually identical, 2.68 in online versus 2.61 in enhanced courses. However the apparent similarly on this fundamental indicator hides more than it reveals. Indeed, the pass rate is significantly higher in enhanced courses, implying that the grade distributions are dissimilar in the two types of courses. Figures 1 and 2 clearly illustrate this difference. Grades in the online courses approximate a bimodal distribution, with a large percentage of A's, very few C's and a substantial share of failing grades (F's and WU's). By contrast, grades in the enhanced courses are much closer to a normal distribution. In effect, the comparable GPA's are derived from sharply divergent patterns of grades.

Table 3 also shows that online students had a significantly greater incidence of course attrition, more than double that of students in enhanced courses (26% versus 12%). Similarly, online students tended to receive a disproportionate number of incomplete grades (12% versus 3%).

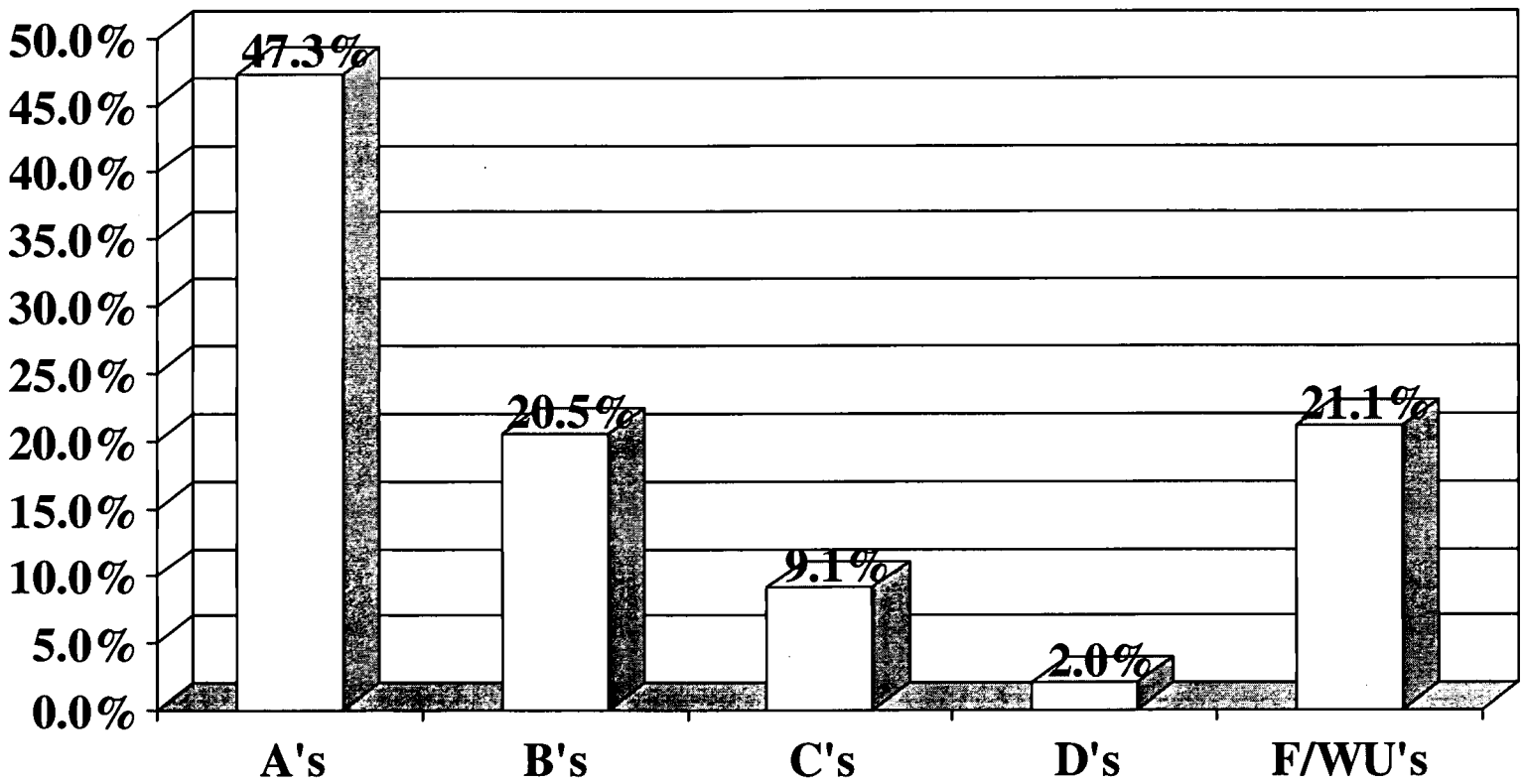
Table 3
Comparative Academic Performance

	Online	Enhanced	Diff.
GPA	2.68	2.61	+.07
Pass Rate	79%	90%	-11
A	47%	28%	+19
B	21%	33%	-12
C	9%	23%	-14
D	2%	5%	-3
F	3%	6%	-3
WU	18%	5%	+13
# Earning Grade	298	288	

	Online	Enhanced	Diff.
W	13%	8%	+5
WU	13%	4%	+9
Total Withdrawal	26%	12%	+14
Incompletes	12%	3%	+9
Total Enrollment	412	328	

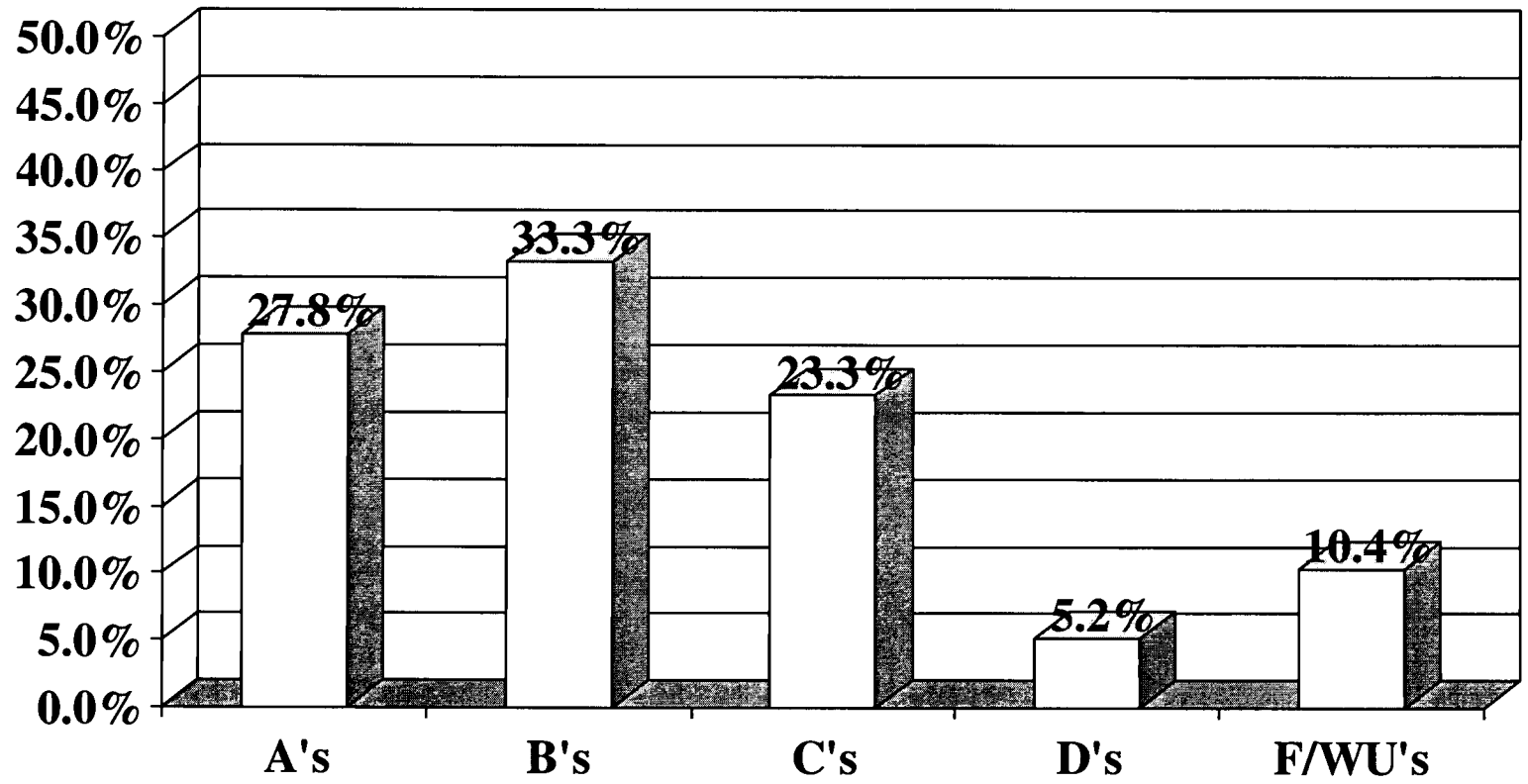
(W is a withdrawal)
(WU is an unofficial withdrawal)

Figure 1
Online Grade Distribution



Unofficial Withdrawals (WU) are calculated as F's.

Figure 2
Enhanced Grade Distribution



Unofficial Withdrawals (WU) are calculated as F's.

Student Satisfaction and Perception of Course Benefits

Students in the online classes expressed greater satisfaction with their course than did those in the technology-enhanced courses. They also were more apt to indicate that they felt supported by their professors through comments and feedback. Not surprisingly given the online format, a much larger proportion of distance students said that their ability to express themselves in writing had improved over the span of the course. Students in both types of courses were equally likely to indicate that the course format left them feeling more confident and prepared for technology-based employment. Enhanced students, however, were somewhat more likely to say that the course increased their comfort in using the Internet and computer software.

Instructors' Perception of Student Engagement and Learning

Among the survey questions faculty were asked, the most salient concerned the relation between the course format and student engagement and learning. Fifty-six percent of online faculty reported that their students were more engaged with the course materials as a result of the format, as did half of the enhanced faculty. Yet with respect to learning, 44% of enhanced and one-third of online faculty said that the format facilitated greater mastery of course content.

Discussion and Implications

As we stated previously, although there are many studies indicating that there is no significant difference in the educational outcomes of distance education compared to traditional classroom instruction, the advent and increasing use of advanced instructional technologies suggest that this research may no longer provide a valid comparison of the true strengths and weaknesses of online instruction relative to face-to-face classroom-based instruction. Our comparison of online and technology-enhanced classroom courses found that online students had a significantly greater distribution of high and low grades, a significantly lower pass rate, and a significantly higher withdrawal rate than their counterparts in the technology-enhanced classes. In spite of the no significant difference literature, the bimodal grade distribution and high course attrition rates that we found in BMCC's online courses have been reported in other recent evaluations of online instruction (National Education Association, 2000, p.21; Carr, 2000).

Our survey data indicate that online students were more likely to be satisfied with their course than were students in the technology-enhanced classes. We question the validity of this finding because of possible survey response bias in the online classes. Although we cannot match survey responses to individual students (the questionnaires were anonymous), the fact that nearly half of the online students earned A grades while many others had failing grades and/or incompletes leads us to suspect that the high achieving students are overrepresented among the survey respondents. Indeed, despite using comparable survey collection procedures, the response rate in the online courses was 32% as compared to 76% in the enhanced classes (response rate calculations exclude students who withdrew). We say this not to imply that students don't like online courses. Our point is that we are not sure because of likely response bias. But even more to the point, considering that a bimodal grade distribution and high course attrition rates appear to be associated with online courses, they would seem to be especially vulnerable to such biases. Therefore research on online education that utilizes survey data should pay particularly close attention to possible response bias. This is also true of reviews of this literature.

In the main, our research indicates that online and technology-enhanced classroom-based courses are associated with important differences in student achievement. Our results are consistent with other recent studies indicating that online courses tend to have unusually high attrition and failure rates, along with a disproportionate number of students earning high grades. These course outcomes suggest that some students flourish in the online environment, while others flounder. Indeed, distance education experts have repeatedly stated that online courses are not for everyone (Elliot, B., Ambrosia, A. & Case, P., 1999; Gilbert, S. D., 2000). Students who are self-motivated, independent and manage their time well, are more apt to excel in this environment. This view is certainly contrary to the notion that there is no significant difference in student performance. Additional research that controls for student personality and achievement characteristics is needed to better assess and compare student success in online and on-campus courses (National Education Association, 1999). In the meantime, technology- enhanced, classroom courses may be the best solution for most students.

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