The impact of classroom technology on student behavior

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ABSTRACT

The trend toward technology enhanced classrooms has escalated quickly during the past five years as students have become increasingly tech-savvy. Classrooms across the nation have become "wired" and textbook publishers now offer a wide variety of computerized teaching supplements. In fact, some may argue that technology is now expected in the college classroom. The objective of this research is to examine whether the use of technology in university classes impacts student behavior and student perceptions of instructional quality. This paper summarizes the results of a survey administered to students enrolled in business courses at a mid-sized Midwestern university. The results suggest that adding technology in courses where it is not currently used is likely to have a positive impact on student perceptions of the instructor and on student behavior. However, removing technology from courses that already use it would not appear to have a negative impact on all aspects of student behavior. Overall there are certain aspects of student behavior (the amount of time that students study, the quantity of notes they take, their attendance, and their interaction with the instructor) which appear to be technology neutral. In contrast, technology tends to have a meaningful impact on student preparation for class, attentiveness, quality of notes taken, student participation in class, student learning, desire to take additional classes from the instructor or in the subject matter, and the overall evaluation of the course and the instructor.

Keywords: class technology, instructional quality, student behavior, student perceptions

INTRODUCTION

Technology, it seems, is everywhere these days. As computers have become more commonplace, the use of information technology has become pervasive in most everyone's lives. For most of us, it is hard to image daily life without the influence of technological devices, be it handheld video games, personal digital assistants, cell phones or any number of computers. This is especially true for younger generations. In academia, we have likely reached the point where the use of technology is expected, by both students and their parents (Christensen, 1999).

The trend toward technology enhanced classes has escalated quickly during the past five years as students have become increasingly tech-savvy, classrooms across the nation have become "wired" and textbook publishers now offer a wide variety of computerized teaching supplements. Lowerison, Sclater, Schmid, and Abrami (2006) suggest that technology has the potential to transform the learning environment from passive to active and more subject to the control of the learner. According to Roblyer (2003), technology may enable the learner to be more actively involved in his or her own learning. While technology may enhance the classroom and engage today's student more effectively, most do not believe it replaces the need for a structured, content-driving learning process that is grounded in theory. To be effective, technology-based tools must accompany appropriate pedagogy (Laurillard, 2002). That said, a 2001 national study showed that 87% of faculty believe computer technology enhances student learning (Epper and Bates, 2001).

Despite this widespread belief that the use of technology in the classroom is generally good, such may not always be the case. Burbules and Callister (2000) suggest technology can be used well or poorly, and thus its effectiveness is dependent on how it used, by whom and for what purpose. Instructors use varying amounts of technology in their classes. For example, some professors utilize PowerPoint slides or similar technology extensively or moderately throughout a course, while others seldom or never use technology. There may be several reasons why instructors ultimately adopt technology for classroom use. For some, it may help them to create better organized, more focused lectures. For others, they believe that the use of technology benefits students by engaging them more in the classroom and allowing them to listen more closely without transcribing every word that is spoken. Some professors may choose technology because writing on whiteboards or blackboards hinders their ability to interact with students. Still other instructors may adopt technology as a time saving device because it is readily available today, provided by the publishers who are eager to convince faculty to adopt their textbooks. Although the motivation may differ, theoretically the overall expectation is that technology will improve the course, engage the students and enable them to learn more. There may also be at least the implicit hope by the faculty member that teaching evaluations will improve.

The study of what makes a college teacher effective is ongoing. Witcher, Onquegbuzie, Collins, Filer, Wiedmaier, and Moore (2003) suggest that students believe that effective teachers possess many if not all of the following nine characteristics, listed in order of importance: (1) student-centered; (2) knowledgeable about the subject matter; (3) professional; (4) enthusiastic about teaching; (5) effective at communication; (6) accessible; (7) competent at instruction; (8) fair and respectful; and (9) provider of adequate performance feedback. Clearly, utilization of technology can impact several of these identified characteristics or traits. Thus, in recent years, the proliferation of technology in an educational setting has sparked considerable interest on the

part of researchers, and a number of studies have focused on the positives and negatives of technology use from the perspectives of the institution, student and professor.

A recent study by Apperson, Laws and Scepansky (2006) examined the impact of PowerPoint on the students' classroom experience. While they found no differences in grades as a result of the use of PowerPoint in the classroom, they did find that students in PowerPoint-enhanced classrooms responded differently to the classroom experience. Specifically, students believed that the PowerPoint classes were better organized and more interesting. Students also rated the professor high overall and indicated that they would be more likely to take another class from that professor. Interestingly, students in PowerPoint enhanced courses also found that the instructors exhibited more positive behaviors seemingly unrelated to the use of technology, such as providing helpful feedback in a timely fashion and creating assignments that involve higher-order more critical or creative thought. Furthermore, Atkins-Sayre, Hopkins, Mohundro, and Sayre (1998) concluded that the use of technology adds to the instructor's credibility. Lecturers can manage class time more efficiently as less time is spent writing on whiteboards or changing transparencies (Daniels, 1999, Mantei, 2000), and thus lectures may flow better. Overall, Apperson et al (2006) believe that the use of technology in classrooms causes students to have a more favorable attitude toward their education, and benefits accrue to instructors who utilize it in their classes.

However, technology usage does not necessarily result in better teaching evaluations for faculty. Lowerison et al found no significant relationship between actual computer use and perceived effective computer usage on course evaluations (2006). Several explanations were offered for this unexpected outcome, including the fact that students may now expect technology to be used in the classroom and no longer see it as a unique class feature that enhances their learning. These findings are consistent with the Christensen (1999) study mentioned earlier. It may also be the case that technology is not being used in an appropriate manner, that is, as a transformative, student-centered tool for learning, a concern expressed by Burbules and Callister (2000).

Computer technology may also better support diverse needs and capacities of students, providing the potential for deeper processing and understanding of information (McCombs, 2000). While the technology may enhance the classroom and engage today's student more effectively, most do not believe it replaces the need for a structured, content-driving learning process that is grounded in theory. To be effective, technology-based tools must accompany appropriate pedagogy (Laurillard, 2002). As McFarlane states, "computer use alone, without clear objectives and well designed tasks, is of little intrinsic value (1997). This paper continues the inquiry into the impact of technology on student perceptions of their own learning as well as their academic behavior.

PRESENT STUDY

Students taking various business classes in a medium-sized Midwestern university were invited to participate in research study seeking to assess the impact of the presence or absence of technology in the classroom on self-perceived student effort and behavior. Prior to the survey being administered in individual classrooms, instructors who participated were asked whether or not they made moderate or extensive use of technology in their courses. If the instructor used technology moderately or extensively, then the survey given in that class asked the students to give their opinion regarding how the absence of technology would impact various components of

student learning. For example, students were asked whether the lack of technology would have a positive or negative impact on their attentiveness in class as compared to what it had been.

Alternatively, if the instructor indicated that he/she did not utilize technology moderately or extensively, then the survey given in that class asked the students to give their opinion regarding how the addition of technology would impact them. Thus, for example, students in these sections were asked whether more technology usage by the instructor would affect their own level of class preparation.

Survey questions were based in part on three different student evaluation forms previously or currently being used by the researchers' university, including an early version developed and used by all public institutions within the state, the Student Instructional Report II and the IDEA Diagnostic Form Report. Both versions of the survey used the following five point scale to collect student opinions: "1" was significantly positive, "2" was somewhat positive, "3" was no difference, "4" was somewhat negative, and "5" was significantly negative. The survey also included numerous demographic questions to facilitate analysis of the responses. Among other things, students were asked whether they were graduate or undergraduate students, their program of study or major, and their year in school (e.g., freshman, sophomore, etc.), as well as their grade point average and gender.

In total nine business faculty members, including two of the paper's authors, administered the survey in their classes. Faculty participants were selected on the basis of their rank, varying degrees of technological proficiency and usage, discipline, and gender in order to provide a cross-section of courses being evaluated. Classes chosen included those at the 100 (first year), 200 (second year), 300 (junior level), 400 (senior level) and graduate (700) level. In all, the survey was administered in fourteen different business classes, including multiple sections of a few of the courses.

The survey was administered near the beginning of last year's fall semester. Participating faculty were asked to devote class time to allow for the completion of the survey. Enrollment in the sections surveyed totaled 700 students, including some students who were enrolled in more than one of the classes included in the sample. In total, approximately 550 usable surveys were completed and returned. A brief summary of demographic information for the undergraduate survey respondents is included in the Appendix.

RESULTS

Table 1 and 2 show the preliminary results of the data analysis. In each table, the mean response for each question is compared to a neutral response of "3" in order to evaluate the effects that each group might anticipate given possible changes in their classroom environments. Recall that each item was based on the following five point scale: "1" - significantly positive, "2" - somewhat positive, "3" - no difference, "4" - somewhat negative, and "5" - significantly negative, resulting in a lower mean for a more positive perception. The mean is provided for each question as well as the number of students who gave a particular response.

Table 1 shows the results for the surveys given in the classes in which the instructor indicated that he/she used technology moderately or extensively. The survey then asked the students to give their opinions regarding how the absence of technology would impact their learning from the course. There were 374 usable surveys returned from this set of classes. The means in Table 1 fluctuate between the "high 2" range and the "low 3" range. Responses from the students in these courses that used technology suggest that students anticipate that the loss of

technology would have a positive impact (mean is less than the neutral response of 3.0 and statistically different from the neutral response) on the amount of time they study for class each day, the amount of time they study for exams and quizzes, the quantity of notes they take, their overall attendance for the class, and their appreciation for the instructor's effort. Assuming that students would view less study time as more positive, it appears that students feel they would study less if technology is removed from the course. It seems somewhat counterintuitive that the absence of technology would have a positive impact on the amount of notes that students take, however, the "quantity" of notes taken can be viewed from two different angles. Students may consider it a positive to take fewer notes, and students may perceive that they take fewer notes when technology is used in the classroom. The loss of technology, according to the students, would also have a positive impact on their attendance and their appreciation for the instructor's effort. Students may perceive that it would be more important to attend class to hear the material presented if the notes were not available via technology outside of class. In addition, it appears that students believe that technology may make teaching "easier" as the loss of technology would have a positive impact on student appreciate of instructor effort.

In contrast, student responses indicate that students expect that the loss of technology would have a negative impact (mean is greater than the neutral response and statistically different from the neutral response) on attentiveness in class, the amount learned from class, the students' desire to take additional classes from the particular instructor, and the students' desire to take additional classes in the subject matter. These results suggest that students perceive there are specific benefits associated with technology use in the classroom.

Technology may be one way instructors can maintain student interest. Indeed, the responses appear to suggest that students perceive that they might learn less if technology were withdrawn. Students also indicated that they would be less inclined to take additional classes from the instructor if technology were not used, and they might also be less inclined to take more courses in the same subject matter if technology were not a part of the classroom experience. On the other hand, the responses suggest that students might be more likely to attend class and have a greater appreciation for instructor effort if technology were not used in the classroom.

Results of the two questions as to how a change in technology use from moderate/intensive to none at all would impact the student's overall evaluation of the course and the instructor are also presented in Table 1. Students who currently experience technology in the classroom would rate a course less favorably if the technology were removed (mean above the neutral 3.0 and statistically different from the neutral 3.0). However, the impact on the students' ratings of the instructor appears to be neutral under the loss of technology scenario.

Table 2 shows the results for the surveys given in the classes in which the instructor indicated that he/she did not use technology moderately or extensively. Those surveys then asked the students to share their thoughts regarding how the addition of technology would impact the how they behaved in the course. There were 183 usable surveys returned from this set of classes. The mean for every question was below the neutral response of "3," which suggests that students thought that those courses that did not presently use technology could be improved by the addition of it; a lower mean again reflects a more positive impact. The responses given by the students in the courses that did not include a technology component indicated that its addition of technology would have a positive impact (mean less than and significantly different than the neutral response) for all questions except two, i.e. the amount of interaction with the instructor outside of class and the students' desire to take more classes in the subject matter. These results

suggest that in the opinion of the students, the addition of technology would have an overall positive impact on their behavior.

The addition of technology would, according to the students, have the most positive impact on the students' appreciation for the instructor's effort, the amount the students learn from the course, and the quality of the notes that the students take. According to both Tables 1 and 2, the amount of interaction that students have with the instructor outside of class is technology "neutral" as the mean was close to "3" for both versions of the survey. Results of the two questions pertaining to how the addition of technology to a course that does not currently use it would impact the student's overall evaluation of the course and the instructor are presented in Table 2 as well. The responses were positive (mean less than the neutral response of 3.0 and statistically different from the neutral response of 3.0). These results suggest that the prospect of including technology in the classroom environment appears to increase the likelihood that students would perceive both the course and the instructor in a more favorable light.

In addition to comparing the means for each version of the survey to a neutral response of "3," the means for each version can be compared to each other. In Table 3, the first set of data (i.e., the left side) shows the results for the surveys given in the classes in which the instructor indicated that he/she used technology moderately or extensively, with the students being asked how the removal of technology would impact their behavior. The second set of data (i.e., the right side) shows the results for the surveys given in the classes in which the instructor indicated that he/she did not use technology moderately or extensively, with the students being asked how the addition of technology would influence their behavior.

Responses from those students in classrooms that currently used technology (left set) appeared to suggest a relatively neutral impact on the students' evaluation of the instructor if technology were withdrawn (mean close to 3.0), but a slightly more negative (mean above 3.0) response to the evaluation of the course if technology were withdrawn [see Table 1]. Students who were in class that did not currently use technology (right set) indicated that the addition of the technology would improve their evaluation of both the course and the instructor (mean below 3.0) [see Table 2]. As might be expected given the different results reported in the first two tables, the differences between the two groups were statistically significant for some of the variables as reported in Table 3. Students appear to want technology in the classroom and that desire appears to be reflected in the overall evaluation of the course and instructor.

As Table 3 illustrates, students who are not currently exposed to technology in the classroom generally responded more favorably to the prospect of adding the technology than did students who imagined the technology being withdrawn. Eleven of the 17 questions reflected statistically significant differences ($\alpha < 0.050$) in the mean responses between the two groups. In other words, students who currently experience technology in the classroom gave significantly different responses from those who currently did not have technology in the classroom. The questions that reflected statistically significant differences are noted with an "*" in Table 3. For those questions in which a statistically significant difference between the two groups was observed, responses from students who currently do not experience the use of technology in the classroom reflected more positive mean responses to the addition of technology usage than did their counterparts who might experience the withdrawal of technology in the classroom.

The six items that did not generate statistically significant differences between the two survey groups were as follows:

- Amount of time you study for class each day.
- Amount of time you study for exams and quizzes.

- Quantity of notes.
- Overall attendance.
- Amount of interaction with the instructor during class.
- Amount of interaction with the instructor outside of class.

These results suggest that student perceptions of these six items are "technology neutral." In other words, the addition of technology where it is currently not used or the loss of technology where it is used is not perceived to have a meaningful impact on the amount of time students study, the quantity of notes they take, their attendance, or their interaction with the instructor. In contrast for nine of the eleven items marked with an "*" in Table 3, technology appears to have a positive impact because the loss of technology (left side) has a mean greater than "3" (negative impact) and the addition of technology (right side) has a mean less than "3" (positive impact). Therefore, according to the comparison of the two samples, technology has meaningful impact on student preparation for class, attentiveness, quality of notes taken, student participation in class, student learning, desire to take additional classes from the instructor or in the subject matter, and the overall evaluation of the course and the instructor.

The student response to one question [student's appreciation of instructor effort] is more problematic. In each group student responses suggested a change from the existing situation might be viewed more positively than maintaining the status quo, and each group reflected responses that were significantly different from a neutral response on this question [see Tables 1 and 2]. Although each group responded more positively than neutral to this question, students in the group without technology for whom it was suggested technology might be added responded more positively than did the students who were asked to imagine a class in which the technology might be withdrawn.

SUMMARY AND CONCLUSION

The results of this study suggest that adding technology to courses where it is not currently used is likely to have a positive impact on student perceptions of the instructor and the course as well as on most aspects of student behavior. However, it interesting to note that removing technology from courses that already use it would not appear to have a negative impact on all aspects of student behavior. For example, removal of technology from a course might, according to student responses, have a positive impact on the amount of time they study for class each day, the amount of time they study for exams and quizzes, the quantity of notes they take, their overall attendance for the class, and their appreciation for the instructor's effort. However, removal of technology from a course that currently utilizes it would be viewed negatively in terms of the overall evaluation of the course, the students' attentiveness in class, the amount the students learn from class, the students' desire to take additional classes from the particular instructor, and the students' desire to take additional classes in the subject matter.

Comparison of the loss of technology in a course that currently uses it versus the addition of technology to a course that does not use it suggests that there are certain aspects which are "technology neutral." In other words, the addition of technology where it is currently not used or the loss of technology where it is used is not perceived to have a meaningful impact on the amount of time students study, the quantity of notes they take, their attendance, or their interaction with the instructor. In contrast, technology appears to have a meaningful impact on student preparation for class, attentiveness, quality of notes taken, student participation in class,

student learning, desire to take additional classes from the instructor or in the subject matter, and the overall evaluation of the course and the instructor.

The research is not meant to determine how effective technology was in helping students learn or which technology might be most effective. Rather, this research focuses on student perceptions or opinions regarding technology usage and how adding technology to a course that does not use it or eliminating technology from a course that does use it might impact a student's perception of the course or the faculty member as well as his/her behavior. These results suggest that students taking business classes at this Midwestern University perceive that technology use in the classroom does indeed have an overall positive impact. While technological enhancement may not necessarily be appropriate for all classroom situations and all subject matter, these results suggest that instructors who are comfortable using technology and find that it enhances their teaching experience should continue to incorporate it in their classes. Those who do, however, must remember technology for what it is – a tool which can have a positive impact on student behaviors and perceptions when used appropriately.

LIMITATIONS AND FUTURE RESEARCH

There are several limitations to the present study. The results were drawn from data collected from students enrolled in business courses at a single Midwestern University and, therefore, the results may not be generalized to hold for different populations such as non-business students or students at universities in other parts of the country or even the world. Further analysis is presently underway that considers the impact of the addition of technology to a course that does not use it or the removal of technology from a course that does use it on a student's perception of instructor effectiveness. In addition, while this particular research focuses on student perceptions of technology use, the ultimate goal of technology integration in the classroom should be to help students learn. Therefore, further research to help to identify which technology uses are most educationally meaningful would help educators to make informed decisions regarding the plethora of technology tools available for the classroom today. Gaining a better understanding of student expectations regarding technology use for students of different ages would also be useful information. Another avenue of future research, which could only occur subsequent to the two avenues previously mentioned, would be a study of whether student perceptions are congruent with the use of technology tools that are found to be most effective in advancing student learning.

Table 1
Comparison of Student Responses Relative to a Neutral Response for the Impact on Personal Behavior of the Loss of Technology Where It is Now Used

	Expected Effect of the Loss of Technology				
	N	Mean	Std Dev	test-stat	Alpha
The level of your preparation for each class session.	372	3.032	0.968	0.643	0.521
The amount of time you study for class each day.*	373	2.831	0.843	3.870	0.000
The amount of time you study for exams and quizzes.*	373	2.721	0.960	5.608	0.000
Your attentiveness in class.*	372	3.228	1.197	3.682	0.000
The quantity of notes you take.*	372	2.769	1.324	3.368	0.001
The quality of notes you take.	373	3.078	1.302	1.153	0.250
Your level of participation in class discussions.	372	3.043	0.895	0.927	0.355
Your overall attendance for the class.*	373	2.788	0.823	4.967	0.000
The amount of your interaction with the instructor during class.	373	2.976	0.824	0.565	0.572
The amount of interaction with the instructor outside of class.	373	3.005	0.846	0.122	0.903
The amount you learn from class.*	373	3.231	1.090	4.084	0.000
Your appreciation for the instructor's effort.*	372	2.849	1.038	2.798	0.005
Your appreciation for the importance of the material.	373	2.960	0.925	0.840	0.402
Your desire to take additional classes from the particular instructor.*	374	3.112	0.981	2.213	0.028
Your desire to take additional classes in the subject matter.*	374	3.104	0.916	2.202	0.028
Your overall evaluation of this course.*	372	3.290	1.062	5.271	0.000
Your overall evaluation of this instructor.	372	3.048	1.008	0.926	0.355

Note : Questions with statistically significant differences between mean responses and an expected neutral response [3.0] are marked with an "*".

Table 2
Comparison of Student Responses Relative to a Neutral Response for the Impact on Personal Behavior of the Addition of Technology Where It Is Not Used

	Expected Effect of the Addition of Technology				
	N	Mean	Std Dev	test-stat	alpha
The level of your preparation for each class session.*	183	2.601	0.883	6.112	0.000
The amount of time you study for class each day.*	183	2.820	0.822	2.967	0.003
The amount of time you study for exams and quizzes.*	183	2.634	0.860	5.762	0.000
Your attentiveness in class. *	183	2.634	1.111	4.460	0.000
The quantity of notes you take.*	183	2.743	1.202	2.891	0.004
The quality of notes you take.*	183	2.557	1.179	5.077	0.000
Your level of participation in class discussions.*	183	2.814	0.776	3.238	0.001
Your overall attendance for the class.*	183	2.689	0.959	4.395	0.000
The amount of your interaction with the instructor during class.*	183	2.891	0.741	1.996	0.047
The amount of interaction with the instructor outside of class.	183	2.962	0.615	0.842	0.401
The amount you learn from class.*	183	2.563	1.040	5.684	0.000
Your appreciation for the instructor's effort.*	183	2.546	1.004	6.113	0.000
Your appreciation for the importance of the material.*	183	2.590	0.890	6.227	0.000
Your desire to take additional classes from the particular instructor.*	182	2.747	0.929	3.668	0.000
Your desire to take additional classes in the subject matter.	182	2.901	0.848	1.573	0.117
Your overall evaluation of this course.*	182	2.571	1.031	5.605	0.000
Your overall evaluation of this instructor.*	182	2.582	0.976	5.775	0.000

Note : Questions with statistically significant differences between mean responses and an expected neutral response [3.0] are marked with an "*".

Table 3
Comparison of Responses to Questions about Student Behavior for the Impact of the Loss of Technology Where It is Now Used (Left Set) versus the Addition of Technology in Classes Where It is Not Used (Right Set)

	Expected Effect of the Loss of Technology			Expected Effect of the Addition of Technology			
	N	Mean	Std Dev	N	Mean	Std Dev	alpha
The level of your preparation for each class session.*	372	3.03	0.97	183	2.60	0.88	0.000
The amount of time you study for class each day.	373	2.83	0.84	183	2.82	0.82	0.880
The amount of time you study for exams and quizzes.	373	2.72	0.96	183	2.63	0.86	0.298
Your attentiveness in class.*	372	3.23	1.20	183	2.63	1.11	0.000
The quantity of notes you take.	372	2.77	1.32	183	2.74	1.20	0.825
The quality of notes you take.*	373	3.08	1.30	183	2.56	1.18	0.000
Your level of participation in class discussions.*	372	3.04	0.90	183	2.81	0.78	0.003
Your overall attendance for the class.	373	2.79	0.82	183	2.69	0.96	0.205
The amount of your interaction with the instructor during class.	373	2.98	0.82	183	2.89	0.74	0.237
The amount of interaction with the instructor outside of class.	373	3.01	0.85	183	2.96	0.61	0.534
The amount you learn from class.*	373	3.23	1.09	183	2.56	1.04	0.000
Your appreciation for the instructor's effort.*	372	2.85	1.04	183	2.55	1.00	0.001
Your appreciation for the importance of the material.*	373	2.96	0.93	183	2.59	0.89	0.000
Your desire to take additional classes from the instructor.*	374	3.11	0.98	182	2.75	0.93	0.000
Your desire to take additional classes in the subject matter.*	374	3.10	0.92	182	2.90	0.85	0.012
Your overall evaluation of this course.*	372	3.29	1.06	182	2.57	1.03	0.000
Your overall evaluation of this instructor.*	372	3.05	1.01	182	2.58	0.98	0.000

Note : Questions with statistically significant differences in the mean responses between the two groups are marked with an "*".

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APPENDIX

Demographic Information for Undergraduate Students in the Sample

Technology = Technology Used; Impact of the Absence of Technology
No Technology = Technology Not Used; Impact of the Addition of Technology

Major for Undergraduate Students in Sample		
	Technology (N = 329)	No Technology (N = 155)
Accounting	19%	15%
Economics	5%	5%
Finance	8%	13%
Health Service Administration	8%	8%
Management	26%	23%
Marketing	13%	8%
Business Undeclared	14%	18%
Other – Non-business	7%	10%

Year for Undergraduate Students in Sample		
	Technology (N = 329)	No Technology (N = 155)
Freshman	18%	3%
Sophomore	22%	52%
Junior	32%	23%
Senior	28%	22%

X^2 tests for differences in the distribution of majors between the two groups and for differences in the distribution of undergraduate years did not reject the null hypothesis. It was assumed there were no significant differences in the distribution of undergraduate majors or in the distribution of students in terms of academic progress when comparing the two groups.

	Technology (N = 329)		No Technology (N = 155)	
	Female	Male	Female	Male
Student gender	40%	60%	49%	51%

A test of proportions suggested no significant difference in the proportion of female to male students when comparing the two groups included in this study.