Understanding distractors in a business technology classroom

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ABSTRACT

Technology classrooms provide a valuable educational environment; however, they may also create distractions for students different from a regular classroom. Distractions can result from activities students do themselves or they can be caused by other students in the classroom. Where students sit in the classroom can also have an impact. Students in the back of the classroom report more distractions from texting and online gaming. Students who are more distracted indicate it is harder to pay attention in a lab classroom as opposed to a regular classroom. Distractions, especially texting, have a negative impact on the learning environment which reduces a student's ability to learn important technology and research skills. Finally, distractions show a negative association with overall course grade.

Keywords: Classroom technology, Distractions, Computer lab, Cell phones, Learning effectiveness

INTRODUCTION

Many universities integrate technology into their curriculum. There are benefits to incorporating technology, but there are also drawbacks. A classroom equipped with computers or the incorporation of laptops into a regular classroom may introduce distractors that are not necessarily present in a traditional classroom setting. These distractors can negatively influence students' academic performance by reducing engagement in the class or lowering grades.

This School of Business has been developing classes that utilize a technology classroom. Senior level finance courses have been using the classroom for seven years. The classroom experience in those courses indicated that many students were not comfortable using technology for academic purposes. As a response to faculty concerns about students' confidence in technology, a new course (BUS 111: Business Applications) was introduced in the business core curriculum. The goal is to educate students on using technology in business applications. This course, along with added emphasis in other courses, will hopefully better prepare students for the technology needs in advanced senior-level courses.

The technology classroom is outfitted with 28 computer stations. Depending on the instructor, students are either required to use the lab computers or may use personal computers in the classroom. It is located on a main entryway into the building with a wall of windows. The design was intentional so that it was visible to visitors; however, this presents a challenging environment for both students and faculty in the classroom and has many potential sources of distractors, which is the focus of this research. There is a constant movement of people outside the classroom which can draw attention away from instruction. The temptation of technology and the design of the classroom provide an opportunity to better understand these and other distractions to the educational experience.

The purpose of this paper is to better understand different types of distractions and their impact on student performance and the learning environment. The study will explore if there is a difference between expected and actual distractors and analyze if the student placement (i.e., seating row) is associated with distractors. Various associations with outcomes possibly affected by distractions are evaluated. Specifically, if it is harder to pay attention in class, self-evaluation of technology and research skills, and final grade.

LITERATURE REVIEW

As many researchers have discovered, one big drawback of teaching courses in a computer lab is the distraction provided by technology. Computer access can be a distraction to students by allowing them to surf the web, check email and message each other during class. Martin (2011) compared two class sections, one in a lab and one in a traditional classroom. Students in the traditional class preformed slightly better on exams than students in the lab. Martin attributed the lower scores to students using the lab computers for internet use rather than class work. Mendini and Peter (2019) found students taking a marketing class in a traditional classroom report higher level of engagement and reduced distraction than students in a smart classroom.

Skolnik and Puzo (2008) studied the use of laptop computers in business courses. Initially, students in finance courses used university laptops secured to tables, not personal laptops. An expansion to the study evaluated other business courses in which personal computers were allowed in classrooms. In the initial experiment, student surveys found that

students felt the technology improved learning and increased Excel skills. In the second part, learning enhancement fell and distraction rose. A survey of faculty found they felt computers were most beneficial when demonstrating spreadsheets and less beneficial when lecturing. Edmonds and Ruch (2015) looked at incorporating iPads into business school curriculum. Students who self-identified at more engaged reported lower distraction from the iPad. Students also report that faculty familiarity with technology is important in reducing distractions.

La Roche and Flanigan (2013) found that while the highest percentage of students say they use technology to takes notes, distractions like Facebook and email are also commonly reported. They find students preferred low-tech classroom experiences and that technology is not viewed as a way to increase engagement in the course. Mueller and Oppenheimer (2014) performed experimental tests of immediate retention of class material have found that multitasking (laptops) and internet browsing impairs performance. Even when distractions are controlled for, laptop use might impair performance by affecting the manner and quality of in-class note taking.

Students are distracted by other things besides computers. Phones tend to be a primary source of distraction. Jackson (2013) surveys students on how they use their mobile devices during class. The students report that phones are a bigger distraction than laptop computers, with 78% of students indicating phones are mostly a distraction. Students are not receptive to policies that include banning phones or laptops, but indicate that better communication and education on proper usage of technology would be more effective.

Berry and Westfall (2015) found that 80% of students report looking at cell phones at least once per class. Students report that phones are a distraction, but policies to limit use are not effective. Cell phone use is not going away, so finding ways to engage students in discussions and group environments can minimize the distraction. Cell phone usage in college classes is prolific, but does it affect performance? Fox et al. (2009) found students who are distracted by instant messaging while completing a reading comprehension task took significantly longer but did not have lower performance scores.

Since distractions can take many different forms besides technology, Tesch et al. (2011) evaluated 57 different distractions in the classroom, both external (36) and self-generated (21). The top external distractors are difficulty in understanding the professor, students talking and the classroom temperature. Top self-distractors are illness, sleeping and their personal phone ringing.

The paper will discuss the methodology and provide basic information on the students participating in the survey. Next it will look at which distractions are the worst for students followed by an analysis of the relationship between distractions and the learning environment and grades.

METHODOLOGY

Surveys were given to 246 students in BUS 111 and 400 level finance courses in Spring 2018, Fall 2018, and Spring 2019. Students were asked the same questions at the beginning and the end of the semester. This was a convenience sample, with the courses chosen based upon their location in the computer lab classroom. Each student survey from the beginning of the semester was matched to the same student for the end of semester leading to 184 matching records. Incomplete records were removed resulting in a sample size of 163 students (overall

response rate 66.2%). Survey questions asked about familiarity with technology, skills developed in the classroom, distractions and general demographic information. Grades and seating assignment were added to the database at the end of each semester. Most questions were based on a 5-point Likert scale.

Table 1 (Appendix) provides general information about the survey respondents. The number of males in the sample is approximately double the number of females, 111 males vs. 52 females. This is similar to enrollment in other business courses. There were also more respondents from the 100-level course (BUS 111, Business Applications) than from the FINA 400-level courses. Of the 113 students in BUS 111, 65 were freshman and the rest upper classmen. All of the students in the 400-level finance courses are upper classmen. All students were within the traditional 18- to 23-year-old age range. Two-thirds of the students reported they had taken a class focused on technology at the university, yet only 24% had taken a previous course either full-time or part-time in the lab.

Students were asked to give their impressions on their technology skills and the learning environment in the lab, see Table 2 (Appendix). On a 5-point Likert scale of 1 (no usage) to 5 (excessive usage), students' mean rating of the University's use of technology was 3.82 (moderate to abundant). The mean rating of their own familiarity was 4.17 (abundant to excessive). Students also indicate they feel confident they will succeed in future technology courses (M = 4.48).

Additional questions on Table 2 (Appendix) utilize a 5-point Likert scale of 1 (strongly disagree) to 5 (strongly agree). Students gave positive feedback on use of real data vs. textbook data (M = 4.39). This is likely more common in the 400-level courses than the 100-level course. As for the lab creating a collaborative or interactive environment, they agree (M = 3.60 and M = 4.00, respectively). The students report that they do not find it harder to pay attention in the lab vs a regular classroom (M = 2.41; disagree to neither agree nor disagree). This will be studied further in the analysis of specific distractions. They report an increase in technology skills and feel proficient in technology (M = 4.22 and M = 4.18, respectively). Improvement in research skills and proficiency in research is slightly lower (M = 3.69 and M = 3.82, respectively). The 400-level finance courses focus more on research than the 100-level course, so this could be due to the higher number of 100-level students in the sample.

RESULTS

Distractions in classroom can be caused by many different things like talking, making noises and movements around the classroom. They can be caused by other students in the classroom or they can be self-created. This analysis will cover several different activities that can cause students to lose focus during class.

Students were asked at the beginning of the semester to rate how often they expected to do eleven different distracting activities on a 5-point Likert scale of 1 (never) to 5 (always). They were also asked to evaluate how often they expected other students to do the same activities. At the end of the semester, the students were then asked how often they actually did the activities and how often they observed other students doing the activities.

Research Question 1: Is There a Difference Between Expected and Actual Distractors for Self and Others?

Expected distractions are measured from the beginning of the semester survey and actual distractions are measured from the end of the semester survey. Results in Table 3 (Appendix) show the means scores for each of the indicated distractions. When evaluating how often other students would do these distracting activities, actual distractions were significantly lower than expected for almost all activities. Only other students actually arriving late was not significantly lower than expected.

When evaluating their own actions, students reported actual distractions as lower than expected for several of the activities. Students indicated two of the activities, texting and playing online games and social media, as actually being a bigger distraction than expected. However, the low means for online games and social media (1.38 vs. 1.57) indicate that gaming, while higher than expected, was rare. The means for texting (2.30 vs 2.48) do show that this was a bigger distraction for students. This is explored more in Table 4 (Appendix).

Research Question 2: What are the Highest Ranking Actual Distractors for Self and Others?

To understand which of the activities are the biggest distracters for students, Table 4 (Appendix) ranks the activities for both other students and self. For all of the distractions, means at or below 3 indicate that students are not frequently doing any of these activities. Other students texting is the biggest distraction with a mean of 3.07 on a 5-point Likert scale of 1 (strongly disagree) to 5 (strongly agree). This is followed by talking with others (M = 2.99) and looking out the windows (M = 2.79). When evaluating the biggest self-distracters, students rank looking out the windows as highest (M = 2.60), followed by texting (M = 2.48) and talking with others (M = 2.42). These results are comparable to other studies that look at the topic, with the exception to window watching. The classroom design in this study with large windows is common, so understanding this distraction is important for faculty using this type of classroom. Communicating with students about the importance of not being distracted and staying on task might help alleviate some of the biggest distractions.

Research Question 3: What is the Association Between Seating Row and Actual Distractors Self and Others?

Where students sit in a classroom may impact their ability to concentrate on the material. Benedict and Hoag (2004) find that students who sit in the front perform better than students who sit in the back because better students tend to select front row seats. Perkins and Weiman (2005) randomly assign seats and still find that students who sit in the front perform better than students who sit in the back. Both studies imply that students in the front find it easier to pay attention and engage in the class.

To better understand how distractions may impact students sitting in different rows, this study compares the distraction level of students who sit in the front vs. the back of the classroom. In all of the classes surveyed, students self-select seats and remain in the same seat the entire semester. Table 5 (Appendix) looks at the correlations between distractions and seating row. Positive correlations indicate students in the back are more distracted by the activity and negative

correlations indicate students in the front are more distracted by the activity. Students in the back rows are distracted by other students playing online games or social media ($r = .12$, $p < .10$). Students who sit in the front seats are distracted by other students who arrive late ($r = -.12$, $p < .10$), and other students who have computer problems ($r = -.10$, $p < .10$) These could be due to an instructor's reaction to late-comers and computer problems. Front row students may observe more of this by their close proximity to the instructor.

In general, distraction activities by the self tend to show slightly higher significance than distractions by others. When looking at their own actions, students in back rows are more distracted by their own texting ($r = .22$, $p < .01$) and playing games ($r = .17$, $p < .05$) Since it is harder to monitor students in the back row, they can more easily get away with these activities than students in the front rows. For students in front rows, arriving late themselves ($r = -.11$, $p < .10$) and their own computer problems ($r = -.13$, $p < .05$) were the biggest distractions.

Research Question 4: Is There an Association between Distractors Self and Other and Harder to Pay Attention?

Distractions happen in all classrooms. Students with smartphones and laptop computers can be distracted in any type of classroom. As previously reported, students were asked if they found it harder to pay attention in the lab than a regular classroom. The mean response to this question was 2.41, on a 5-point Likert scale of 1 (strongly disagree) to 5 (strongly agree). This suggests that most students do not feel like the lab environment is harder to pay attention in than a regular classroom.

Results look at the correlations between the distractions and the response to the question on paying attention. See Table 6 (Appendix) for correlations. Looking at both actions of others and actions of self, there are significantly strong correlations between distractions and students' ability to pay attention. The positive correlations indicate that students who report higher distractions also report that it is harder to pay attention in the lab than a regular classroom. This does not mean that the lab classroom is a bigger distraction, but that students who are more distracted by the defined activities find it harder to pay attention in the lab classroom. The most significant activities by others that make it harder to pay attention are other students talking ($r = .19$, $p < .01$), repetitive motions by classmates ($r = .18$, $p < .01$), other students texting ($r = .21$, $p < .01$) and classmates working on material for other classes ($r = .26$, $p < .01$). When looking at self-distractions that make paying attention harder in the lab, the most significant ones are playing games ($r = .21$, $p < .01$) and doing work for other classes ($r = .31$, $p < .01$).

Research Question 5: What is the Association Between Distractors from Others with Improved Technology Skills and Improved Research Skills?

Distractions in the classroom may impact the learning environment by reducing students' ability to engage in the course. Students responded to questions asking if the lab improved their technology skills and research skills. Students were also asked if they felt proficient in technology and research. See Table 7 (Appendix) for results on distractions caused by other students. When looking at distractions by other students, there seemed to be little impact on students' development of research and technology skills. Students who were more distracted by others' texting had slightly lower improvement in research skills ($r = -.15$ $p < .10$). Students who were distracted by other students who left early also reported lower improvement in research

skills ($r = -.18$, $p < .05$). Oddly, when other students had computer problems, this seemed to improve research skills ($r = .24$, $p < .01$). This could be due to an instructor informing the whole class how to correct a computer problem, so everyone learned from each other's computer problems.

Research Question 6: What is the Association Between Distractors from Self with Improved Technology Skills and Improved Research Skills?

Table 8 (Appendix) displays the connection between self-reported distractions and improvement in skills. There is a significant negative correlation between texting and improvement in both technology and research skills ($r = -.18$, $p < .05$ and ($r = -.22$, $p < .01$). There is also a significant negative correlation between leaving early and improvement in technology and research skills ($r = -.16$, $p < .01$ and ($r = -.14$, $p < .10$). Online gaming, social media and doing work for other courses also had significant negative relationships with improvement in research skills. These results indicate that a student's own behavior can more negatively impact the educational environment than the behavior of others. Students' own distractions result in lower reported learning.

Research Question 7: What is the Association Between Distractors for Self and Others with Grade?

To understand more about how distractions can affect students and the learning environment, the paper will evaluate the connection between these activities and course grades. Actual course grades were recorded by the corresponding professors after completion of the course.

Table 9 (Appendix) shows correlations between distractions and grades. Activities by others had little relation to grade, but self-activities show a greater impact on course grade. The actions that had the strongest negative relation to grade were texting ($r = -.18$, $p < .05$), coming and going during class ($r = -.24$, $p < .01$), and playing games and viewing social media ($r = -.19$, $p < .01$). Other activities that have a lower significance to grade are asking irrelevant questions ($r = -11$, $p < .10$), repetitive motions ($r = -.10$, $p < .10$) and leaving early ($r = -.12$, $p<.10$), This helps confirm that when students are distracted, specifically by their own actions, it can result in lower overall performance in courses.

DISCUSSION AND CONCLUSIONS

Distractions can be problematic in any classroom, but especially in a technology classroom where students are working on either school computers or personal laptops (Mendini & Peter, 2019; Skolnik & Puzo, 2008). This paper contributes to the literature by analyzing some of the more common distractions faced by students and looking at their impact on performance and learning environment. Major distractions for students were texting and talking during class, which is consistent with findings by Berry and Westfall (2015) and Jackson (2013). Another big distraction is related specifically to the type of classroom where technology courses are held. The lab was designed with large windows to show off the room to University visitors and other students. This presents one of the biggest distractions. Since many technology classrooms have a

similar design, anyone teaching in these classrooms needs to understand and work with students to try and minimize the impact.

When looking at where students are most distracted, it depends on the type of distraction (Tesch et al., 2011), but also on the students' location within the classroom. Students in back rows tend to be more distracted by gaming and social media than those in front rows, both by themselves and others. Texting is also more of a distraction for back row students. Monitoring back row students can be difficult, and students who self-select back row seats may do so because they can get away with more of these activities than front row students. Front row students are more distracted by late arriving students and computer problems. This may be related to how an instructor reacts to these activities and the close proximity of those students to the instructor.

In general, students do not feel like it is harder to pay attention in a lab classroom in relation to a regular classroom. There are, however, some significant associations between students who report higher distractions having a harder time paying attention in the lab classroom. Students who are texting, talking, playing online games, and viewing social media, window watching and working on material for other classes more strongly agree that in the lab environment it is harder to pay attention. It could be that the students who are likely to be distracted by these activities find the lab environment more tempting than a regular classroom. These findings are consistent with Martin (2011), and Mendini and Peter (2019).

Distractions can also impact the learning environment, which in turn influences the acquisition of skills. Students who are distracted by texting or working on material for other courses report lower improvements in technology and research skills. Grades can be negatively associated to distractions, especially self-distractions like texting and playing online games or looking at social media. These findings are consistent with previous research (Berry & Westfall, 2015; Fox et al., 2009). There are some significant correlations between these distractions and the overall course grade. Higher distractions are associated with lower course grades.

Overall, the lab environment is a valuable learning experience for students. The technology and research skills they gain are valuable in preparing them for the business world and graduate school. It is important to understand how distractions impact the experience. Finding ways to minimize the distractions could have a positive impact on grades and their skills improvement. But, the benefits do seem to outweigh the drawbacks of utilizing a lab classroom.

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Appendix

Table 1
General information about survey respondents

Gender	M	F
Number	111	52
Percent	68%	32%

Course	BUS 111	FINA 400
Number	113	50
Percent	69%	31%

Class level	F	So	Jr	Sr
Number	65	33	18	47
Percent	40%	20%	11%	29%

Have you taken a class focused upon technology before at Wingate	No	Yes
Number	53	110
Percent	33%	67%

How many classes have you had in the Finance lab prior to this course (either part or full time)	Zero	One or more
Number	124	39
Percent	76%	24%

Table 2
Technology skills and experience in lab

	Mean	Stdev.
How would you rate Wingate's use of technology in education	3.82	0.69
Rate your familiarity with technology	4.17	0.66
How do you view the probability of you succeeding in a future technology class	4.48	0.59
Using real data instead of textbook data helped understanding and apply course concepts better	4.39	0.71
The lab promoted a collaborative work environment among students	3.60	1.06
The lab promoted an interactive work environment among students	4.00	0.91
I found it harder to pay attention in the lab than a regular classroom	2.41	1.05
The lab improved my technology skills	4.22	0.68
The lab improved my research skills	3.69	1.01
I feel proficient in technology	4.18	0.67
I feel proficient in research	3.82	0.80

Note: The survey questions used a Likert scale from 1 to 5.

Table 3
Comparison of expected distractions to actual distractions

Distraction from Others	Expected (Beginning of term)	Actual (End of term)	Difference	Sig.
Talk with others	3.31	2.99	-0.319	*
Ask irrelevant questions	2.44	1.90	-0.534	*
Repetitive motions	3.19	2.28	-0.908	*
Texting	3.40	3.07	-0.331	*
Arrive late	2.69	2.61	-0.080	
Leave early	2.15	1.98	-0.166	***
Come and go during class	2.26	2.06	-0.202	**
Window watching	3.29	2.79	-0.497	*
Online games, social media	2.44	2.22	-0.212	**
Work for other classes	2.50	2.15	-0.344	*
Computer problems	2.96	2.71	-0.255	*

** Significant at .01 level*
*** Significant at .05 level*
**** Significant at .10 level*

Distraction by Self	Expected (Beginning of term)	Actual (End of term)	Difference	Sig.
Talk with others	2.69	2.42	-0.270	*
Ask irrelevant questions	1.47	1.33	-0.141	***
Repetitive motions	2.31	1.88	-0.436	*
Texting	2.30	2.48	0.178	**
Arrive late	1.62	1.58	-0.037	
Leave early	1.40	1.37	-0.028	
Come and go during class	1.54	1.37	-0.166	*
Window watching	2.74	2.60	-0.135	
Online games, social media	1.38	1.57	0.190	**
Work for other classes	1.48	1.47	-0.018	
Computer problems	2.33	1.94	-0.387	*

** Significant at .01 level*
*** Significant at .05 level*
**** Significant at .10 level*

Table 4
Ranked actual distractions by others and by self

Distraction by Others	Mean	Distractions by Self	Mean
Texting	3.07	Window watching	2.60
Talk with others	2.99	Texting	2.48
Window watching	2.79	Talk with others	2.42
Computer problems	2.71	Computer problems	1.94
Arrive late	2.61	Repetitive movements	1.88
Repetitive movements	2.28	Arrive late	1.58
Online games, social media	2.22	Online games, social media	1.57
Work for other classes	2.15	Work for other classes	1.47
Come and go during class	2.06	Come and go during class	1.37
Leave early	1.98	Leave early	1.37
Ask irrelevant questions	1.90	Ask irrelevant questions	1.33

Table 5
Correlation between distractions by others and distraction by self and seating row

Distraction by Others	Correlation between distraction by others and seating row		Correlation between distraction by self and seating row	
Talk with others	0.047		0.053	
Ask irrelevant questions	-0.023		-0.030	
Repetitive motions	-0.045		-0.024	
Texting	0.079		0.218	*
Arrive late	-0.124	***	-0.110	***
Leave early	0.048		0.093	
Come and go during class	0.004		-0.017	
Window watching	0.018		0.045	
Online games, social media	0.118	***	0.175	**
Work for other classes	-0.019		-0.014	
Computer problems	-0.103	***	-0.133	**

** Significant at .01 level*
*** Significant at .05 level*
**** Significant at .10 level*

Table 6
Correlations between distractions by others and self and ability to pay attention

	Correlation between distraction by others and ability to pay attention		Correlation between distraction by self and ability to pay attention	
Talk with others	0.188	*	0.054	
Ask irrelevant questions	0.157	**	0.172	**
Repetitive motions	0.181	*	0.129	***
Texting	0.215	*	0.128	***
Arrive late	0.162	**	0.028	
Leave early	0.094		0.142	**
Come and go during class	0.139	**	0.163	**
Window watching	0.170	**	0.167	**
Online games, social media	0.124	***	0.214	*
Work for other classes	0.262	*	0.315	*
Computer problems	-0.008		0.062	

** Significant at .01 level*
*** Significant at .05 level*
**** Significant at .10 level*

Table 7
Correlation between distraction by others and skills

	Correlation between distraction and lab improved tech skills	Correlation between distraction and lab improved research skills	
Talk with others	-0.036	-0.068	
Irrelevant questions	-0.028	-0.027	
Repetitive movements	-0.063	-0.048	
Texting	-0.049	-0.151	***
Arrive late	0.013	-0.012	
Leave early	-0.055	-0.184	**
Come and go during class	0.101	0.048	
Window watching	0.111	0.077	
Online games, social media	0.008	-0.081	
Work for other classes	-0.072	-0.099	
Computer problems	0.077	0.237	*

** Significant at .01 level*
*** Significant at .05 level*
**** Significant at .10 level*

Table 8
Correlation between distraction by self and skills

	Correlation between distraction and lab improved tech skills		Correlation between distraction and lab improved research skills	
Talk with others	0.039		0.048	
Irrelevant questions	-0.075		-0.024	
Repetitive movements	-0.039		0.021	
Texting	-0.179	**	-0.222	*
Arrive late	-0.116		0.011	
Leave early	-0.159	*	-0.141	***
Come and go during class	-0.141	***	0.009	
Window watching	0.093		0.071	
Online games, social media	-0.101		-0.152	***
Work for other classes	-0.101		-0.160	**
Computer problems	0.053		0.137	***

** Significant at .01 level*
*** Significant at .05 level*
**** Significant at .10 level*

Table 9
Correlations between distractions and grades

	Correlation between distraction by others and grade		Correlation between distraction by self and grade	
Talk with others	-0.090		-0.076	
Ask irrelevant questions	0.009		-0.113	***
Repetitive motions	0.000		-0.104	***
Texting	-0.002		-0.180	**
Arrive late	0.106	***	-0.066	
Leave early	0.034		-0.122	***
Come and go during class	-0.023		-0.244	*
Window watching	-0.038		-0.071	
Play games, view social media	0.003		-0.188	*
Work for other classes	0.086		0.061	
Computer problems	-0.004		-0.094	

** Significant at .01 level*
*** Significant at .05 level*
**** Significant at .10 level*