Laptop Technology in Classrooms: How Student Perceptions Shape Learning and Satisfaction

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Abstract - This study is based on perceptions of students regarding the integration of laptops in classroom endeavors. Empirical findings are based on data collected from a sample of 392 students in undergraduate and graduate universities in twelve states of the USA. Three key findings related to the integration of laptop technology into classrooms of higher education are reported. First relates to student perceptions and feelings surrounding laptop use in the classroom. Secondly, we report how these perceptions vary depending on personal characteristics of students. Lastly, we examine the role these perceptions play in student learning, as well as student satisfaction. Traditionally, laptop technology has been viewed as tool for facilitating note taking. However, our findings indicate that the learning experience is equal, and in some instances greater, when laptops are used to develop a more interactive learning environment, increase information gathering during class time, and enhance classroom discussion.

Keywords – Pedagogy, Laptops in Classrooms, Student Learning, Student Satisfaction, Technology in Classrooms

Relevance to Marketing Educators, Researchers and/or Practitioners – Many traditional higher education instructors are uncertain about technology use during class time. Our research suggests that these instructors could integrate laptops in their classrooms based on the topic being covered, the learning outcomes desired, the profile of their students, their teaching style, and student learning styles. Our findings indicate that laptops in classrooms provide for higher satisfaction from students, and are irrefutable catalyst for higher and more stimulating levels of learning and student satisfaction.

INTRODUCTION

In the digital age, new technological advances are becoming integrated into everyday life at a very fast pace. For example, technologies such as the cell phone have quickly evolved from a "portable telephone device" to an all-in-one emailing, text messaging, personal organizing digital device. Although digital devices of this nature continue to seep into everyday life, the use of technology in the classrooms of higher education institutions is still in question. Technology has brought about sweeping changes such as high-speed WiFi internet capabilities and more versatile laptop computers; however, these technologies have yet to find their way into all classrooms of universities and colleges across the country. One of the main reasons behind the current situation is the fact that there are several differing viewpoints as to whether bringing such technologies to the classroom would bring positive changes to the classroom environment. Many opponents believe it would work in the opposite direction and dilute the learning experience. Our research looks at the topic of laptops and their integration into the classrooms of higher education. We have taken a look at the educational experience in the classroom as a transaction, the factors influencing the use of the laptops in the classroom are investigated from the perspective of students.

LITERATURE REVIEW

The use of technology in the classroom learning experience is of crucial importance to marketing educators. One among many of our constituents (and some would argue the most important of them all), our students, are engaged in a service encounter in the classroom that should reflect the realities of the world they grew up in and are destined to serve in. In all aspects of marketing the provider-customer interaction is undergoing a change based on the integration of technology in such critical moments. Salespeople routinely rely on technology to make their value propositions come alive and customers are frequently required to grapple with technology as they tend to perform more and more of the value-adding tasks themselves (think ATM machines). We as service providers in the institutions of higher education have to keep up with our customers and their demands (Dabholkar 2000). As mobile (smart) phones have become a mainstay in today's society, much like laptops, we must find a way to integrate these into the classroom. As Kolb (2008) puts it, "If their [students] phones work so well for them outside the classroom, we need to get them thinking about bringing these tech tools inside and putting them to good use." There is a dearth of research that looks at technology integration in service encounters (see Bitner, Brown, and Meuter 2000).

Based on Parasuraman's pyramid model of services marketing (1996), this paper focuses on the experience of students and the role of technology integration in the learning experience offered in their classrooms. In order for us to arrive at a point where educational institutions would be able to provide their internal customers (educators) with the motivation, support, and incentives to integrate technology in the classrooms, we first have to examine the diverse perspectives that the service provider (educator) and the service recipient (student) represent when it comes to integration of laptops in the classroom. Based on our interviews with students and faculty we can surmise that some of the views regarding this issue might be at divergence from each other.

This research is the first step in building a theoretical foundation to gauge the differing perceptions of students regarding integration of laptops in the classroom. The goal

of this study is to arrive at dimensions that would be helpful in developing measurement scales that are psychometrically robust enough to be used in a larger study at national and international levels.

Past research in the area of technology adoption has relied heavily on the telecommunication industry (Short, Williams, and Christie 1976, Berry 1999). Alsop (1999) and Mossberg (1999) present a customer-driven perspective of the frustrations and disappointments expressed by customers faced with new technology in marketing transactions. Mick and Fournier (1998) make a case for how technology can cause both negative and positive reactions in a marketing encounter, they term this mixed reaction "technology paradox". In pursuing our research we have been mindful of this tension. As we developed the scales for this study, we preserved the nature of that tension (and technology paradox) in all aspects of the classroom experience and integration of laptops in classroom.

Philip and Garcia (2013) point out the benefits of new text that can be brought into the classroom via the use of technology such as mobile devices. Students' experiences outside the classroom can be related to traditional classroom discussion material through the use of technology. One such example could be pictures, videos, etc. of a student's trip abroad. The technological capabilities that would allow this student to instantly show the entire class this experience are astounding.

Many instructors who oppose the use of technology (laptops, specifically) in the classroom often propose that they cause unnecessary distractions during periods of instruction. However, as Wright, Perry, Yoshizuka & Barnett (2011) point out, distractions happen without technology in the classroom; whether this be through conversing with classmates, texting, or simply daydreaming. The fact that a laptop is present does not create distraction. Wright et al. (2011) believe that it is the instructor's duty to present the material in a way that will eliminate the possibly of any distraction, let alone technological distractions. By allowing for laptops in classrooms, instructors can challenge themselves to prevent students from psychological drift and therefore increase their own productivity.

Relatable research has been done in the area of telecommunication. Telecommunication for work poses many of the same benefits and downfalls as when used for educational purposes. Devasagayam and Stark (2013) convey that telecommunication and overall use of technology allows one the freedom to work and learn using the materials that they prefer, or perhaps grew up with. With this freedom, comes more creativity. A hefty majority of higher education instructors promote creativity and often times find it difficult to pry this creativity from shy students. Devasagayam and Stark suggest that allowing the use of technology will promote creativity, productivity, and innovation.

In contrast, there are a vast number of instructors who believe that to allow laptops in the classroom is a no-brainer. Spies, Kjos, Miesner, Chesnut & Fink (2010) share their opinions on the subject and provide reasons why laptops must be integrated more frequently and efficiently. Spies et. al (2010) explain that the current generation of learners (born 1982-2002) has been raised with technology as their primary source for information and learning. By providing this demographic of learner with laptops in the classroom must only enhance the all-around experience. Also, the shear nature of today's workforce is a reason for this technology to be used in higher education classrooms, they posit that computer and similar technologies are the primary media for all kinds of business related tasks.

Cowles and Cosby (1990) alert us that the customer perception regarding technology might in itself lead to segmentation based on tech-perception. Dabholkar (1996) reported a

positive correlation between feelings and perceptions regarding technology and intention to use such technology. Our scales draw upon these studies and further use the notions of ease of use, motivation to use, benefits of technology use, and the perceived problems and risks associated with technology adoption propounded by Davis, Bagozzi, and Warshaw (1989) and Dabholkar (1994).

SURVEY DEVELOPMENT

All primary data for research was collected through an online survey that was developed specifically for this research. In an effort to minimize the time needed to participate in the survey, questions primarily consisted of the Likert-type format. For each question respondents rated their evaluation of a statement by selecting from the scale with 1 representing "Strongly Disagree", 3 representing "Neither Agree or Disagree" and 5 "Strong Agree". Several items were reverse scaled to ascertain respondent attention and scale validity. Research for the study was conducted at several colleges and universities throughout USA, twelve states were represented in our sample. Most colleges which students in this study attend have been making strides in recent years to update the learning environment for their students and are committed to providing essential skills and resources to succeed following graduation. Currently, some colleges represented do not encourage laptop use by students in the classroom and as a result respondents with no previous experiences were asked to comment on how they would like laptops to be used in the classroom.

Prior to the distribution of the survey, every effort was made to increase the respondent's level of ease and establish face and content validity. This was accomplished through two waves of pre-testing. Each wave consisted of two to three students and faculty members who worked through the survey and provided their comments. It is important to note that these individuals were not included in the final sample.

All respondents were contacted through e-mail and social media. Each member student received an email outlining the objectives of the study. Participation was completely voluntary and was completed through an online survey-hosting website. A total of 581 responses yielded 392 useable student responses for the study.

SAMPLE PROFILE

Of the 392 respondents in the sample, approximately 70% (274) were female. Nearly 77% (302) of our sample consisted of individuals who are between the ages of 18 and 23. Of the 392 students, 30 were graduate students, 92% (360) are from four year colleges, the rest from two year colleges. Majority of our sample reported that they were from private colleges (59%) the rest from public institutions. Thirty-six majors were represented in the sample, with 23 students reporting double-majors. Students were given the option to provide their minor if it was applicable, forty-two minors were listed and five students reported having two minors. Nearly 62% of the student respondents (242) reported a GPA of 3.0 or higher. It should be noted the preceding demographic information was not required, rather an optional section of the survey. Our sample provides a wide range of student characteristics that represent a typical student population on a university campus in the US.

FINDINGS AND DISCUSSION

In an effort to further examine the views of students on the integration of laptop technology into the classroom, we obtained interval level data using a Likert-type scale. We begin by summarizing the overall perceptions of our sample, then lead into Analysis of Variance (ANOVA) to check for differences in mean ratings of students based on personal characteristics. Further regression models were developed to examine the significant aspects survey results relating to student learning and student satisfaction.

Descriptive Statistics

Laptops in the classroom…	Mean	Std. Deviation
...develop a more interactive learning environment.	3.67	.982
…facilitate information gathering during class time.	3.98	.881
…aid in the overall learning experience.	3.71	.991
…enhance classroom discussion.	3.19	1.033
…improve the academic performance of students.	3.48	.947
…should be equipped with wireless internet.	4.31	1.101
…place students at a disadvantage in today's highly competitive job market.	2.15	1.092
…aid in the overall satisfaction of the learning experience.	3.68	.873
…create distractions for students.	3.55	1.096
…facilitate note taking for students.	3.75	1.062
…take away from the overall satisfaction of the learning experience.	2.53	.999

1 = "Strongly Disagree" 2 = "Disagree" 3 = "Neither Agree nor Disagree" 4 = "Agree" 5 = "Strongly Agree" n=391

An analysis of the above chart (response of 391) shows that overall, students very heavily favor the use of laptops in the classroom for specific reasons. Student respondents have shared their opinions on what benefits and drawbacks may arise from use of laptops. The average respondent strongly agreed that laptops used during class time should be equipped with wireless internet. Also, a majority of respondents agreed that laptops facilitate both note taking for students and information gathering during class time. The average response toward laptops having a negative effect (and we included reverse scaled items to ascertain validity) on students is one of general disagreement. These student respondents disagreed with the assertion that laptops take away from the overall satisfaction of the learning experience. As expected, we found that students do not believe they are placed at a disadvantage in the job market because of the use of laptops in the classroom.

When prompted with "Successful integration of laptops in the classroom depends on…" students believed that the most vital variable to an instructor successfully integrating laptops in the classroom is the teaching style of the instructor. About 90% of respondents agreed that the instructor's teaching style can make or break laptop integration. The second most important variable is believed to be the learning style of student, followed by the topics

being discussed in the classroom. Respondents believe that the least important variable to be the major being pursued by student.

Respondents were prompted with, "Laptops are most beneficial in the classroom when used for…", and asked to check all that apply. Our findings show that students believe laptops in classrooms are most beneficial when used for information searches. Over half of the respondents also believe that laptops in the classroom are beneficial when it comes to taking notes. Although a lesser number of respondents believe so, laptops in classrooms are also seen as beneficial when used to provide information during class discussions, and work on group projects.

RESULTS BY STUDENT CHARACTERISTICS

We proceeded to run one-way ANOVAs to examine the impact of student characteristics on key variables in our survey. We report results based on a significance level of 0.10, the findings below paint an interesting picture.

When it comes to gender, results indicate that males display a higher mean response (3.87 v/s 3.58) for question related to laptops developing a more interactive learning environment. Further, this difference in perceptions is significant, as indicated by an ANOVA test (F = 7.009; p: 0.008). Similar results were found when comparing males and female student's views on laptops facilitating information gathering during class time. Male students displayed a much higher mean response (4.11 v/s 3.93) than females (F = 3.482; p: 0.063). There is a significant difference in the sample in whether or not laptops in the classroom take away from the overall satisfaction of the learning experience. Females display a higher mean response mean 2.59 (males 2.38) with an F value of 3.373; p: 0.067).

We then moved on to examine the impact of respondent age on critical variables of interest. Students ages 23-30 (seniors and graduate students) hold the highest mean (4.05) response that laptops facilitate note taking during class time (F = 2.086; p: 0.082). The final significant difference we found when it comes to age of respondent is when it comes to laptops in the classroom taking away from the overall satisfaction of the learning experience. Students who are 50 years of age or older displayed a much higher mean (about 2 full points above the rest, at 4.50) response than all other age groups (F = 2.788; p: 0.026).

Overall, results indicate that males find laptops more useful in the learning process. It seems like male students are able to work on a laptop in classroom while contributing to the learning environment and gathering information for classroom activities. As students progress through years in college, they seem to get better at note taking in classroom using laptops. Nontraditional students (50+) do not like using laptops in classrooms and report a diminishing satisfaction with the learning experience. Based on the composition of the class, instructors might find it useful to tailor the use and emphasis placed on laptops in classrooms.

REGRESSION RESULTS

The variable related to laptops contributing to the overall improvement in academic performance of the student was regressed on developing a more interactive learning environment. The overall model was a good fit at 0.0001 level (F: 166.73) the R-square was 30%. Laptops were seen as contributing to student learning by actually increasing interactions in the classroom. Laptops as facilitators of information gathering during the

classroom was similarly seen as a significant driver of academic performance of students ($F=120.71$; $p:0.0001$; R-squared 23.3%). When students witnessed laptops being used effectively in increasing the overall progression of course material, they also felt their academic performance was significantly positively impacted ($F=140.21$; $p:0.0001$; R-squared 26.5%). Students believed that their academic performance was significantly impacted by use of laptops in classroom and interaction of the teaching style of the instructor and the learning style of the student ($F=7.006$; $p:0.001$; R-squared 3.5%). Similarly, if the topic being discussed in class on a given day related well with use of laptops, it was found to have significant impact on the academic performance of the student ($F=3.669$; $p:0.056$; R-squared 0.009). The intended major of the student did not alter the results ($F=0.009$; $p:0.925$; R-squared 0.0001).

The variable related to laptops contributing to the overall satisfaction with the learning experience was regressed on developing a more interactive learning environment. The overall model was a good fit at 0.0001 level ($F: 268.80$) the R-square was 40.9%. Laptops were seen as contributing to student satisfaction when they were used to enhance interactions in the classroom. Laptops as facilitators of information gathering during the classroom was similarly seen as a significant driver of student satisfaction ($F=218.04$; $p:0.0001$; R-squared 35.9%). When students witnessed laptops being used effectively in increasing the overall progression of course material, they also reported higher satisfaction with the learning experience ($F=163.05$; $p:0.0001$; R-squared 29.5%). Student satisfaction was significantly positively impacted by use of laptops in classroom and interaction of the teaching style of the instructor and the learning style of the student ($F=21.049$; $p:0.0001$; R-squared 9.8%). Similarly, if the topic being discussed in class on a given day lent itself to use of laptops in the classroom, it was found to have significant impact on the overall satisfaction of the student ($F=16.322$; $p:0.0001$; R-squared 4%). Once again, the intended major of the student did not alter the results ($F=0.307$; $p:0.001$; R-squared 0.001).

CONCLUDING REMARKS AND FUTURE RESEARCH

Our study has contributed three key findings related to the integration of laptop technology into classrooms of higher education. First relates to student perceptions and feelings surrounding laptop use in the classroom. Secondly, we have reported how these perceptions vary depending on personal characteristics of our sample. Lastly, we examined the role these perceptions play in driving student learning, as well as student satisfaction.

Traditionally, laptop technology has been viewed as tool for facilitating note taking. However, our findings indicate that the learning experience is greater when laptops are used to develop a more interactive learning environment, increase information gathering during class time, and enhance classroom discussion. Additionally, a seamless integration of laptops in classes that cover topics that indeed need the use of laptops significantly increases student satisfaction and enhances the learning experience. The teaching style of the instructor and the learning style of the students must be taken into account when laptops are used in the classroom. Further, the major field of study of the student does not alter our results. When students were asked to comment on how use of laptops in the classroom impact their overall evaluation of the quality of the instructor, the course, the institution at-large, it was found that

in all three cases students positively correlated use of laptop in the classroom with perceptions of quality (means: 3.08, 3.50, and 3.53, respectively).

It is important to recognize that there are limitations inherent to our research findings. We do not have data on teaching style of the instructor or the learning style of the student to be able to further refine our results. While our sample is national in scope and representative in terms of gender, GPA, and types of colleges, there are several areas of the country that are not represented. Further, this study lacks data relating to faculty perceptions on this important issue.

As we continue in our research, we hope to collect data from a broader sample of students and also collect data from instructors. A comparison of student and faculty perception on the effectiveness of laptops in the classroom could lead to interesting avenues of research and discussion. Other research plans include investigating additional data from our survey that were beyond the scope of this paper and conducting additional statistical analysis in an effort to develop a theory that may be applied to the adoption of all new technology (beyond laptops – podcasts, RSS, streaming, Wiki, Blogs, social media, etc.) in the classrooms of higher education. This becomes even more important in light of the current advances on the notion of a "flipped" classroom.

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