The Use of Digital Technologies in the Classroom: A Teaching and Learning Perspective

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Abstract
Today’s college students, often referred to as the “digital generation,” use an impressive assortment of technological tools in a wide variety of ways. However, the findings reported here suggest that students prefer more traditional instructional technology for effective engagement and learning. Faculty members, however, prefer the use of course-learning technology offered by their universities or publishers. In addition to this potential mismatch between preferences of students and teachers, the research finds that there are vast differences in preferences and usage across disciplines, in particular, business and economics instructors and students having stronger technology preferences than instructors and students of the fine arts and life sciences.

Keywords
digital technologies, instructional technologies, digital natives, teaching, learning

Today’s college students are described as technologically savvy and the most visually sophisticated of any generation, with technology as familiar as a knife and fork to this group (Stamats, 2008). However, it was reported recently that college students are studying less and less and, not surprisingly, this technological expertise is too easily seen as the culprit in the demise of learning (O’Brien, 2010). For example, teachers and parents might assume that students are spending too much time in today’s world of Web 2.0 communicating with friends via Facebook, blogging, and tweeting or in virtual worlds interacting with gamers around the globe playing Halo or the latest Madden. If students are studying less and thus learning less because of technology, then educators have failed to harness the electronic infrastructure so as to create an environment for teaching and learning (Ives & Jarvenpaa, 1996).

According to D’Aloisio (2006), if students are made aware of the direct correlation between the skills they acquire in the classroom and the transferability of those skills to business settings, they may be motivated to participate actively in their education. Technology may actually be a positive influence in creating a new knowledge revolution. Instead of using technology for only its social and entertainment value, students can learn to use instructional technologies as a skill set for the future and, in doing so, learn more efficiently. That is, less time spent studying will be due to the fact that instructors and students have harnessed technology in such a way as to enable efficiencies in both the in-class and out-of-class processes (e.g., electronic library access, spellchecking of documents, electronic exchange between student and teacher and among group members). According to Peterson, Albaum, Munuera, and Cunningham (2002), “any new instructional technology should allow a student to learn more, learn faster, and/or learn easier” (p. 14).

Given the duality of the instructional technology, in that it needs to be adopted by both teachers and students to achieve its full potential, the current research seeks to better understand instructional technology as a pedagogical tool in teaching and learning. As such, the two exploratory studies presented here attempt to capture usage from the perspectives of both students and faculty members and, in doing so, relate instructional technologies to student engagement in the course/subject and learning outcomes. Initially, we provide an overview of educational scholarship related to technology usage

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in the marketing classroom. We then present the results of the two separate exploratory studies. Finally, we use these preliminary findings to identify areas for future consideration.

**Technology in the Marketing Classroom**

Malhotra (2002) ushered in the new millennium by offering a definition of instructional technology, “Instructional technology includes hardware and software, tools and techniques that are used directly or indirectly in facilitating, enhancing, and improving the effectiveness and efficiency of teaching, learning, and practicing marketing knowledge” (p. 1). Peterson et al. (2002) offered a similar definition, “Instructional technology includes electronic and non-electronic instruments, tools, and techniques that are used in the delivery of course materials and/or in a ‘backroom’ support capacity” (p. 9). Technology has now become a routine component of the classroom and educational processes in general (Nuldén, 1999).

Scholarship in marketing education has addressed instructional technology from two angles. The broad perspective looks at overall integration trends with respect to technology in the classroom and if this technology inclusion has had positive outcomes on teaching and learning. The second, narrower angle has been the reporting of how particular Web 2.0 technologies have been used in the marketing classroom via online activities and projects. An overview of some of the more recent findings in each of the areas is provided here.

**Broad Perspective**

Educational scholarship has examined instructional technology broadly with respect to tool usage and outcomes of such usage. Usage-wise, Peterson et al. (2002) conducted two small-scale, exploratory surveys to observe the applications and opinions of instructional technology in the university classroom. In their survey of 61 marketing professors, nearly two thirds of the responding professors used some form of instructional technology in their classrooms, with PowerPoint slides mentioned most frequently. This finding was consistent with what the authors found in their 265 responses to a similar survey of students enrolled in an introductory marketing course in which the most beneficial technologies were believed to be those related to the in-class projection of visual aids. During this same timeframe, Ferrell and Ferrell (2002) surveyed students who were exposed to professors using classroom technology such as PowerPoint. Their exploratory effort was intended to gauge student perceptions of instructional technology use (“overused,” “not overused”) in the classroom. Most students (ratio of 2:1) in their study felt that PowerPoint technology was not overused in the classroom. These parallel findings are not surprising given the timeframe for the studies, as instructional technology was in its infancy. PowerPoint (or related projection offerings) was supplanting traditional overhead transparency usage at that time.

From an outcomes assessment perspective, Ueltschy (2001) explored the use of technology in the classroom relative to increases in student learning, involvement, and enjoyment and found that interactive technology had positive outcomes in all three areas. Along these lines, Clarke, Flaherty, and Mottner (2001) investigated whether or not there were differences between student evaluations of instructional technologies and their perceptions of learning, ability to find a job, and expected job performance. A total of 14 instructional technology tools were assessed relative to the three student outcomes. The authors reported that students perceived 9 of the tools to significantly influence learning, 10 tools to significantly influence their ability to get a job, and 8 tools to significantly influence expected job performance.

More recently, Robinson (2006) provided support for the relationship between instructional technology usage and positive outcomes. The interesting twist in his research was that expectations of performance outcomes led to positive attitudes toward instructional technology usage. That is, as students perceived that new instructional technology would increase the probability of goal attainment, they were more likely to have a positive attitude toward the technology. This is consistent with findings by Hunt, Eagle, and Kitchen (2004), who found that a positive attitude toward instructional technologies was the largest predictor of student preferences for technology-based learning methods. Essentially, these findings support the notion that instructional technologies can serve as the means to attaining personal goals per the educational process (D’Aloisio, 2006).

Although studies such as the ones reported here lean toward positive outlooks toward instructional technologies, Strauss and Hill (2007) explored student satisfaction with web-based instructional tools. In their study, almost one half of marketing students did not embrace web-based instructional technology for learning in traditional classrooms. This begs the question as to whether or not students prefer simplicity in their use of instructional technology tools or even if there is a saturation point at which more tools demand too much time and energy for the knowledge gained in the end.

**Specific Classroom Examples**

The rise in interactive digital media has catapulted professor–student interactions from the traditional Web 1.0 model to a new post–Web 2.0 interactive world, and the goal here is to provide a few recent scholarly examples of Web 2.0 in the classroom. Types of interactive digital media within the Web 2.0 domain are varied and include social networking sites (e.g., Facebook, MySpace, Twitter), blogs, mobile devices (e.g., cell phones, PDAs), user-generated content (e.g., YouTube), and virtual worlds (e.g., Second Life).
An instructional technology familiar to many educators and discussed often in the educational literature is that of online course delivery (i.e., distance learning). For example, Hansen (2008) offered a comprehensive comparison of knowledge transfer in online versus traditional course delivery, finding that online students produced better knowledge transfer results as measured by performance in the development of a marketing plan. These results were attributed in large part to the sense of community found in the virtual teams.

The use of virtual teams, even beyond those found in more traditional online course delivery, is a pedagogical enhancement made possible by instructional technologies. For example, Hu (2009) used an international virtual team project involving collaboration between American and Chinese students in the development of a marketing plan in an international marketing course. Similarly, Newman and Hermans (2008) reported on the use of virtual teams composed of MBA students in the United Kingdom and the United States in which the virtual teams worked with virtual clients. Although virtual teams allow for remote communication and interactions, Cronin (2009) and Workman (2008) facilitated integrative efforts among students by the use of wikis (digital repositories via websites) that allowed students to interact on particular marketing topics. Both authors found that the development of a wiki was a unique opportunity for collaborative learning in the marketing classroom.

Communication-wise, professors have attempted various formats that tap into today’s complex mix of communications technologies. Since college students tend to own or have access to a cell phone (Caruso & Salaway, 2007), Day and Kumar (2010) examined how learning could be enhanced by using a cell phone’s SMS text messaging feature in an in-class purchasing and supply chain management simulation. During each period of the simulation, students placed their orders via SMS text message for their upstream supply chain partner. SMS text messaging was then used to send the students all calculations relevant to inventory, back order, and total costs.

Given the popularity of social networking for communicating (Nielsen Company, 2010), Boosström, Kurthakoti, and Summey (2009) used a segregated social network (a social network not used for other classes or for personal use) for communication between the professor and student and among students. Using Ning.com, students were exposed to the productivity benefits of using a social network for work-related communication purposes. In this example, students reported that the social networking site contributed to a sense of accomplishment and learning. In another communication foray, Zahay and Fredricks (2009) used podcasting to provide students with access to professorial insights during nonclassroom time. These insights included additional content such as recent examples and updated statistics, guest speaker notes, and team project feedback. In their postuse evaluation, 87% of the students provided positive comments about the use of podcasts for communication purposes.

Social networks, text messaging, e-mail, and chat rooms have allowed for virtual communication and collaboration between and among teachers and students. Taking “virtual” to the next level, however, means that people meet “face to face” in a virtual (nonreal) environment. According to Bainbridge (2007), a virtual world is “an electronic environment that visually mimics complex visual spaces, where people can interact with each other and with virtual objects, and where people are represented by animated characters” (p. 472). Wong (2006) suggested that the classroom of the future would not be on the college campus but, rather, would be in the virtual world of Second Life, and Rzewnicki (2007) reported that more than 100 universities from more than 20 countries offered online instruction in Second Life. Whereas Wood, Solomon, and Allan (2008) discussed advantages and disadvantages to teaching in virtual worlds, other marketing scholars have begun to experiment in the virtual world environment. Building on the marketing plan component in most marketing principles classes, Tuten (2009) reported on her class project wherein students had to create a marketing plan for a product that would be marketed in Second Life. Similarly, Bal, Crittenden, Halvorson, Pitt, and Parent (2010) reported on their efforts at teaching marketing cases in Second Life.

As portrayed in these specific examples, McCorkle, Alexander, and Reardon (2001) were on target when they stated, “Technology is transforming the way businesses use marketing, the way marketing educators teach students, and the way students learn marketing” (p. 16). As such, researchers must understand the role of technology in teaching and learning. However, as noted by Barner-Rasmussen (1999), issues in the choice of pedagogy must also focus on the impact that instructional technologies have on course development cost and time, teacher workload, amount of metateaching (i.e., teaching students how to work and learn with the instructional technology), and technical requirements of the course. The first phase of the research into instructional research reported here attempts to understand technology as related to the demands on the instructors.

The Instructor and Technology

In the mid-2000s, Cengage Learning engaged in an exploratory research project to better understand how educators use technology for teaching and learning. A proprietary survey was administered to a convenience sample of instructors at colleges and universities across the United States in an effort to comprehend how they spend their time preparing for and otherwise delivering and administering their teaching responsibilities. The survey was administered to faculty across a wide variety of disciplines (per the company’s traditional demarcation of disciplines): social sciences, mathematics and science, humanities, vocational,
and business and economics. The survey resulted in 1,717 usable responses.

Initially, the data were explored to determine if there were differences among the various academic disciplines with respect to instructional technology. Based on the results of the survey, the traditional specializations do not differentiate in their desires when it comes to course materials. That is, professors from social sciences to business and economics have almost identical utility values (i.e., preference for use) with respect to the following:

- **Method of Delivery**
  - Print instructional material
  - Combination of print and electronic
  - All electronic

- **Customization**
  - No customization
  - Select ordering of material
  - Eliminate unused/unassigned material
  - Select publisher content and ordering material
  - Integrate third party content
  - Integrate own content

- **Reference Content**
  - Related reference content with search capability
  - No integrated reference content
  - Predetermined set of reference materials
  - Tool to build reference content into syllabus

- **Student Experience**
  - No student-focused technology
  - Minimal, simple student tools
  - Advanced technology-based course management tools

- **Professor Experience**
  - No technology-based course management tools
  - Minimal, simple teacher tools
  - Advanced technology solutions for teachers

Overall, respondents had a higher utility value for more rather than less technology when it came to technology solutions for both students and teachers. Additionally, instructors placed a high utility value on having a mixture of print and electronic instructional materials. A key finding in this phase of company research was that there did not appear to be differences across disciplines with respect to utility values of various teaching components.

Teaching tasks were also explored in this phase of the research. That is, what do instructors see themselves doing when it comes to the act of teaching and what role, if any, does technology play in educational activities? Responses from the survey provided seven categories of educational activities: (a) course planning, (b) course management, (c) teaching, (d) assignments, (e) assessment, (f) grading, and (g) overall general needs. Technology arose as the most challenging task when it came to course planning and course management. That is, instructors noted the challenge in using technology to construct their courses and to engage in their university’s online course management systems. Teaching-wise, instructors could complete the process of teaching without the necessity of learning new technologies (once the course was developed and maintained on the university e-system), yet technology was viewed as useful for developing interactive teaching material. In general, learning new technologies was seen as a challenging task in the overall act of teaching, but it was not viewed as of particular importance with respect to assignments, assessment, and grading. Interestingly, technology did not appear as one of the most important tasks in any of the seven categories of educational activities.

In sum, this phase of the company research sought to identify differences, if any, in needs across disciplines and (b) better understand the work process engaged in by instructors and determine particularly challenging tasks within the workflow process. The need and challenge of instructional technology were evidenced in both aspects of the research project. The second phase of exploration, discussed next, focused specifically on instructional technologies and included both faculty and students in the research.

### Instructors and Students: Technology Use, Engagement, and Learning Outcomes

Citing studies examining technology and its linkage to learning outcomes, Peterson et al. (2002) stated,

One of the most striking, yet disturbing, observations is that, despite the vast number of studies that have been conducted in attempts to evaluate the effectiveness of various instructional technologies used in higher education, no definitive conclusion is possible as to whether instructional technology generally contributes positively to student learning. (p. 13)

Seeking to provide insight into instructional technology use and learning outcomes, Cengage Learning, in conjunction with Eduventures in late 2009, conducted a survey of both instructors and students to explore their perspectives on digital technologies in the classroom.
Table 1. Instructor and Student Preferences for Technology by Field

<table>
<thead>
<tr>
<th>Field</th>
<th>Instructor</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>64%</td>
<td>73%</td>
</tr>
<tr>
<td>Business</td>
<td>63%</td>
<td>66%</td>
</tr>
<tr>
<td>Education</td>
<td>53%</td>
<td>46%</td>
</tr>
<tr>
<td>Social sciences</td>
<td>51%</td>
<td>55%</td>
</tr>
<tr>
<td>Humanities</td>
<td>43%</td>
<td>37%</td>
</tr>
<tr>
<td>Physical sciences and math</td>
<td>40%</td>
<td>61%</td>
</tr>
<tr>
<td>Life sciences</td>
<td>29%</td>
<td>55%</td>
</tr>
<tr>
<td>Fine arts</td>
<td>25%</td>
<td>47%</td>
</tr>
</tbody>
</table>

There were 765 students and 308 instructors who completed the survey. Because of the proprietary nature of the research, the data and analyses cannot be presented here in their entirety. However, Eduventures is an industry leader in higher education research, and the data collection process and subsequent analytical methods followed rigorous research protocol. For each group of respondents (students and instructors), up to three sets of output were produced, depending on the question: (a) frequency table, (b) cross-tabs, and/or (c) cross-tabs, including a chi square or Fisher’s test where appropriate.

The major research questions pursued were the following:

1. How do technology preferences differ between students and instructors?
2. What are the student and instructor perceptions of technology use, technology support, and the effectiveness of digital tools?

Technology Preferences

McCorkle et al. (2001) suggested that “while some professors follow the changes in [business] technology with reluctance and uneasiness, their students are saying ‘I want more’ with ready abandon and willing experimentation” (p. 16). As such, the aim of the questions related to technology preferences was to discern the degree of desire for the use of technology in the act of teaching and learning. In addition to discerning differences in the preference for technology between teachers and students, possible differences among disciplines and between genders were also explored.

Overall, 58% of the student respondents preferred a “great deal” of technology in courses compared with 48% of the instructors. However, there were differences by discipline and gender. As observed in Table 1, there was considerable variation of instructor and student preferences for technology based on field of study. Although most students and instructors in engineering and business preferred a great deal of technology, there were vast differences between student and instructor preferences in the Fine Arts and Life Sciences as well as moderate differences between preferences in the Physical Sciences and Math. The overwhelming majority of instructors in the Fine Arts and Life Sciences do not prefer to teach a course using a great deal of technology, yet approximately one half of the student respondents in these fields would prefer to take a course that uses a great deal of technology. Although the instructor and student preference differences are not as large as in the Physical Sciences and Math, there were also notable differences between the preferences of these two groups.

Gender-wise, a larger proportion of men preferred to take courses that used a great deal of technology when compared with women ($p < .01$). This finding is not surprising given the number of studies that suggest a disparity by gender with respect to computers and technology (Kim & Bagaka, 2005). For example, a study by ECAR revealed that 54% of male college students perceived themselves to be early adopters of technology versus only 25% of female college students (Smith, Salaway, & Caruso, 2009). Gender did not play a statistically significant role in determining instructors’ preferences for teaching a course that uses a great deal of technology.

With differences in technology preferences between teachers and students, across disciplines and between genders, the second research question in the Cengage/Eduventures study went beyond generalities to explore use, support, and preferences for particular digital tools by students and instructors.

Perceptions of Use, Support, and Digital Tools

**Use.** Students and instructors were asked their perceptions of use of instructional technology in the classroom. From the instructor’s viewpoint, 61% of the instructors perceived that at least 75% of the students used instructional technology effectively. Likewise, 65% of the student respondents thought that at least 75% of the instructors used instructional technology effectively. Of these students, 63% preferred to take a course with a “great deal” of instructional technology, and student preference for technology in a course was related to the perceived effective use of instructional technology by the instructor ($p > .01$). However, there may have been a self-selection bias in that students who preferred instructional technology opted for courses where it was used a great deal and, therefore, likely used more effectively. There were no statistical differences across disciplines or across GPAs in student perceptions of effective use of instructional technology by instructor.

**Support.** Although perceived use was comparable, there were differences between instructors and students in the perceptions of support. There was a statistically significant relationship between student preference for technology use in a course and perceived support offered by instructors ($p > .01$). Additionally, although 65% of the instructors thought that students were tech savvy, only 42% of the student respondents felt that instructors provided students with adequate training.
and support in the use of instructional technology. This finding corroborated results from an ECAR multischool survey in which “barely a third of the students said that most or almost all of their instructors provided them with adequate training for the IT in their courses” (Smith et al., 2009, p. 17).

Critically, although today’s college students are immersed and fluent in digital media, this proficiency may not necessarily transfer to proficiency in the use of instructional technology. This is consistent with Robinson (2006), who reported that not all students have the same level of ability and confidence when it comes to technology. Thus, a student may understand that a particular instructional technology would be useful but may not have the expertise to use the technology and, therefore, will need training and support as made available by the classroom instructor.

**Digital tools.** There are a variety of digital tools in the marketplace. For purposes of this study, the digital tools were segmented into three product groups: traditional digital tools (e.g., websites, e-mail, Microsoft Office, PDFs, instant messaging), social and interactive digital tools (e.g., Facebook, Wikis, blogs, podcasting, simulations, games, virtual worlds), and course/learning digital tools (e.g., online quizzes and tests, lecture-capture, whiteboards, virtual classes, course/learning management systems). The differences between instructor requirements and student use frequency and experience with various digital tools are displayed in Figure 1.

Both students and instructors were then asked about the perceived effectiveness for each of the three types of digital tools (Table 2). There were some interesting differences between students and instructors with respect to the perceived effectiveness. Whereas 73% of the students found traditional digital tools to be effective, only 52% of the instructors thought they were effective teaching tools. Yet whereas 55% of the instructors believed that course/learning digital tools were effective teaching tools, only 30% of the students thought they were effective. However, students and educators had similar perceptions of effectiveness for social and interactive digital tools.

Instructors were asked about their perceptions of the impact of digital tools on student learning and engagement. Seventy-eight percent of the instructors thought that student engagement in a course had improved as the use of digital tools increased. Of the instructors who believed that engagement levels had improved, there was a strong correlation with perceptions of learning, with 87% believing that learning outcomes had improved as well \((p > .01)\). However, instructor preference for technology played a significant role in the perception of improved engagement and learning \((p > .01)\). That is, instructors who preferred a great deal of technology in courses they taught were, on average, more likely to believe that student engagement levels and learning outcomes have improved. The instructors who believed that engagement activities and learning outcomes improved were queried as to the digital learning tools most required or strongly recommended to their students. Table 3 shows the percentage of these instructors who believe that each of the digital tools have an impact on student engagement and learning outcomes for the course.

Fifty-eight percent of the student respondents believed that instructional technology engaged them in their coursework and helped them achieve learning outcomes. There was a statistically significant relationship between instructor use and support of instructional technology and the proportion of students who found instructional technology to be engaging for the coursework \((p > .01)\). Figure 2 shows the relationship between instructor requirements of digital tools and student perceptions of engagement with regard to the various tools. Figure 3 shows the digital tool use frequency for the students who believed that technology helped engage them in their coursework. Traditional digital tools were used most readily by highly engaged students, whereas course/learning and social/interactive tools were used less frequently \((p > .01)\).
This finding is particularly interesting since instructors perceived traditional tools to be less effective than course/learning and social and interactive tools.

Overall, students appreciate and use digital tools in academic work more readily than instructors require. This is consistent with the suggestion that students want more instructional technology and are willing to experiment with such tools (McCorkle et al., 2001). Of critical importance, however, is that instructional technologies do appear to have a positive impact on teaching and learning. That is, students and instructors did perceive a positive relationship between instructional technology use and engagement in the learning process and in the outcomes of the process.

**Summary**

The findings of the two major research studies reported here contribute to our knowledge about instructional technologies from the viewpoints of both students and instructors. In general, it appears that students and instructors are eager to learn and teach with a variety of digital technologies. The research highlights issues and concerns in three major areas: disciplinary differences, metateaching demands, and tool sophistication.

**Disciplinary Differences**

Although faculty across disciplines exhibit similar utility values for various course materials, there are disciplinary differences in preferences for instructional technology. Unlike their colleagues in Engineering and Business, faculty of the Fine Arts and Life Sciences do not exhibit strong preferences for teaching courses with technology. However, these disciplinary differences were not evident among students. Thus, it appears that college students, regardless of discipline, are interested in instructional technology.
Metateaching

Although students are willing to experiment and appear to want more when it comes to instructional technology, there is a caveat to their desires. That is, digital natives or not, students expect the instructor to offer support for use. Teaching (either taking up class time or extra time outside of class) will have to go beyond the boundaries of the pure subject material and will require teaching students how to work and learn with instructional technologies. Yet this type of metateaching may be at odds with the fact that instructors did not see technology as one of the most important tasks in any of the seven educational activities identified in the first phase of this research. Teaching about the instructional technology would make technology an important educational task within all seven educational activities. Currently, it may be that technology is secondary to the more traditional tasks involved in delivering a course.

Tool Sophistication

Traditional instructional tools appear to be sufficient for student engagement. It does not look as if more sophisticated or advanced Web 2.0 digital tools are needed for enhancing the learning experience. Although college students may use these contemporary digital tools for communication and entertainment, they do not see them as necessary for learning. There may be a point of saturation in that students use contemporary digital tools for their personal benefit but do not expect to have to use them for educational purposes as well. Today’s college students have grown up in a digital world of communications but may not have time over 4 short years of college to truly digest the value of contemporary digital tools as instructional technology. These students are willing, however, to experiment with more contemporary tools if the opportunity is provided to them and if the support to do so is available.

The past decade has seen a plethora of research with respect to instructional technology. This study adds to the educational scholarship over the past decade by examining teaching and learning from the perspectives of the instructor and student dyad. The results of the two research projects contribute at the broad level of scholarly research with respect to integration trends in the classroom and their linkages to outcomes. More narrowly, the research denotes specific technological tools that are used and supported by instructors and students and links tool usage to student engagement and learning outcomes.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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