Computers & Education 53 (2009) 1241–1255

Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Students' perceptions of teaching technologies, application of technologies, and academic performance ☆

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ARTICLE INFO

Article history:
Received 12 December 2008
Received in revised form 13 June 2009
Accepted 15 June 2009

Keywords:
Computer-mediated communication
Multimedia/hypermedia systems
Post-secondary education
Evaluation methodologies
Teaching/Learning strategies

ABSTRACT

This study examined business students' perceptions of four objectives (i.e., Enjoyment, Learning, Motivation, and Career Application) across five teaching technologies (i.e., Projector, PowerPoint, Video, the Internet, and Lecture), business professors' effective application of technologies, and students' academic performance. We collected data from 215 students at a regional state university in the USA. We developed Students' Perceptions of Technology Scale, SPOTS, specifically for the present study, used the most rigorous criteria, and investigated reliability, convergent and discriminant validity, exploratory and confirmatory factor analysis, and measurement invariance of this scale. Mean scores revealed that Video conveyed the highest amount of Enjoyment. PowerPoint provided the highest amount of Learning and Motivation. The Internet provided the highest Career Application for future jobs. Younger students preferred Video, whereas older students favored Lecture. Regression results showed that the use of Video for Learning, Projector and Lecture for Enjoyment, PowerPoint for career and Motivation, and the Internet for Learning contributed to professors' teaching effectiveness. Students' high ratings for professors' effective use of the Lecture method and low expectation for the use of a Projector predicted their self-reported GPA (academic performance). Professors may use a different mix of technologies in the classroom and use them creatively in order to promote the most Learning for students and satisfy students' Learning needs and objectives.

1. Introduction

Rapid developments in information technology (IT) have provided rich sources of information and generated changes to teaching and learning for faculty and students in almost any discipline. Many schools in the USA and around the world have adopted different computer-related technologies in learning and education, e.g., the use of multimedia in the classroom (Schmid, 2008), communication technology (Alavi & Gallupe, 2003), technology-mediated distance learning (Brower, 2003) for undergraduate classes, on-line master of business administration (MBA) courses, and executive MBA programs (Arbaugh, 2005).

More recently, online learning environments (OLEs) and technologies as well as social media Internet technologies provide many new forms of communication that allow professors and students to exchange information and ideas across time and space in university classes. These new technologies may include discussion boards, weblogs, wiki, Q&A using mobile phones, synchronous chat environment, email, instant messaging, and Twitter, among others (e.g., Connell, 2006; Farmer, 2004; Fichter, 2005; Richardson, 2008). Technologies like Twitter enable us to know where the nodes of our community are, provide a sense of connectedness to and awareness of others, and have this sense even when the members of our community are not within sight. All these changes may provide additional challenges to the process of teaching and learning.

More than a decade ago, researchers have suggested that "as teachers have progressed from the use of blackboards and chalk, to overhead transparencies and computer-aided presentations, and now to multimedia, more research is needed to help guide the use of these tools to enhance learning" (Frost & Fukami, 1997, pp. 1276–1277). However, empirical evidence on the technology's ability to promote learning is not very robust.

What is missing? Those faculties promoting technology may emphasize the delivery of instructions or exchange of information rather than the ability of technology to promote a "learning experience" for students. All the bells and whistles of high-tech presentations bring

☆ Portions of this paper were presented at the International Congress of Psychology, July 20–25, 2008, Berlin, Germany.

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doi:10.1016/j.compedu.2009.06.007

the materials to life in the classroom. However, rather than blindly touting the latest computer technology, managerial fad, or fashion, professors need to focus on students' perceptions regarding the use of technologies: Do computers and technologies in the classroom help students achieve their learning goals and objectives? Do computers and technologies enhance professors' teaching effectiveness in the classroom? Do computers, technologies, and professors' use of technology promote students' learning? This study attempts to fill a very small part of the void.

Multimedia education involves more than one medium for the organization, information exchange, and interactive aspects of the learning experience. Proserpio and Gioia (2007) argued that we are no longer teaching a verbal, or even just a visual, but now a virtual generation of students. The values, communication styles, and life experiences of Gen-Xers and Gen-Yers (Millennials, born after 1980) are significantly different from that of baby boomers (e.g., Tang, Cunningham, Frauman, Ivy, & Perry, in press). Optimal teaching and learning occur when teaching technologies and styles align with learning styles. Students with different age and gender may have different perceptions toward the traditional teaching and the use of new technology (Caudron, 1997). University students with the new and the latest computer and technology in classroom settings may gain competitive advantage in the global market (Rice & Aydin, 1991).

Moreover, technology may have its negative effects, e.g., cyberloafing (Lim, 2002), cybercheating (Austin & Brown, 1999), technology-based cheating (McCabe, Butterfield, & Treviño, 2006), and information overload that resulted in less learning (Mayer, Heiser, & Lonn, 2001; Mayer & Massa, 2003; Rockwell & Singleton, 2007). Administrators, professors, students, and employers are aware of the trend that the use of technology and computer in university classrooms will change future employees' efficiency and effectiveness in using the different types of technology on jobs in the competitive world market.

Very little research has addressed (1) students' reactions to multimedia education (Connell, 2006; Mayer et al., 2001; Schmid, 2008) and (2) the development of models and methodologies for the study of technology-mediated learning (Webster & Hackley, 1997). Research findings regarding students' perceptions may have important implications for administrators, faculty, students, and employers and may enhance the delivering of education to students, students' learning experience in college, and students' application of knowledge and skills in the real world of work. Professors may use different combinations of methods to teach different courses using traditional lecture, Projector, PowerPoint, Video, or the Internet. It is almost *impossible* to "separate" all these methods in a realistic classroom environment.

Many courses are delivered at different times of the week with different lengths of class period (schedules), e.g., three times a week (Monday–Wednesday–Friday), twice a week (Tuesday–Thursday), once a week (evening), or one full day (9 am–5 pm) for only half of a semester (Saturday). Even for the same course, the "length" of class periods (1 h a day vs. 8 h a day) may force the same professor to adopt different teaching strategies, methods, and technologies in classrooms. The pattern may vary across different courses (accounting, computer science, economics, education, English, finance, history, management, marketing, psychology, statistics, etc.). We attempt to examine only students' general perceptions of the use of computers and technology in classrooms regardless of course content, schedules, or instructors.

1.1. The present study

This study attempts to examine business students' general perceptions of four objectives across five teaching technologies, professors' effectiveness in using these technologies, and students' self-reported GPA. One of the major objectives of this study is to develop a short and simple to use scale that measures students' perceptions regarding the use of five technologies (i.e., Projector, PowerPoint, Video, the Internet, and Lecture) in achieving four objectives (i.e., enjoyment/fun, learning, motivation, and career application). Furthermore, we ask the following key research questions: Are there individual differences in students' perceptions of educational technologies? What is the best combination of teaching technologies and learning objectives that contribute to professors' overall effectiveness in classrooms? What are the major factors that contribute to students' bottom-line learning or performance?

2. Theory and hypotheses

2.1. Teaching and technology

The top six technologies used by university professors, in descending order, are: the overhead projector, the VCR/DVD, a slide projector, the Internet, a large screen video data display and an instructor computer workstation (Brill & Galloway, 2007). Further, regarding future use, professors have the greatest interest in using the Internet, a CD-ROM, instructor computer workstation, and a video disc player. We examine some of these technologies in the present study.

It is beyond the scope of this study to examine all forms of technology, purposes of learning, and teaching effectiveness. We will examine a few selected studies that compare and contrast several of these teaching technologies. Regarding level of medium richness, face-to-face communication, with the highest medium richness, allows multiple verbal and nonverbal cues, immediate feedback, the use of natural language, and personal focus. This is followed by telephone, electronic mail, and print communications (Daft & Lengel, 1986). Perceived medium richness is also associated with students' attitudes toward and the use of media (Fulk, Schmitz, & Ryu, 1995). People might perceive media differently in different social contexts. Interaction between the professor and the students is the key to all learning, learning with multimedia, in particular.

Research suggests that, in a study of distance education, students expected the class to be intrinsically interesting and enjoyable. At the end of the course, however, only 9% of the students suggested that the technology made the class more interesting (Cleveland & Bailey, 1994). One's capability to interact with a given technology plays a significant role in one's expectations and performance. Students had a preference for teacher contact over the Internet instruction (Maki & Maki, 2002) and performed better on a posttest when taught through traditional lectures than when taught through the Internet (Faux & Black-Hughes, 2000). Students' learning was affected interactively by their comprehension skill and course format. Differences between formats increased with *comprehension skill* such that the Web-based course advantage became greater as comprehension skill increased. In general, students of all skill levels prefer the lecture courses over the Web-based courses (Maki & Maki, 2002).