College Student's Expectations of Technology- Enhanced Classrooms: Comparing 1996 and 2006

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ABSTRACT

Multimedia technology is commonplace in today's classrooms and the demand for technology-enhanced learning environments is projected to continue its substantial growth. Though it is often assumed students expect this technology in their college classrooms, there is little quantitative evidence to support these assumptions (Snyder & Vaughan, 1998; Snyder & Vaughan, 1996, and Chang, Choi, Moon, Chan, & Chan, 2004). The question becomes, as students are exposed to the use of technology and multimedia both in the classroom in lower levels and in their personal lives, have their expectations of the optimal learning environment changed? This study replicates a 1996 study of expectations of the college student about technology to be used in their college classroom. The 1996 data includes a sample of 714 students at a small southeastern private college. The 2006 data samples 639 students at three institutions (two public and one private) in two southern states. Students reported their prior experience with software as well as their use of computers in high school classes. Additional Likert-scaled questions asked students about their ideal classroom instruction techniques and what technology and computer activities they anticipated professors would use to present college course information. While faculty may perceive today's students as technologically savvy and demanding of technology applications in all facets of learning, the research results did not support this view. Interestingly, as found ten years earlier, students anticipated lectures, class discussion, and weekly outlines in their college courses. Implications and suggestions for future research are included.

INTRODUCTION

As recently as the late 1980's, articles on technology in the classroom were scarce and required a definition and explanation of technology-enhanced options before presenting a new theory. Businesses were slowly integrating multimedia and technology into their corporate presentations, while the academic community was struggling to fund technology for classroom use. This has changed dramatically illustrated by a Market Data Retrieval study that estimates colleges spent $6.94-billion on information technology in 2006, a 35percent increase from the previous year. This includes $3.4-billion on hardware, $1.6-billion on software, and $1.6-billion on outside services, not including salaries. Kiernan (2006) reports the average college technology budget is $1.4 million.

Projections are that technology usage will transform higher education learning and teaching in the future (Kiernan, 2006) while at the same time research on the use of technology in higher education and of the link between the technology-enhanced classroom and student learning is limited and conflicting.   Studies in the late 1990's appeared to suggest cautious optimism for a positive relationship between the use of technology and student educational achievements (Schacter, 1999). Over time, others have disagreed on the benefits of the various types of information delivery on learning, while other indicated faculty costs and time may outweigh the benefits of technology to student learning (Smith, 2001).

Some research does provide support that students perceive technology as an effective learning tool (Krentler & Willis-Flurry, 2005) consistent with increase in personal technology usage. Many institutions and faculty assume students expect their courses to be infused with technological supplements. Growing up in an intensive environment of television, movies and video games, younger students have developed learning styles where comprehension occurs largely through visual

images. This form of delivery may shape what students perceive and affects both their interest levels and their retention of information. In this vein a similarity can be drawn to the phenomenon that has occurred in news coverage, whereby "snippets" or "sound-bites" are the forms of information most sought due to time constraints and limited attention spans.

Similarly, it is expected students raised in an environment where senses are flooded with visual inputs may have different expectations regarding what they consider to be an optimal classroom design, and whether they consider multimedia to be a nicety or a convention of necessity. Additionally, as Schrum (2005) points out, most students are ahead of their professors in computer literacy. It is also expected that in their just-in-time environment, students seek immediate feedback on assignments and demand anytime access for grade posting. Anecdotal evidence suggests students prefer Web-posted documents including class syllabi, lecture notes, links to current articles and readings, or PowerPoint slides. Major textbook publishers offer this form of support in ancillary materials specifically developed for the on-line environment. With the proliferation of the I-Pod it is not inconceivable that some students would prefer lectures and video clips to download as pod casts for MP3 players and other personal listening devices.

Multimedia technology is commonplace in today's classrooms and the demand for technology-enhanced learning environments is expected to continue its substantial growth over the next decade (Debevec, Shih, & Kashyap, 2006; and Hall & Elliott, 2003). Schrum (2005) reports that technological advances have exceeded the most optimistic expectations but agrees educational institutions have not yet realized the full potential. The delivery of education has indeed changed with the growth and proliferation of multi-media, even if course content and objectives have remained the same. Multimedia and a myriad of technologies are not only being used in a variety of educational settings but their use is also being studied by educational researchers in a variety of settings including the information systems classroom (Bradley, Mbarik, Sankar, Raju, and Kaba (2007); accounting classrooms (Sugahara and Boland, 2006) and in business education courses (James, Burke, & Hutchins, 2006).

Young (2004), in a survey of 4,374 freshman and seniors found 48.5 percent of the students felt the biggest benefit of classroom technology is convenience (checking grades online, for example) while only 12.7 percent of the students said improved learning was the greatest benefit. Some 3.7 percent felt information technology (IT) provided no benefit at all in their classrooms. Young (2004) found most students (41.2percent) preferred a "moderate use of IT" and agreed there is a mythology about today's students. While they may live online in their personal environment, very few students (2.2percent) wanted entirely online courses and 2.9percent preferred courses with no use of information technology (Young, 2004).

The question becomes, as students are exposed to the use of technology and multimedia both in the classroom in lower levels and in their personal lives, have their expectations of the optimal learning environment changed? Specifically,

1. What are student's expectations regarding pedagogical techniques in the classroom?
2. How have student's expectations regarding pedagogical techniques in the classroom changed over the past decade (1996-2006)?
3. Does the extent of previous usage of technology impact the student's expectations?

METHODOLOGY

In 1996 a survey was given to 714 students at a small southeastern private college. The sample was composed of 39 percent male and 61 percent female students. Of the sample, 69 percent were freshmen, 9 percent sophomores, 11 percent juniors, 11 percent seniors or graduate students. Seventy-six percent of the sample was Caucasian, 15 percent African American, 2 percent Hispanic, 5 percent Asian, and 2 percent were classified as other. The age make-up of the sample included 5 percent that were age 17 or younger; 6 percent that were between the ages of 18 and 20; 73 percent that were between the ages of 21 and 23; 5 percent that were between the ages of 24 and 29; and 11 percent that were age 30 or older.

In 2006, this survey was administered to 639 students at three southeastern colleges in two southern states (Georgia and Tennessee) and included two public institutions and one private institution. The sample was composed of 45 percent male and 55 percent female students. Of the sample, 80 percent were Caucasian, 7 percent African American, 7 percent Hispanic, 3 percent Asian, and 3 percent were classified as other. The sample included 1 percent of the students that were age 17 or younger; 77 percent that were between the ages of 18 and 20; 16 percent that were between the ages of 21 and 23; 3 percent that were between the ages of 24 and 29; and 3 percent that were age 30 or older.

The survey instrument, as shown in Appendix A, consisted of 43 content questions in a five-point Likert scale with seven demographic questions. Of the content questions, 15 addressed student expectations regarding the use of technology within the classroom, while five questions considered the extent technology was used in their classroom during their senior year in high school. Fifteen questions polled students on their ideal classroom environment. The remainder of the questions addressed the extent of students' personal computer usage.

RESULTS

The analysis was divided into three parts. The first part considered the components of the students' anticipated learning environment and compared the 1996 and 2006 results; the second part analyzed and compared the two student samples perceptions of their ideal learning environment, and the third part identified and compared the relationships between the students previous exposure to (and usage of) computer technology with their anticipations for future exposure to multimedia environments.

TABLE 1
1996 – 2006 Comparison - Expectation of College Learning Environment

I anticipate my professors will use the following techniques to present course information
(1996 data shown in parentheses)

	5 Extensively (almost every class)	4 Periodically (once/week)	3 Occasionally (6-7 times/semester)	2 Rarely (1-2 times/semester)	1 Never
1.Lecture	61% (77%)	28% (17%)	9% (5%)	1% (1%)	1% (0%)
2.Written handouts or outlines	16% (11%)	37% (47%)	32% (26%)	11% (14%)	4% (2%)
3.Class discussion	40% (51%)	36% (35%)	18% (11%)	5% (2%)	1% (1%)
4.In-class exercises	23% (15%)	31% (35%)	30% (31%)	14% (16%)	2% (3%)
5.Outside classroom assignments	25% (39%)	30% (24%)	20% (22%)	19% (13%)	6% (2%)
6.Group activities in class	10% (6%)	24% (27%)	35% (40%)	26% (23%)	5% (4%)
7.Student presentation	7% (1%)	15% (13%)	31% (34%)	33% (45%)	14% (7%)
8.Overhead projector and transparencies	27% (12%)	31% (36%)	23% (29%)	13% (17%)	6% (6%)
9.Videos/DVDs	6% (2%)	13% (12%)	33% (32%)	29% (47%)	19% (7%)
10.Computer presentation software(PowerPoint)	26% (3%)	28% (17%)	27% (30%)	15% (37%)	4% (13%)
11.Electronic-mail	9% (6%)	30% (17%)	32% (22%)	15% (33%)	14% (22%)
12.Computer Projects	7% (3%)	16% (15%)	29% (30%)	32% (40%)	16% (12%)
13.Computer simulations	6% (3%)	14% (11%)	25% (25%)	33% (41%)	22% (20%)
14.Computer activities in class	8% (4%)	12% (12%)	29% (29%)	31% (36%)	20% (19%)
15.Internet (accessing from class)	11% (3%)	18% (17%)	25% (31%)	26% (35%)	20% (14%)

PART 1 - ANTICIPATED IDEAL LEARNING ENVIRONMENTS

The anticipated learning environment of the students was measured by student responses to the statement: "I anticipate professors will use the following techniques to present course information". The statement was followed by a list of pedagogical techniques which were scored on a Likert scale; (5) Extensively (almost daily), (4) Periodically (once/week), (3) Occasionally (6 - 7 times per quarter), (2) Rarely (1 - 2 times per quarter) and (1) None at all. Responses of 3, 4, or 5 were included in the analysis of the student's anticipated environment.

In 1996, 21 percent of the students anticipated that computers would be used in presenting class material extensively or periodically with 22 percent anticipating them to be used occasionally. Forty-seven percent expected computer projects and 50 percent anticipated at least occasionally internet access in the classroom. The use of computer simulations was anticipated by 38 percent of the students. E-mail by 45 percent and Video/DVD's by 46 percent. In comparison, in 2006, 82 percent of the students expected computer based classroom presentations, 54 percent computer projects, and 55 percent internet access. In 2006, 44 percent anticipated computer simulations, 75 percent use of email and 48 percent exposure to Video/DVD. Table 1 shows this comparison.

PART II - IDEAL LEARNING ENVIRONMENTS

The ideal learning environment of the students was measured by student responses to the statement: "In my ideal classroom, instructors would use the following". The presentation of material through the use of computers was included in the profile of 62% of student's ideal classroom environments in 1996 compared to 81 percent in 2006. Other aspects of computer technology in their ideal learning environment included computer projects, cited by 50% of the respondents in 1996 and 58 percent in 2006 and computer simulations, indicated in 1996 by 50% of the students and in 2006 by 54 percent. Use of e-mail and the internet were a part of the ideal learning environment of 55 percent and 60 percent of the 1996 students respectively and 76 percent and 78 percent of the 2006 students respectively. Table 2 shows this comparison.

PART III – PREVIOUS EXPOSURE

Previous exposure to the use of computer technology in the classroom was measured by the student's responses to questions regarding the extent that their instructors used computers during their last academic year. Previous exposure to the usage of computers to present course material was reported by 53 percent of the students in 1996 and 79 percent in 2006. Other aspects of computer technology previously used in the classroom included simulations reported by 30 percent of the students in 1996, 50 percent in 2006, and the use

of e-mail which was reported by 11 percent of the 1996 student sample and 49 percent of the 2006 sample.

It could also be inferred that previous exposure to computer technology such as multimedia in the classroom could come from the student's personal usage of these tools. This was measured by asking students to indicate "To what extent you used the following software during the past year". Responses were measured on a five point Likert scale; (5) Extensively (almost daily), (4) Periodically (once/week), (3) Occasionally (6 - 7 times per quarter), (2) Rarely (1 - 2 times per quarter) and (1) None at all. Responses of 3, 4, or 5 were included in the analysis of the student's usage.

In 1996, 71 percent of the students indicated that they had a computer available for their personal use with 38 percent using a computer more than 10 hours per week, 27 percent 6 to 10 hours per week, 19 percent 4 to 6 hours and 16 percent less than 3 hours per week. The number of students indicating that they had a computer available for their personal use increased to 95 percent in 2006 with 39 percent using a computer more than 10 hours per week, 23 percent 6 to 10 hours per week, 26 percent 4 to 6 hours and 12 percent less than 3 hours per week.. Twenty three percent of the students in 1996 reported having used some form of presentation software; 90 percent word processing software; 39 percent spreadsheets; 35 percent e-mail; and 43 percent used the internet occasionally or more. It was also interesting the note that while only 62% of the students reported using or computer based games in 1996, 16% of the students used them daily and 23% used them on a weekly basis. In 2006, 70 percent of the student sample indicated occasional or more usage of presentation software; with 91 percent using word processing software, 59 percent using spreadsheets, 94 percent accessing the internet and 83 percent using email. The number of students using computer based games actually declined with only 37 percent of the students indicating that they used them occasionally or more.

This third part of the data analysis also compared the student's exposure and perceptions of their ideal learning environments. The student samples were divided into two groups based on their exposure to technology in the classroom through a previous instructor's use of the computer to present course material. The ideal classrooms described by the students were then compiled.

In 1996, for students with a higher level of previous exposure to computerized classroom presentations, their ideal classroom used primarily lecture (94%), handouts (93%), class discussion (94%) and in class exercises (86%). This was almost identical to those students with little or no previous exposure to computerized classroom presentations, 93 percent wanted lecture, 95 percent wanted handouts, 94 percent class discussion and 80 percent in class exercises. Neither group of students wanted student presentations with 53 percent of the low exposure and 49 percent of the high exposure students indicating them 1-2 times per semester or less. The only pedagogical technique with any recognizable difference was computerized presentation of information with 56 percent of the students with low previous exposure indicating it as a

TABLE 2
1996 – 2006 Comparison   Ideal College Learning Environment

In my ideal classroom, instructors would use the following: **(1996 data shown in parentheses)**

	5 Extensively (almost every class)	4 Periodically (once/week)	3 Occasionally (6-7 times/semester)	2 Rarely (1-2 times/semester)	1 Never
1.Lecture	35% (46%)	31% (37%)	22% (12%)	7% (4%)	4% (1%)
2.Written handouts or outlines	39% (30%)	34% (46%)	18% (19%)	7% (4%)	2% (1%)
3.Class discussion	42% (61%)	33% (25%)	16% (10%)	7% (3%)	2% (1%)
4.In-class exercises	27% (27%)	32% (38%)	27% (23%)	11% (9%)	3% (3%)
5.Outside classroom assignments	10% (12%)	24% (36%)	31% (30%)	24% (15%)	11% (7%)
6.Group activities in class	21% (18%)	22% (33%)	29% (28%)	18% (15%)	10% (6%)
7.Student presentation	7% (4%)	12% (13%)	23% (33%)	37% (38%)	21% (12%)
8.Overhead projector and transparencies	23% (14%)	25% (27%)	26% (30%)	17% (19%)	9% (10%)
9.Videos/DVDs	21% (8%)	29% (23%)	25% (35%)	19% (27%)	6% (7%)
10.Computer presentation software(PowerPoint)	27% (7%)	30% (22%)	24% (33%)	14% (25%)	5% (13%)
11.Electronic-mail	27% (7%)	25% (22%)	24% (26%)	17% (25%)	7% (20%)
12.Computer Projects	13% (3%)	16% (17%)	30% (29%)	31% (33%)	10% (18%)
13.Computer simulations	11% (4%)	16% (18%)	27% (28%)	31% (31%)	15% (19%)
14.Computer activities in class	15% (6%)	20% (20%)	28% (32%)	25% (26%)	12% (16%)
15.Internet (accessing from class)	24% (8%)	26% (23%)	28% (29%)	16% (24%)	6% (16%)

preference in their ideal classroom compared to 66 percent of those with high exposure.

In 2006, the ideal classroom again used lecture for both groups of students, with 88 percent of those with low exposure and 91 percent of those with high exposure indicating it as a preference. Ninety one percent of both groups wanted handouts, while a high percentage, (88 percent low exposure, 92 percent high exposure) expressed a desire for class discussion. The desire for student presentations was low for both groups with 63 percent of those with low exposure and 55 percent of those with high exposure wanting them less then twice a term. As with the 1996 sample, a recognizable difference was present in the percentage of students expressing a desire for computer presentation of classroom information, with 70 percent of those with low exposure and 84 percent of those with high exposure indicating this technique.

DISCUSSION

With regards to hypothesis one, "What are student's expectations regarding pedagogical techniques in the classroom?" both the 1996 and the 2006 data showed a picture of a lecture dominated classroom, with multiple handouts, ample time for class discussion, minimal outside assignments or group projects, and limited student presentations. It also indicated a desire for frequents email interaction with instructors and use of computers for information presentation.

Hypothesis two, "How have student's expectations regarding pedagogical techniques in the classroom changed over the past decade (1996-2006)?" yielded some surprising results. While students use and exposure to technology has evolved over the last decade, neither their expectations nor their ideal classroom descriptions have changed. And, in accordance with this finding, the students previous exposure to technology in the classroom did not appear to have a strong influence on either their expected or ideal classroom environments.

While we are not proposing that students dictate how subject matter is presented in the classroom, knowledge of these expectations is beneficial. If gaps between reality and expectations exist, it may be necessary for high school teachers and guidance counselors, freshman-level college professors, and others to change these perceptions to more closely mirror reality. Part of a student's first year experience may need to include a more realistic preview of the typical college classroom environment and a discussion of both in-class and out-of-class expectations, just as realistic job previews have shown to increase satisfaction within some occupations and reduce turnover (see for example, Mashburn, 2000; Roszkowski and Ricci, 2004; Horn, Griffeth, and Palich, 1998; and Elliott, 2002.) Providing students with a more realistic view of the pedagogies common to today's college environment may also increase their satisfaction, retention, and ultimately matriculation.

Regardless of the students' ideal and anticipated classroom learning environments, the final judge of the appropriate pedagogies may lie with the instructor. Certain material may lend itself to different delivery methods. For example, students may need the reinforcement of outside class assignments even though they would prefer otherwise. Also the availability of Internet access during class may divert student's attention from the message and may hinder learning.

Group projects and student presentations are not expected or preferred, however, they may be necessary to achieve the learning goals of the course.

DIRECTIONS FOR FUTURE RESEARCH

This study provides just the beginning of exploring the changes in expectations of students as they relate to pedagogical techniques. Additional analysis needs to be conducted on the changes in expectations and ideal learning environments. Also, the data needs to be examined for differences based on gender, age, or usage of technology. Also, the study did not capture non-classroom exposure of students to multimedia technologies, such as those experienced by students with past or current employment.

A larger study of students is needed to confirm these findings. Additional study can attempt to differentiate between the non-classroom uses of multimedia technologies by students. Additional studies can research the impact of multimedia on learning. Still other studies should address whether educational institutions are providing these technologies and what usage requirements are suggested. Inclusion of students in the course design for the type and amount of technology used should also be studied to see if such participation in the design impacts student outcomes. Other studies should research the use of technology and the impact on student achievement. Also such studies should consider the various learning styles of students and which ones are most influenced by technology usage and if new technologies offer new learning strategies for students who do not perform as effectively using traditional methods.

Also to consider is whether satisfaction with the amount and type of technology influences overall student satisfaction which could then influence learning, retention, motivation, attendance, and degree completion. As colleges and universities work to increase student retention, this could be an important research stream. Studies could determine is students who were previously passive or disengaged in classrooms that relied exclusively on the lecture-only delivery format are more engaged and attentive when technology is used to break the prior monotony of the classroom.

Future research is needed to expand this exploratory study by confirming and considering the reality of changing expectations within a first-year experience. Further research can seek to explain why students indicate such a strong desire for summaries and handouts. Is this a function of their learning style? Is it due to poor study skills or note-taking ability? Is it a preference for a shorter summary rather than reading the entire textbook chapter? Could their attention span for reading be a function of their exposure to media? It would also be interesting to consider whether exposure to the actual college environment alters their ideal expectation over time (i.e., do sophomores and juniors maintain the same ideal learning environment expectations or have they been conditioned to expect different?).

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APPENDIX A

Academic Environment Expectation Questionnaire

Please circle the number that best describes your answer.

I anticipate my professors will use the following techniques to present course information:

	5 **Extensively** **(almost every** **class)**	4 **Periodically** **(once/week)**	3 **Occasionally** **(6-7 times/** **semester)**	2 **Rarely** **(1-2 times/** **semester)**	1 **Never**
1. Lecture	5	4	3	2	1
2. Written handouts or outlines	5	4	3	2	1
3. Class discussion	5	4	3	2	1
4. In-class exercises	5	4	3	2	1
5. Outside classroom assignments	5	4	3	2	1
6. Group activities in class	5	4	3	2	1
7. Student presentation	5	4	3	2	1
8. Overhead projector and transparencies	5	4	3	2	1
9. Videos/DVDs	5	4	3	2	1
10. Computer presentation software (PowerPoint)	5	4	3	2	1
11. Electronic-mail	5	4	3	2	1
12. Computer Projects	5	4	3	2	1
13. Computer simulations	5	4	3	2	1
14. Computer activities in class	5	4	3	2	1
15 .Internet Resources (accessing the Internet from class)	5	4	3	2	1

To what extent did your instructor use computers during your last academic year?
(If freshman, senior year of high school)

16 .In class assignments	5	4	3	2	1
17. Out of class assignments	5	4	3	2	1
18. Course material presentation	5	4	3	2	1
19. Communicate through e-mail with students	5	4	3	2	1
20. Course material computer simulations	5	4	3	2	1

Please indicate to what extend you used the following software during the past year

	5 Extensively (almost every class)	4 Periodically (once/week)	3 Occasionally (6-7 times/semester)	2 Rarely (1-2 times/semester)	1 Never
21. Word processing software	5	4	3	2	1
22. Internet	5	4	3	2	1
23. E-mail	5	4	3	2	1
24. Spread sheets (Excel, etc.)	5	4	3	2	1
25. Presentation software (PowerPoint, etc.)	5	4	3	2	1
26. Graphics software (Harvard Graphics, etc.)	5	4	3	2	1
27. Games	5	4	3	2	1
28. During the last calendar year, I used a computer an average of: (check one)					
☐ (1) 3 hours or less per week		☐ (2) 7 to 10 hours per week			
☐ (3) 4 to 6 hours per week		☐ (4) more than 10 hours per week			

In my ideal classroom my instructors would use the following:

	5 Extensively (almost every class)	4 Periodically (once/week)	3 Occasionally (6-7 times/semester)	2 Rarely (1-2 times/semester)	1 Never
29. Lecture	5	4	3	2	1
30. Written handouts or outlines	5	4	3	2	1
31. Class discussion	5	4	3	2	1
32. In-class exercises	5	4	3	2	1
33. Outside classroom assignments	5	4	3	2	1
34. Group activities in class	5	4	3	2	1
35. Students presentations	5	4	3	2	1
36. Overhead projector and transparencies	5	4	3	2	1
37. Videos/DVDs	5	4	3	2	1
38. Computer presentation software (PowerPoint)	5	4	3	2	1
39. Electronic-mail	5	4	3	2	1
40. Computer projects	5	4	3	2	1

41. Computer simulations	5	4	3	2	1
42. Computer activities in class	5	4	3	2	1
43. Internet Resources (accessing the Internet from class)	5	4	3	2	1

44. Do you have a computer available) for your personal use (at home, in your room, etc.)?	(1) Yes	(2) No
45. Gender	☐ (1) Male	☐ (2) Female
46. Race	☐ (1) White	☐ (2) Hispanic
	☐ (3) American Indian	☐(4)African American
	☐ (5) Asian	☐ (6) Other
47. Age	☐ (1)17 & younger	☐ (2) 18-20 years
	☐ (3) 21-23 years	☐ (4) 24-29
	☐ (5) 30-39	☐ (6) 40 & older
48. Classification	☐ (1) Freshman	☐ (2) Sophomore
	☐ (3) Junior	☐ (4) Senior
	☐ (5) Other	

Thank your for completing this survey.