IP Teleconferencing in the Wired Classroom: Gratifications for Distance Education

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ABSTRACT

Students have various motivations for participating and engaging in courses offered by distance education technologies over the Internet. While many of these courses have traditionally been Web-based asynchronous offerings, enhanced technology and reduced costs of IP-enabled teleconferenced synchronous course sections are encouraging more institutions to adopt this effective option for delivering important content to several physical locations at the same time. This study examines differential student motivations for participating in local and distance teleconferenced sections of an information technology course, enabled by Internet-based videoconferencing. This research lends support to three hypotheses concerning technology-mediated distance education systems. First, that traditional college age students prefer the local section of a distance education course on measures of satisfaction with the teleconferenced course, while non-traditional (age 25-34) students do not share this preference. Second, that older, non-traditional, students rate a distant course higher for satisfaction than do 18-24 year old students. Finally, that the social presence advantages of Internet-enabled teleconferencing appeal more to socially-oriented students than they do to students with a low social orientation. An unexpected, but serendipitous, finding of this research was that the group that could likely derive the greatest benefits from Internet-enabled distance education – older, non-traditional students – also may be more comfortable with the use of that technology, based on their higher reported degrees of self-perceived technical competency

Keywords: Videoconference, gratifications, satisfaction, technology mediated learning, synchronous distance education

1. INTRODUCTION

Distance education (DE) will continue to expand and become more popular as educators strive to increase cost-effectiveness and efficiency of course delivery modalities (Allen, et al., 2004). With new technologies available for delivery and administration of courses, administrators will also continue to ask questions about the economic efficiency of various DE alternatives, such as teleconferencing, computer-mediated delivery, and hybrid mixtures of models (Chang, 2004). Web-based technologies to supplement and deliver courses have been a popular solution for many administrators (Berger and Topol, 2001; Casini and Vincino, 2003) and by some accounts asynchronous computer-based instruction over the Internet is the leading DE delivery mode (Chang, 2004). Yet, while complete Internet delivery of courses is popular among administrators for its economic efficiencies, its success has been equivocal (Ginsberg and Foster, 1998; Hara, 1998; Johnson, 2000; Wilkes, Simon and Brooks, 2006). The question remains: what are the key benefits of providing DE course offerings via teleconference, and how do they contrast to the cost-driven movement to computer-mediated approaches?

This paper examines student motivations to engage in Internet-delivered IP teleconference courses across geographically dispersed collegiate campuses, for the purpose of delivering technical content in introductory courses on information technology. The paper first examines theoretical perspectives of student motivations to engage in various modes of distance education, and then presents and

tests a series of hypotheses related to differential student response to technical course content delivered by IP-mediated teleconference channels.

2. THEORETICAL PERSPECTIVES

Though the modality is immensely popular with administrators due to cost considerations, students do not always accept the asynchronous Web delivery of computer-mediated course content as a comparable substitute to live instruction classes, as evidenced by higher dropout rates and lower retention rates than traditional class formats (Brewer, 2004). The subsequent lack of interaction with instructors in strictly asynchronous online courses proves problematic when course content requires frequent clarification or elaboration, such as might be the case with technical course content (Flowers, Pascarella and Pierson, 2000; Gloster and Doss, 2000). In short, despite the increasing popularity of Web-based instruction for reasons of economic efficiency, live interaction instruction has clear benefits for the education process (Abler and Wells, 2005).

Internet technology serves increasingly important support roles in distance education, but computers will never totally substitute for the learning experience students receive from an instructor (Stafford, 2005). Further, Web-based offerings are never completely satisfactory to students (Hara, 1998). Videoconferencing of classes can overcome the clear social limitations of computer instructed course offerings (Abler and Wells, 2005), since part of the live interaction experience involves important information from social cues (Stiefelhagen, Chen and Yang, 2005). The ultimate goal, then, of technology-mediated DE systems is to increase the amount of social presence in order to provide participants with the sense and benefits of a traditional classroom or seminar room (He, Zhang and Cheng, 2004), thus overcoming the frustrations that students tend to feel when not able to directly interact with instructors and classmates (Hara, 1998). In addition to the benefits of increased social presence in course settings, videoconferencing can also make topic area experts more widely available across different university settings (Abler and Wells, 2005), thus greatly enriching student exposure to highly qualified instructors.

The videoconferencing modality is not without challenges, either. Students on the remote end of a DE teleconference can feel socially removed and isolated from the general class where the teleconferenced lecture originates (Stafford, 2005). Student ratings of teacher effectiveness can also suffer on the distant end of a distance education scheme (Lemak, et al., 2005) but integrating Internet technology into the teleconferenced course ameliorates this effect (Stafford, 2005). Hence, it seems that hybrid models of computer-based and teleconference-based instruction seem quite promising (Allen et al., 2004).

Interactive technology as part of a course enhances the learning process (Huang and Lu, 2003). Alavi's work (Alavi, Wheeler and Valacich, 1995; Alavi, Yoo and Vogel, 1997) suggests that fostering collaborative video-conferenced interactions among students in separate sections is a synergistic learning technique, and the integration of Internet tools in the teleconferencing classroom can achieve this (Stafford, 2005). It is a routine matter to provide a distance education course by teleconference (Alavi et al., 1995; Gloster and Doss, 2000; Rovai, 2001), and may even be desirable to do so in order to boost exposure of undergraduate students to key instructional personnel. It is a reasonably simple matter to further enhance teleconferenced courses with Internet access, and substantial synergies can be realized in such schemes (Berger and Topol, 2001).

Stafford (2005) demonstrated three dimensions of student gratifications for ISDN-based teleconferenced course delivery enhanced by Internet access. Content gratifications related to the information provided by the course modalities, social gratifications were discerned in technology-enabled social interactions with student peers at distant sites, and usage processes gratifications related to enjoyment of technology usage. Of these, Stafford (2005) suggested that the leading motivations for student participation in ISDN-based videoconference courses were related to the topic of the course, itself (the knowledge delivered) and the interaction processes facilitated by the live interactions (social gratifications).

It has been demonstrated that students in distance education courses are likely to feel separated and potentially alienated from the rest of course members due to the mediated interface through which the course is delivered (Gloster and Doss, 2000). This social dimension of motivations speaks to the need students might have to stay in touch and not be "out of sight" in a DE course, and it is well established that learning approaches that fit the needs of students achieve higher levels of learning motivations (Abraham, 2002) so increasing social presence should be beneficial to DE students. Social motivations are also related to the interactive and distinctly interpersonal social environment of classes in which much learning takes place (Evans, 1986).

As student bodies diversify, it will be important to understand differential student predispositions to respond to distance education offerings in order to supply accurate information to guide course design and administration. There are indications that a number of demographic and behavioral variables can predict student response to various delivery modalities. Of these, age, in particular, appears to have important implications. Kirschner (2005) observes that only one third of the current 16 million plus college students are in the traditional 18-24 demographic, while the majority are older, part-time students seeking to balance job and family responsibilities with college (Kirschner, 2005; Lipke, 2000). This is the emerging group that new DE alternatives can best serve, and it is likely that their preferences will be rather more toward technology-facilitated time-savings and efficient DE alternatives.

3. HYPOTHESIS DEVELOPMENT

There are customer satisfaction issues with both kinds of DE courses. With regard to strictly online courses, higher drop out rates and reduced satisfaction levels tend to relate to the lack of instructor interaction in computer-mediated course delivery situations (Flowers et al., 2000; Gloster and Doss, 2000). Further, some complex topics such as information technology are not readily transferable to Web-based instructional channels (Brewer, 2004). Face-to-face

interaction with instructors can be desirable in terms of enhancing the learning process and for purposes of student motivation (Parnell and Carraher, 2003), through the beneficial provision of social presence effects in the DE classroom (He et al., 2004) and this is especially the case for highly technical topics (Stafford, 2005). Even so, not all sections of DE teleconferenced classes are perceived equally. Students on the remote end often tend to feel isolated from the main origination section, despite the ameliorating effects of two-way teleconferenced interactions (Lemak et al., 2005; Stafford, 2005). This suggests that:

H1: There will be a significant preference among students for the local section of two distance education course sections on information technology.

In view of changing demographic trends among students, there also will be differential responses from students in terms of their preferences for technology-mediated DE courses. Evidence from the field shows that younger students are more comfortable with the technology involved in DE courses than older students (Parnell and Carraher, 2003). However, the increased numbers of older students in the modern student body, who are more likely to hold jobs and attend part-time (Kirschner, 2005), implies that there will be increasingly fewer members of the demographic group most generally expected to be technologically sophisticated in DE courses. Generally speaking, however, we expect that:

H2: There will be a significant difference between younger students and older students on measures of technical mastery of DE technology.

Even in spite of their expected lower degrees of technical proficiency, older students are expected to prefer the flexibility provided by DE course offerings (Parnell and Carraher, 2003). The increasing scheduling challenges faced by the increasingly older student demographic (Brewer, 2004; Kirschner, 2005) means that older students are more likely to appreciate DE courses, as compared to younger students:

H3: There will be a significant difference between younger and older students in DE courses for appreciation of the course.

Lastly, in videoconference formats, social cues are strongly represented, in comparison to strictly computer-mediated instruction formats (Alavi et al., 1997; Brewer, 2004). It is likely that highly technical courses will require more social interaction (Abler and Wells, 2005), since it has been shown that increased social presence in DE courses aids in the successful delivery of complex and highly technical course content (He et al., 2004; Stafford, 2005). Hence, we expect that students with high social motivations for DE course participation will have significantly better perceptions of the course and course delivery technology than students in the local section of an introductory technology course:

H4: High social orientation students will have significantly better perceptions of technology in DE course than low social orientation students.

4. METHOD

The hypotheses were tested in introductory courses in information technology where student volunteers were awarded bonus points for their participation. The origination section was located on a Midsouth urban college campus in the College of Business Management Information Systems Department. The distant section was located two states away in a Southwestern residential college campus Business Department IT course. The professors of each class traded lectures during the course of the semester, each serving as a guest lecturer for the other. Data was collected when the Midsouth campus was operating as the origination section and the Southwestern campus was serving as the distant site.

A total of 63 students participated across both sections, with 48 at the distant site and 15 at the origination site. Among these students, there were 21 females and 42 males. Eleven of the students had experienced a distance education course at least once before, while this specific course was the first experiences for 52 of the students. In terms of technology usage, the sample reported a mean response at or near the scale midpoint for measures of Internet usage rate and email usage frequency. Among the two broad age groupings of college students discussed by Kirschner (2005), 51 were in the 18-24 age grouping and 12 were 25-34. Because of the potential for interactions between age, social orientation, and location, the distribution of ages was analyzed and is reported in Table 1. Of particular concern is the large number of traditional college-age students in the distant section, and the possibility that data provided by this large sub-group may overwhelm the remaining data. To prevent that effect, the hypotheses that are not specifically related to age will be analyzed by comparing only the responses within each age group.

DE Section	18-24	25-34
Local Section	7	8
Distant Section	44	4

Table 1: Age Distribution Between DE Sections (count) by Age Group

Hypotheses were tested in SPSS 12.0, using correlation, one-way and two-way analysis of variance techniques. Results indicated that all but one hypothesis were confirmed in testing.

5. RESULTS

A number of the measures employed in this study could be used to describe gratifications for distance education. Satisfaction with the video conference, a perception that the learning goals were met, and the perceived usefulness of the video conference each could potentially suffice as the dependent variable to test these hypotheses. Each is a form of gratification, but each based in different theory. To determine how these potential dependent variables were related, a correlation analysis was performed, and the results are provided in Table 2.

Variable	Satisfaction	Learning Goals met	Perceived Utility
Satisfaction	1	.832**	.450**
Learning Goals met		1	.470**
Perceived Utility			1

** Correlation is significant at the 0.01 level (2 tailed)

TABLE 2: Correlation of Potential Dependent Variables

As shown, each potential outcome variable is significantly correlated with the others, so though satisfaction with the video conference will be the dependent variable for hypothesis testing, each result could also be interpreted using the other outcome variables with similar result.

Hypothesis 1 predicted that, of a distant and a local origination section of an IP teleconferenced distance learning course, there would be a significant preference among students for the local section. Though significant differences were expected between the distant and local sections on the measure of satisfaction with the teleconferenced course (agree/disagree, 7 point Likert format), an even more interesting result was noted as a result of further analysis due to the potential interaction of Age. To avoid this interaction, the data for each age group was analyzed separately using analysis of variance. As shown in Table 3, hypothesis 1 was supported for students in the traditional college age group (18-24), but no significant difference was found among the non-traditional students (25-34). Means analysis indicated higher average agreement to the satisfaction measure among the 18-24 year old students in the local section than in the distant section, but no significant difference among the 25-34 year old students.

DE Section	18-24	25-34
Local Section	6.00 (1.155)	6.25 (0.886)
Distant Section	2.20 (1.250)	4.75 (2.630)
	$F_{1,49} = 56.718$, p = .000	$F_{1,10} = 2.286$, p = .162

Table 3: Course Satisfaction Between DE Sections (mean/sd) by Age Group

Hypothesis 2 predicted that the younger students in the group of two sections would report higher degrees of technical competency, but as shown in Table 4, this proved not to be the case. In fact, this hypothesis is rejected because the 25-34 age group in both sections of the DE course reported significantly stronger self-perceived technical competency than did the 18-24 year olds from both sections.

Hypothesis 3 and Hypothesis 4 both seek to explore antecedents of course appreciation. Hypothesis 3 suggests that older students will appreciate DE courses more than younger students, as operationalized between 18-24 and 25-34 census age groupings. Hypothesis 4 explores the social presence advantages of teleconferencing, postulating that DE courses will appeal more to socially-oriented students than they would to students with a low social orientation. A composite of Stafford's (2005) social gratification scales was used to assess average social gratifications for the DE course. This was comprised of four-7 point Likert format scales anchored by "chatting," "friends," "interaction," and "people," as gratifying aspects of technology-mediated courses. A sample mean of 12.9 (σ = 7.5) was then used to create a dichotomous mean-split classification for purposes of testing the hypothesis.

Age Grouping	Technical Mastery
18-24	10.059 (3.414)
25-34	15.000 (2.216)
	$F_{1,61} = 22.719$, p = .000 Overall mean = 11.000 (3.755)

Table 4: Technical Mastery by Age (mean/sd)

Due to the likelihood of an interaction between Age and Social Presence, these hypotheses were analyzed simultaneously using a 2 way analysis of variance. In this manner, the interaction of the two main effects can be evaluated. As shown in Table 5, both main effects are significant and the interaction, though present, is non-significant. Both the older student group and the higher social presence groups rated the DE course higher for satisfaction with the teleconferenced course.

	Between Subject Effects
Age	F=6.889 (p=.000)
Social Orientation	F=4.381 (p=.041)
Age*Social Orientation	1.154 (p=.287)
	R squared = 0.548 (Adj R squared = 0.525)

Table 5: Satisfaction with Teleconference by Age and Social Orientation

6. DISCUSSION AND CONCLUSION

There are several forces currently shaping higher education, and three have direct relevance to the subject matter of this article. First, advanced technology, specifically Internet-enabled teleconferencing, has yielded more options for high-quality delivery of instruction to more students in more locations, all at reduced costs. Second is the strong and increasing need to control costs at higher education institutions, which could result in conflict between administrators against educators. Finally, the ranks of non-traditional students are rapidly swelling even while the traditional student population is in decline, resulting in a much more diverse student body that must be served.

As administrators attempt to balance these three forces, it will be important for them to understand differential student predispositions to respond to distance education offerings in order to supply accurate information to guide course design and administration. As they consider the key benefits of providing DE course offerings via teleconference,

and contrast them to the cost-driven movement to computer-mediated approaches, they must bear in mind that a primary goal of technology-mediated DE systems is to increase the amount of social presence in order to provide participants with the sense and benefits of a traditional classroom or seminar room.

This research lends support to three hypotheses concerning technology-mediated DE systems. First, that traditional college age students prefer the local section of a DE course on measures of satisfaction with the teleconferenced course, while non-traditional (age 25-34) students do not share this preference. Second, that older, non-traditional, students rate an introductory IT DE course higher for satisfaction with the teleconferenced course than do 18-24 year old students. Finally, that the social presence advantages of Internet-enabled teleconferencing appeal quite a bit more to socially-oriented students than they do to students with a low social orientation, as measured by perceived usefulness, perceptions of learning goals with regard to technology being met, and overall satisfaction with the teleconference.

An unexpected, but serendipitous, finding of this research was that the group that could likely derive the greatest benefits from Internet-enabled DE – older, non-traditional students – also may be more comfortable with the use of that technology, based on their higher reported degrees of self-perceived technical competency.

This research suggests that one possible optimal arrangement for a higher education course with significant technological content could be a traditional lecture or seminar on a main campus, with traditional students and students with low social orientation on the near end, supplemented with an Internet-enabled teleconferenced section at one or more remote locations which are convenient for non-traditional students. As indicated by this research, there would be a general preference by all students for the local section, but the availability of the distant section would increase the gratification of non-traditional students, who are less likely to have the option of attending class in the traditional setting, and at the same time, more likely to readily accept the interactive teleconference as a useful and satisfactory alternative.

It appears that the ideal instructional method for courses with highly technical content is still the traditional, instructor led lecture or seminar. This study has investigated student gratifications for DE by comparing IP teleconferencing to this ideal. One opportunity for further study would be to research the student preferences between the remote section of an Internet-enabled teleconference and the more standard computer-mediated course. In so doing, the costs of the two methods would be more similar, and thus these could reasonably be expected to be alternatives that an administrator might consider. Perhaps more importantly, the variances attributable to technology would be more equally distributed between these two alternatives, and a true estimation of the value of interactivity, as provided by the Internet, might be understood.

7. REFERENCES

Abler, R. T. and Wells, I. G. (2005), "Distributed Engineering Education: Evolution of the Telecollaboration Stations for Individualized Distance Learning." *IEEE Transactions on Education*, Vol. 48, No. 3, pp. 490-496.

Abraham, T. (2002), "Evaluating the Virtual Management Information Systems Classroom." *Journal of Information Systems Education*, Vol. 13, No. 2, pp. 125-133.

Alavi, M., Wheeler, B.C. and Valacich, J. S. (1995). "Using IT to Reengineer Business Education: An Exploratory Investigation of Collaborative Telelearning." *MIS Quarterly*, Vol. 19, No. 3, pp. 293-312.

Alavi, M., Yoo, Y. and Vogel, D. R. (1997), "Using information technology to add value to management education." *Academy of Management Journal*, Vol. 40, No. 6, pp. 1310-1333.

Allen, M., Mabry, E., Mattrey, M., Bourhis, J., Titsworth, S. and Burrell, N. (2004) "Evaluating the Effectiveness of Distance Learning: A Comparison Using Meta-Analysis." *Journal of Communication*, Vol. 54, No. 3, pp. 403-420.

Berger, K. A. and Topol, M. T. (2001), "Technology to Enhance Learning: Use of a Web Site Platform in Traditional Classes and Distance Learning." *Marketing Education Review*, Vol. 11, No. 3, pp. 15-26.

Brewer, P. D. (2004), "An Examination of Alternative Instructional Methods." *Delta Pi Epsilon Journal*, vol. 46, No. 2, pp. 92-104, 2004.

Casini, M. and Vincino, A. (2003), "The Automatic Control Telelab: A User-Friendly Interface for Distance Learning." *IEEE Transactions on Education*, Vol. 46, No. 2, pp. 252-257.

Chang, S. (2004), "High Tech vs. High Touch in Distance Education." *International Journal of Distance Education Technologies*, Vol. 2, No. 2, pp. i-iii.

Evans, J. R. (1986), "Creative Thinking and Innovative Education in the Decision Sciences." *Decision Sciences*, Vol. 17, No. 2, pp. 250-163.

Flowers, L., Pascarella, E. T. and Pierson, C. T. (2000), "Information Technology Use and Cognitive Outcomes in the First Year of College." *The Journal of Higher Education*, Vol. 71, No. 6, pp. 637-667.

Ginsberg, R. B. and Foster, K. R. (1998), "The Wired Classroom." *IEEE Spectrum*, Vol. 35, No. 8, pp. 44-51.

Gloster, C., Jr. and Doss, C. (2000), "A Distance Education Course in Computer Engineering at NC State University." *Computers in Education Journal*, Vol. 10, No. 3, pp. 22-26.

Hara, N. (1998), "Students' Perspectives in a Web-Based Distance Education Course." *Proceedings of the Mid-Western Educational Research Association*, October 14-17, http://php.ucs.indiana.edu/~nhara/paper/mwera98.htm, current August, 2006.

He, A., Zhang, G. and Cheng, Z. (2004), "A Design of Real-Time and Interactive Distance Education." *International Journal of Distance Education Technologies*, Vol. 2, No. 2, pp. 1-12.

Huang, H. and Lu, C. (2003), "Java-Based Distance Learning Environment for Electronic Instruments." *IEEE Transactions on Education*, Vol. 46, No. 1, pp. 88-94.

Johnson, J.D. (2000), "Levels of Success in Implementing Information Technologies." *Innovative Higher Education*, Vol. 25, No. 1, pp. 59-75.

Kirschner, A. (2005), "Alma Mater in the Time of TiVo." *Chronicle of Higher Education*, Vol. 52, December 9,

http://chronicle.com/weekly/v52/i16/16b00601.htm, current August, 2006.

Lemak, D. L., Shin, S. J., Reed, R. and Montgomery, J.C. (2005), "Technology, Transactional Distance and Instructor Effectiveness: An Empirical Investigation." *Academy of Management Learning & Education*, Vol. 4, No. 2, p. 150.

Lipke, D. J. (2000), "Work Study." *American Demographics*, Vol. 22, No. 10, pp. 9-11.

Parnell, J. A. and Carraher, S. (2003), "The Management Education by Internet Readiness (MEBIR) Scale: Developing a Scale to Assess Personal Readiness for Internet-Mediated Management Education." *Journal of Management Education*, Vol. 27, No. 4, pp. 431-446.

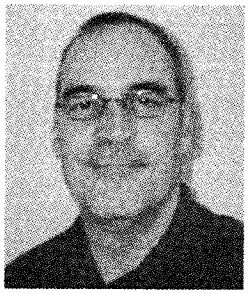
Rovai, A. (2001), "Building Classroom Community at a Distance: A Case Study." *Educational Technology Research and Development*, Vol. 49, No. 4, pp. 1042-1629.

Stafford, T. F. (2005), "Understanding Motivations for Internet Use in Distance Education." *IEEE Transactions on Education*, Vol. 48, No. 2, pp. 301-306.

Stiefelhagen, R., Chen, X. and Yang, J. (2005), "Capturing Interactions in Meetings with Omnidirectional Cameras." *International Journal of Distance Education Technologies*, Vol. 3, No. 3, pp. 34-47.

Wilkes, R. B, Simon, J. C. and Brooks, L. D (2006), "A Comparison of Faculty and Undergraduate Students' Perceptions of Online Degree Programs." *Journal of Information Systems Education*, Vol. 17, No. 2, pp. 131-140.

AUTHORS BIOGRAPHIES



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