

## Technological Delusion: An analysis of the pros and cons of videoconferenced courses in Taiwan

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**Abstract.** Videoconferencing is considered as one of the advanced delivery methods for distance learners in Taiwan. The system generally consists of a broadband transmission network, codec video compression equipment, and audio-visual machines. Although videoconferencing has recently become increasingly popular in universities, it does exhibit several potential factors that could have negative effects on students' learning. This study surveyed 868 on-site and remote-site undergraduates in order to understand their perceptions of and attitudes toward the videoconferencing system. These subjects, belonging to five courses, were taught in five different colleges and universities. The results indicate that several factors could impact student learning via the videoconferencing system. These factors are the learning site, the conception of videoconferencing, and experience with taking videoconferenced courses. Finally, the study concludes with reflections about the lessons learned during the process of developing and delivering videoconferenced courses and some suggestions for further considerations.

**Keywords:** videoconference, distance education, synchronous, Likert scale.

### 1. Introduction

Distance education has expanded dramatically in Taiwan as the development of an information superhighway and its relevant devices have progressed rapidly. In 1995, when the Ministry of Education appointed several universities to launch distance learning programs, it was not clear if such programs were to be established primarily to meet an education need, or if they were simply being driven by the new technology, as noted by DEET (1993, p.78). In order to understand students' perceptions as well as their attitudes toward the videoconferenced courses, educators conducted a few studies and pointed out several potential problems (the Ministry of Education, 1997). This paper intends to deeply investigate the variables which influence students' perceptions of videoconferenced lectures. The ultimate goal, however, is to find out whether the introduction of videoconferencing is thought to benefit most students.

Undoubtedly, two-way videoconferencing is considered to be a close match to traditional classroom instruction that allows the student and instructor to interact face-to-face (Moore & Kearsley, 1996). Research indicates that, despite equipment instability, students and instructors typically like videoconferenced lectures (Rifkind, 1992). However, compared with conventional lectures, such lectures obviously require much greater preparation to convert the material to an appropriate format (Chao, 1999). Moreover, the material must be delivered to the remote sites well in advance of the lecture, and the flexibility of responding to new issues on site is limited as well (Chao, 1999; Knox, 1997). In addition, most people, including instructors and students, have realized that videoconferenced lectures are less dynamic than traditional lectures (Chao, 1999) because instructors must spend extra energy to operate machines, monitor students at remote sites, maintain proper actions and eye contacts within camera range, etc. Accordingly, some lecturers have been required to

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adjust their teaching techniques and habits, sometimes resulting in slower lectures during which students feel bored and distracted.

Interaction is another critical issue that affects the success of videoconferenced courses. In order to overcome issues derived from both physical and psychological distance (Amundsen, 1993), instructors must attempt to improve their verbal and nonverbal communication, hoping to provide a real classroom-like environment for students at both sites. However, interaction between the instructor and two groups of students is more difficult than in the traditional classroom. Compared to on-site students, remote-site students felt that interactions between teachers and students such as feedback, affirming and correcting their performance, and proximity, were more constrained (Chao, 1999). It is therefore suggested that a protocol must be established to ensure equity and to encourage query and answer (Knox, 1997). One should bear in mind that interaction, particularly with larger groups, is extremely difficult but still needs to be encouraged.

The original mission of distance education was to open up learning opportunities for people who had not been able to complete traditional education. As technology advances, people will have more freedom and opportunity to choose how they learn despite age, social status, etc. Videoconferencing, as one of the most popular synchronous distance learning styles, has been widely used in universities and colleges in Taiwan. Because of its cost-effectiveness, institutions which provide such courses usually consider large-scale economy; that is, they enroll many students or broadcast the lectures to many sites simultaneously. While researchers have mentioned several factors affecting the success of two-way videoconferencing (Massoumian, 1989), and specific requirements for instructors (James & Beattie, 1996; Knox, 1997), we should be more cautious when running videoconferenced lectures. This study tries to analyze students' perceptions and attitudes toward the videoconferenced lectures based on these variables: the students' learning site, their videoconferencing conception, and their videoconferencing experience. It may be possible to establish relationships between their perceptions and these variables so that course providers can take them into account in order to provide quality videoconferenced lectures. Specifically, this study poses the following questions: (1) Are there any relationships between the learning site and students' perceptions of learning and teaching? (2) Are there any relationships between students' videoconferencing conceptions and their perceptions of learning and teaching? (3) Are there any relationships between students' videoconferencing experience and their perceptions of learning and teaching?

## **2. Method**

### **2.1. Subjects**

Eight hundred and sixty-eight undergraduates enrolled in five videoconferenced courses at three universities in Taiwan during the 2006 academic year participated in the study as subjects. Of the 868 students enrolled in the courses, 195 were on-site and the others were at three remote sites.

### **2.2. Interactive videoconferencing system**

Without advanced technology, videoconferencing would not be possible, though the technology does not always work perfectly. The system in this study includes a Multiple Control Unit (MCU), a CODEC, a main camera, a lap-top personal computer, an audio mixer, a video mixer, a main controller, one large receiving screen, and a data viewer. The on-site students can see the remote-site students on the large screen installed in the on-site classroom. A small monitor on the podium allows the instructor to view the remote sites. The remote sites have monitors, computers, data viewers, etc, for additional communication.

### **2.3. Videoconferenced Courses**

The videoconferenced courses in which the students were enrolled were general studies courses. The five courses spanned a wide and diverse array of content areas, including (1) Food and Nutrition; (2) The Internet; (3) Employment and Work; (4) Introduction to Cosmism; (5) Introduction to Medicine.

### **2.4. Survey Instrument and Analytic techniques**

The primary survey instrument used in the study was expressly designed to understand students' learning perceptions and their attitudes toward teaching performance in the videoconferenced courses. Learning perceptions included information on query/answer frequency, level of understanding, and level of class

dynamics, while teaching performance included subitems on receiving handouts in advance, the instructor's presentation skills, and the instructor's attention management. The Likert scale (1: very little, 5: very much) was used to assess student satisfaction with these elements of the course. A paired t-test was used to analyze relationships based on the geographical data gathered in the study, such as gender, learning sites (on-site or remote-site), with or without the conception of videoconferencing, and with or without experience with videoconferenced courses.

### 3. Results

Results will be interpreted based on the following research questions: (1) Are there any relationships between the learning site and students' perceptions of learning and teaching? (2) Are there any relationships between students' videoconferencing conceptions and their perceptions of learning and teaching? (3) Are there any relationships between students' videoconferencing experience and their perceptions of learning and teaching?

#### 3.1. Are there any relationships between the learning site and student perceptions of learning and teaching?

Table 1 compares on-site and remote-site students' learning perceptions and their attitudes toward the instructor's teaching performance. The results indicated that there were significant differences between the on-site and the remote-site students on query/answer ( $t = 4.73$ ,  $p = .000$ ), understanding ( $t = 7.73$ ,  $p = .000$ ), and class dynamics ( $t = 3.21$ ,  $p = .001$ ). The remote-site students perceived the class to be less interactive, understandable and dynamic than did the on-site students. On the other hand, the on-site students' attitudes toward the instructor's teaching performance were significantly different from those of the remote-site students (presentation skills:  $t = 3.81$ ,  $p = .000$ ; attention management:  $t = 4.44$ ,  $p = .000$ ). The on-site students showed more positive attitudes toward teacher's presentation skills and his/her attention management than did the remote-site students.

Table 1: Comparisons between on-site and remote-site students' learning perceptions

Variables	On site Mean (SD)	Remote site Mean (SD)	t	p
Learning Perceptions				
query/answer	3.33 (.85)	3.02 (.90)	4.73	.000*
understanding	4.10 (.63)	3.73 (.71)	7.73	.000*
class dynamics	4.05 (.61)	3.90 (.74)	3.21	.001*
Teacher's Performance				
access to handouts	4.18 (.61)	4.15 (.63)	.79	.482
presentation skills	4.11 (.68)	3.92 (.75)	3.81	.000*
attention	2.98 (.89)	2.68 (.93)	4.44	.000*

Note: \*-- represents the level of significance  $\leq .05$

#### 3.2. Are there any relationships between students' conceptions of videoconferencing and their perceptions of learning and teaching?

Table 2 shows comparisons between students with the conception of videoconferencing and those without such an conception of their learning perceptions and their attitudes toward the teaching performance, and no significant differences between these two groups were found except on "class dynamics" ( $t = 2.14$ ,  $p = .032$ ). Students with an understanding of videoconferencing perceived the class to be more dynamic ( $M = 3.99$ ,  $SD = .66$ ) than those who lacked this understanding ( $M = 3.82$ ,  $SD = .84$ ).

Table 2: Comparisons between the students with and without the videoconferencing conception

Variables	w conception Mean (SD)	w/o conception Mean (SD)	t	p
Learning Perceptions				
query/answer	3.13 (.90)	3.10 (.89)	.273	.785
understanding	3.63 (.82)	3.45 (.79)	1.65	.099
class dynamics	3.99 (.66)	3.82 (.84)	2.14	.032*
Teacher's Performance				

access to handouts	4.19 (.62)	4.16 (.55)	.442	.658
presentation skills	3.83 (.82)	3.73 (.83)	1.02	.309
attention	2.79 (.93)	2.65 (.88)	1.26	.208

Note: \*-- represents the level of significance  $\leq .05$

### 3.3. Are there any relationships between students' videoconferencing experience and their perceptions of learning and teaching?

Table 3 summarizes the results of the comparisons between students with videoconferencing experience and those without such experience on learning perceptions and teaching performance. The two groups showed significantly different attitudes on the items of "understanding" ( $t = 2.36, p = .019$ ) and "access to handouts" ( $t = 2.86, p = .004$ ). Students with videoconferencing experience showed higher mean scores on "understanding" ( $M = 4.09, SD = .69$ ) than those without this experience ( $M = 3.95, SD = .76$ ). Meanwhile, Students with videoconferencing experience showed more positive attitudes toward "access to handouts" ( $M = 4.19, SD = .57$ ) than those without experience ( $M = 4.04, SD = .76$ ).

Table 3: Comparisons between students with videoconferencing experience and those with none

Variables	w experience Mean (SD)	w/o experience Mean (SD)	t	p
Learning Perceptions				
query/answer	3.21 (.88)	3.11 (.95)	1.24	.217
Understanding	4.09 (.69)	3.95 (.76)	2.36	.019*
class dynamics	3.42 (.96)	3.36 (.98)	.625	.532
Teacher's Performance				
access to handouts	4.19 (.57)	4.04 (.76)	2.86	.004*
presentation skills	3.83 (.96)	3.82 (.86)	.145	.885
Attention	2.80 (.91)	2.78 (.99)	.298	.766

Note: \*-- represents the level of significance  $\leq .05$

## 4. Discussion

The findings of the present investigation offer some interesting points that need further examination. Regarding the first question, it is very obvious that the learning site is the key factor influencing student perceptions of learning and teaching. The data indicating that remote-site students perceived the class to be less interactive, understandable and dynamic than did on-site students were positively confirmed in the study conducted earlier (Chao, 1999). As mentioned above, the instructors tried to improve their verbal and nonverbal communication in order to overcome physical and psychological limitations, but interaction between instructor and two or more groups of students is more difficult than before. It is worth considering that, although the instructor must take care of the remote-site students, the on-site students' still feel more positive about the instructor's presentation and attention management skills than do the remote-site students. One possible explanation could be that ingrained learning habits make them feel secure as long as they are physically with the "real instructor." The other side of this explanation might suggest that Taiwanese students need more training in independent learning.

The second question addresses whether student's conception of videoconferencing influences their perceptions of learning and teaching, and the results indicate that students with a concept of videoconferencing showed higher mean scores on "class dynamics" than those without such a concept. It is assumed that students with a videoconferencing concept understand the process of such courses and are patient while the instructor is interacting with the remote-site students, and moreover, can appreciate this opinion-sharing process.

The third question explores the relationships between students' videoconferencing experience and their perceptions of learning and teaching, and the results indicate that students with videoconferencing experience showed higher mean scores on "understanding" and "access to handouts" than those without such experience. The findings regarding this pattern of data are worth noting. Students with such prior experience have obviously adapted to the system and figured out how to learn in this situation. Instructors should take advantage of these students to run a short workshop designed to help those who are new to videoconferenced courses, and to encourage peer interaction as well.

## 5. Conclusion

The results of this study differ on some respects from those of Cho's 1998 study (Cho, 1998), in which the author concludes that remote-site students did not perceive the videoconferencing system to be a disadvantage in terms of interactions and communications. However, as the author explains, this phenomenon resulted from the teacher's efforts to pay special attention to remote-site students in order to overcome physical distance at the beginning of the lesson, and as the teacher adjusted his/her attention distribution, remote-site students still showed negative attitudes toward the teacher's performance. Thus, we should bear in mind that the instructional design and strategies of videoconferenced courses should be approached separately according to the learning sites. Teachers should also structure activities and communications for videoconferenced courses carefully to balance interactions with and attention to all students. In addition, students' prior experience with videoconferencing should be considered as a factor in the course design; for those without such experience, a course orientation must be given before the course starts. However, most important is the establishment of a distance learning concept for students, so that they will not depend on the instructor too much, and consequently, will benefit from the remote-site learning as well.

Generally speaking, through trial and error, videoconferenced course offerings have improved. Both instructors and students have begun to yield their class roles to each other. Technology plays an important role in this development, and it will continue to do so. It is also true that this technology causes extra work for both academic and general staff so that planning, preparation and regular communication between different sites still needs to be improved. Nevertheless, a videoconferencing system provides the most convenient distance learning environment, and is likely to become increasingly important in distance education in the years ahead. In this circumstance, several significant technical limitations must be solved as soon as possible, especially as to the number of sites that can be accommodated, etc. We hope that through the use of new technology and team effort, the quality of videoconferenced courses will continue to rise.

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