

Running Head: ANALYSIS OF INSTRUCTOR INTERACTION AND PREPARATION IN
TWO-WAY INTERACTIVE VIDEOCONFERENCING ENVIRONMENTS

An Analysis of Instructor Interaction and Preparation In Two-way Interactive Videoconferencing
Learning Environments

by

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Introduction

Throughout higher education and K-12 school districts the integration of technology into the classroom has exponentially increased over the past decade (Honey, McMillan Culp, & Carrigg, 1999; NCES, 2002) and there does not appear to be a slow down in this trend to construct technology rich learning spaces and systems (Butin, 2000; Williams, 2004). Increasingly schools and institutions are utilizing or planning for technology to offer media rich distance learning opportunities (NCES, 2001; USDOE, 2004). Advances in technology, competition in the industry, and reductions in telecommunications costs, combined with growing usage of funding programs, has now placed these technologies within the financial reach of the majority of schools (Greenberg, 2004; Cole, Ray, & Zanetis, 2004).

Through the integration and use of videoconferencing and related Information Communications Technology (ICT) systems in the classroom, numerous authentic learning opportunities that expand the traditional classroom experience can be provided via face-to-face global communications, virtual field trips, and other social interactions (Kozma, 2003; Williams, 2004). With this in mind, “as technology moves from the periphery to the center in P-12 schools, so must it move from the periphery to the center in teacher preparation” (NCATE, 1997).

Problem Statement

One aspect of necessary teacher preparation with regard to the use of two-way videoconferencing involves implementing pedagogical strategies that provide an engaging and interactive instructional experience for both face-to-face and distant students. Critical to this experience is the design, development, and delivery of instructional content and mastery of the interconnected system of technology tools used in this environment. This study will seek to

provide much needed insight and direction into the theory and practice of utilizing interactive videoconferencing for quality instruction, as it relates to instructor preparation and interaction.

Research Questions

As described by Miles and Huberman (1994), this will be a qualitative study that involves a multimethod, multiple case sampling approach toward researching instructor preparation and interaction, when utilizing two-way videoconferencing systems in the classroom. Specifically this study will attempt to answer the following questions through classroom observation and instructor interview data analysis:

- What preparation have instructors received to provide quality interaction with students, when utilizing two-way videoconferencing systems in the classroom?
- How do instructors perceive their use of videoconferencing in the classroom?
- In what ways does two-way videoconferencing facilitate instructional interaction?

Conceptual Framework

To guide this inquiry into instructor interaction, preparedness, and the transactional aspects of teaching with two-way interactive video, John Dewey in “Democracy in Education” provides an initial foundation on which to build. It was here that he described, “the teacher should be occupied not with subject matter in itself but in its interaction with the pupils' present needs and capacities” (Dewey, 1916).

In their book “Distance Education A Systems View”, Moore and Kearsley build upon the concept of interaction by describing Learner-Content, Learner-Instructor, and Learner-Learner interaction. In a similar vein, Terry Anderson and Fathi Elloumi describe three additional types of interaction, Teacher-Teacher, Teacher-Content and Content-Content. Anderson goes on to define the relationships of all six types of interaction with each other, and to illustrate their influences relevant to the type of educational media (face-to-face, videoconferencing,

teleconferencing, computer conferencing, radio, web based learning, etc.) being employed (Anderson & Elloumi, 2004).

Dewey's original concepts of interaction evolved in 1949, when he and Alfred Bentley published "Knowing and the Known", where they described the transactional view. While there are a number of aspects to the transactional view, Dewey's description of dependability of communication can be seen as key factor in using modern videoconferencing for instruction. With regard to two-way interactive video in the classroom, the instructor, the students, and the individual technology tools that comprise an "interactional" learning environment can be looked at as an entire transactional system.

Building on the work of Dewey and Bentley, in his efforts to define the transactions that take place in distance education, Michael G. Moore expanded upon the concept of the transactional view to develop what is now known as the theory of transactional distance. Which "describes distance as a pedagogical/andragogical phenomenon having the 'macro-factors' of structure and dialogue" (Moore & Kearsley, 2005). Structure and dialogue can be examined through the six types of interaction.

Focusing on the teacher-student and teacher-content aspects of interaction and the transactional elements of instruction, the Framework for Teaching that was developed by Charlotte Danielson in conjunction with the Educational Testing Services and the Association for Supervision and Curriculum Development provides 4 key domains and 22 subcomponents for use in evaluation. Among the components of this framework the "Selecting Instructional Goals", "Demonstrating Knowledge of Resources", and "Designing Coherent Instruction", subcomponents of Domain 1, will be used evaluate the teacher preparation aspect of this study (Danielson, 1996). While Danielson's framework can be applied to interaction and technology

tools such as videoconferencing it appears to be best suited for a face-to-face classroom experience. It is Roblyer and Wiencke that constructed a distance learning based rubric for measuring “five separate elements that contribute to a course’s level of interaction and interactivity”, which will be examined in this study. The five elements are Social/Rapport-Building Designs for Interaction, Instructional Designs for Interaction, Interactivity of Technology Resources, Evidence of Learner Engagement, and Evidence of Instructor Engagement (Roblyer & Wiencke, 2003).

A Review of Methodological Literature

As Delamont points out in “Fieldwork in Educational Settings”, “reading is not enough on its own” (Delamont, 2002). In this book she outlines several basic pieces that should be entered into one’s literary notes. Among these basic pieces is information on the authors methods, theories, participants, conclusions and other procedural elements. It is in this section, that details on two highly relevant research articles are provided.

Introduction - Peterson

In “Making Interactivity Count: Best Practices in Video Conferencing”, Christine Peterson explores the growth of distance education in postsecondary institutions and seeks to provide best practices in the creation of effective distance learning environments, while ensuring quality interaction. The distance learning environment that Peterson focuses on is facilitated through videoconferencing. In the videoconferencing environment, Peterson examines learner-learner, learner-content, learner-instructor, and learner-interface interactions the impact the technology has on them. Peterson states that some people claim that the level of interaction in a face-to-face classroom can be duplicated in a distance environment while providing similar student experiences. With this in mind, Peterson states that the lack of direct instructor presence in the distance learning environment causes a transactional distance that can result in an informalization of the learning environment. This informalization, can result in an overall decrease in course effectiveness. Instructors therefore need to maximize interactions to ensure learner satisfaction. Peterson seeks to answer three research questions to identify “effective strategies and best practices for consideration in the delivery of video conferencing courses:

1. How does technology impact interactions over time?
2. How does technology impact interactions at host versus remote sites?

3. How does technology impact interactions according to students' perceptions?" (Peterson, 2004)

Findings and Results - Peterson

A mixed method approach to answering these research questions, resulted in a fairly substantive amount of quantitative and qualitative data being obtained. The observed quantitative interaction data was presented in a table format indicating total observed occurrences of coded interactions and the mean score across the observed sessions. Similarly a table of student and instructor perceived intervals of interaction in response to interviews was generated and a mean scores were given. In answering the three main questions some variations between the quantitative and qualitative data were found.

For question one, how does technology impact interactions over time? The observed interactions indicated that Teacher to class (T-C) and students to class or to students at the other site (S-C) were the occurred most frequently. However students perceived that student to student at the same site (S-SS) interactions occurred the most. Additionally Peterson stated that "over time it was revealed in participants' responses that interactions with remote site students and interactions with the technology were impacted the most" (pg. 67).

For question two, how does technology impact interactions at host versus remote sites? "Participants agreed that students' different site interactions were greatly impacted by the technology" (pg. 67) with remote site students and instructor interactions occurring more often than instructor to host site interactions. One possible conclusion was that the videoconferencing environment "forced" instructor to remote site student interactions to occur.

For question three, how does technology impact interactions according to students' perceptions? It was determined that "students' perceptions of interactions may not be directly

related to the actual time spent on interactions but rather on the quality of the interaction” (pg. 67). The most significant feedback on this interaction was found in reflective responses collected throughout the study.

In the end a table of 14 suggestions for improving interactions with remote site students and interactions with the technology was produced along with an additional listing of 12 practices for improving interaction in videoconferencing courses. Peterson does offer a word of caution in generalizing the findings of this study to other populations. In that the instructor had not taught a distance based course prior to this and all expect one of the participants had taken two-way videoconferencing courses prior to this.

Methodologies - Peterson

The study that lead to these findings was comprised of 14 masters level students enrolled in Morgantown and Charleston West Virginia as part of the Family/Community/Rural Health Systems nursing course delivered through West Virginia University’s Interactive Video Network. The instructor was a 22 year teaching veteran, with no prior distance education experience other than a guest lecturing experiences. The course met once each week, for six weeks, for four hours each course. All 14 of the students indicated that they would enroll in a videoconferencing course again.

Procedurally the study utilized quantitative measures observing six interaction categories in five-minute intervals over the duration of the course, and surveys were distributed on two occasions. The study also utilized qualitative student and teacher reflections and interviews with instructor and the host and remote site participants. Observation intervals were coded teacher-class (T-C), Teacher to specific student (T-SS), origination site student-teacher (OS-T), remote site student to teacher (RS-T), student to student at the same site (S-SS) and student to the class

or student at the other site (S-C).

The quantitative surveys that were distributed had three sections. Section One assessed perceptions toward overall course interaction between the instructor and students. Section Two gathered data on the technologies impact on interaction and Section Three had participants assign ranks to interactions using a Likert like scale, based on the degree to which they felt it was impacted by the technology. The qualitative reflection forms were distributed at the end of three class sessions. These forms “gave participants an opportunity to provide feedback on things that went well during the class sessions, things they liked or learned, recommendations for improving the class, and the impacts of the technology used during the class sessions. The interviews were conducted with two host and two remote site participants at varying times in the course.

Focusing on interactivity and the impact of technology on interactions the following interview questions were asked.

How would you describe interactions in this environment?

Based on your above description what contributes to or distracts from interactions?

How important do you feel interactions are in a distance learning environments? Why?

How do you feel about the use of technology in learning environments?

How does the use of technology in this course affect the way you interact with the a.

instructor, b. content, and c. other students.

The instructor interviews that were held prior to the first class and after the last class asked similar questions toward interactivity, but also discussed instructional techniques and methods.

Conclusion - Peterson

While this study collected a substantive amount of qualitative and quantitative data on varying interactions, only rudimentary statistical analyses were performed on the data sets.

Correlations were derived through a comparison of mean scores, where a t-test or ANOVA could have provided more statistically definitive results. While there were sound references toward theoretical indicators of interaction in the introduction and purpose statement, a lack of theoretical influence on the resulting list of best practices was noted. That is not to say that the list of recommended practices derived from qualitative feedback and quantitative observations, does not benefit the development of quality interactive distance learning environments.

Introduction – Roblyer and Wiencke

A second study on interaction and distance learning, as indicated by its title “Exploring the interaction equation: validating a rubric to assess and encourage interaction in distance courses” focused on the development and validation of a rubric used to measure the levels of interaction in distance courses. In this article, Roblyer and Wiencke indicated that “substantial distance learning theory and research has focused on the role of interaction in successful distance learning courses. Findings indicate that increased interaction in distance courses is associated with higher achievement and student satisfaction” (pg. 1). From their research, Roblyer and Wiencke proposed five key elements for measuring interaction in distance learning. The first is “social and rapport-building designs for interaction”; second, “instructional designs for interaction”; third, “interactive capabilities (interactivity) of the technologies used in the course”; fourth, “evidence of learner engagement”; and fifth, “evidence of instructor engagement”. Each of these elements were clarified through the use of supporting theoretical research indicating “that instructors, learners, and technologies are all essential parts of the interaction equation” and a distance course is “a created environment in which social and instructional messages are exchanged among entities of a course, and in which messages are both carried and influenced by the activities and technology resources” (pg. 2).

These five elements were subsequently incorporated into the interaction rubric that was developed. Once developed, initial testing and review of the rubric by 42 distance learning instructors revealed that it “did not consider concurrent validity or traditional measures of inter-rater reliability” (pg. 3). Based on this initial instructor feedback, the rubric was refined and this study was expanded to include measurement of additional courses.

Findings and Results – Roblyer and Wiencke

Analysis of the rubric’s ability to measure interaction across four courses and to assess the individual elements that make up the rubric were performed in three key ways. First Chronbach’s alpha levels of .88, .64, .93, and .95, were calculated across rubric scores of each course. These alpha levels are indicative of a high consistency across the student raters in each course. Second, to obtain indicators of concurrent validity, correlations using Pearson’s r were calculated with the overall rubric scores and course evaluation scores resulting in $r = .630$ ($p < .05$), $r = .720$ ($p < .01$), $r = .643$ ($p < .01$), and $r = .475$ ($p < .01$) for courses 1 through 4 respectively. Third, correlations between scores on individual rubric elements and course evaluation scores were also calculated using Pearson’s r . “All correlations were found to be significant...”. “The highest correlations were observed between evaluation scores and Element #4: Student engagement. Lowest correlations were on Element #3: Technology interactivity. Overall correlations were fairly high, with total evaluation score correlating with total rubric score at .641 ($p < .01$)” (pg. 3).

To further validate the rubric, additional correlations were done to determine if student perspectives were related to their prior experiences with distance learning or their possible preferences toward the course delivery format. Roblyer and Wiencke indicated that “no significant correlations were found between any of these variables”. Lastly, a qualitative

interpretation of student perceptions was incorporated into the study to provide further insight into “each course’s interactive qualities and of the importance of interaction to overall course quality”. Among 68 students that completed the rubric, only 27 (40%) of them provided qualitative feedback in the form of responses to open ended questions. The majority of these responses were brief, yet complimentary, and “only a few offered any information helpful to the purpose of this study” (pg. 4). Among this feedback was the formative expression of need for more direction on how to use the variety of online tools that accompany the courses.

Methodology and Conclusion– Roblyer and Wiencke

To obtain the above results, the interaction rubric in this study was included as part of qualitative and quantitative anonymous post-course evaluations in four classes at two universities. For consistency and to further validate the rubric, “the post-course evaluation instrument usually used at University #1 was used for all courses” at both universities. “Also, students were asked if this was their first online course and their preferred delivery system (online, face-to-face, combination, no preference, or other), and they were allowed to make open-ended comments” (pg. 3). The courses themselves were a mix of completely online asynchronous, limited face-to-face interaction, and synchronous videoconferencing with asynchronous activities. The varying characteristics of the four courses percentage indicators were assigned to each of their asynchronous, synchronous, and face-to-face components. Of the 92 students enrolled in the courses 68 (74%) of them ended up completing the rubric with the post-course evaluation. In the end, “the results from this study provide further, though still tentative, evidence that the rubric designed to assess interactive qualities is a valid and reliable measure of one important aspect of distance courses”. The authors also recommended that further studies that incorporate larger samples and other course types will help to further the

development and assessment of distance learning environments in relation to observed interaction.

Methodology

This section describes the methodology and procedural elements that will be used in seeking answers to the questions that guide this study. It also seeks to define the researcher's role and stance in addition to detailing the sample selection, procedures for data collection, and the approach to data coding and analysis. Lastly a justification for the study's validity and reliability is proposed.

Building on the theories of interaction and transaction set forth by Dewey, Moore, Anderson, and others, aspects of the Danielson framework will be combined with the Roblyer and Wiencke rubric to provide a lens through which to investigate instructor preparation and interaction in the instructional environment, when utilizing a two-way videoconferencing system. By combining qualitative data collection with the application of quantitative measures to data analysis, this study will attempt to answer the following questions:

- What preparation have instructors received, or should they receive, to provide quality interaction with students, when utilizing two-way videoconferencing systems in the classroom?
- How do instructors perceive their use of videoconferencing in the classroom?
- In what ways does two-way videoconferencing facilitate instructional interaction?

Role/Stance

As a former Manager of Media Services at an institution of Higher Education and now a K-12 school district Technology Coordinator and Instructional Technology doctoral student, this researcher has been able to build a number of collegial relationships with faculty that utilize videoconferencing for instruction. In my role as researcher, I plan to be able to maintain objectivity by observing as an onlooker, without providing direct support or even having any

occurrence of communication with the participants during the sessions, other than introducing myself and observing the faculty and students in the instructional environment.

Communications with the participants would be conducted during interview sessions.

Professional ties to the sites and participants, should assist in providing access to the necessary observational components of the study. In terms of conducting faculty interviews, the collegial relationship that I have already built, should help to set the participants at ease and maintain useful dialogue.

Sample Selection

Finding videoconference courses offered at K-12 or higher education institutions that cover a range of subject areas and varying instructional uses will be the first step in selecting the sample population. This task will be accomplished through inquiries with institutions of higher education, K-12 schools, and local K-12 intermediate units. Once technologically capable and diverse sites have been located, faculty and instructors that are willing to participate will need to be found, and the necessary permissions to observe faculty and students will need to be obtained where applicable. Prior approval from the dissertation committee and the Duquesne University Institutional Review Board for Research Involving Human Subjects will also be needed.

Procedures

Observations

In “Qualitative Research a Personal Skills Approach”, Gary Shank reminds us that “... thick description is not voluminous description ... [and] the task of thick description is to make meaning clear” (Shank, 2002). While the primary source of observation data will be the researcher’s journal notes, one advantage to studying and observing this instructional

environment is the fact that it can readily be recorded onto videotape for additional review and interpretation without introducing any new equipment or otherwise distracting elements to the classroom. The necessary equipment and the recording process is already an integral part of the instruction and teacher-student interaction. Therefore, whenever possible, direct observations will be recorded through videotaping, either by an external camera source, or through the videoconferencing system if applicable to the site. Recorded observations will then be digitized, edited, and representative occurrences of interactions will be coded and stored for content analysis and display.

Interviews

Interview questions, were prepared for the purpose of obtaining useable data for analysis and on aspects of ensuring overall validity in this research. With this in mind, a semi-structured, open-ended interview in which guiding questions will be used to keep the interview on track, will be conducted with faculty participants. With a strictly structured interview, an open ended survey instrument could have been prepared and sent out for written responses instead, but the responses obtained most likely would not be as extensive as those obtained through verbal feedback and opportunities for divergent and more personal lines of questioning would not be possible. As Dr. Gary Shank points out in his book *Qualitative Research a Personal Skills Approach*, "... an interview is a form of conversation. A very specialized and skilled type of conversation to be sure, but a conversation nonetheless" (Shank, 2002). While thinking of the interview as a conversation, it will also be necessary to keep in mind the words of Harry Wolcott, "talk little, listen a lot" (Wolcott, 1994). Raw data from audio recordings of the responses to interview questions were digitized and transcribed into a word processed format. As a result of the conversational style of the interview, some additional questions arose. All

interview questions and the obtained responses can be found in Appendix B, the interview transcription.

Data Coding and Analysis

The qualitative data obtained through observations and interviews will be coded as part of preliminary analysis, since “it is important not to leave material pile up unanalyzed” (Delamont, 2002). One means of creating codes for analysis is by developing a list “from the conceptual framework, list of research questions, hypotheses, problem areas, and/or key variables that the researcher brings to the study” (Miles & Huberman, 1994). Furthermore, Delamont recommends to “index and code your data densely: do not try to summarize them under just a few themes. Generate as many codes as you can; be ‘wild’ if you can” (Delamont, 2002). With this in mind, codes derived from the primary components of the theoretical framework, research questions, and a few other conceptual factors appear in (parentheses) as follows.

SUPPORTING THEORETICAL INTERACTIONS:

teacher-teacher (TT), student-teacher (ST), teacher-content (TC), student-content (SC), student-student (SS), and content-content (CC) interactions.

ADDITIONAL CONCEPTUAL CODES:

Teacher-Technology Interaction (T-Tech), Student Technology Interaction (S-Tech), Technology-Technology Interaction (Tech-Tech), and Teacher-Student (TS) Interaction.

ROBLYER & WIENCKE, 2003, INTERACTION RUBRIC CODES:

The five elements of the rubric, described below, were coded as Element #1 (SR-I), Element #2 (ID-I), Element #3 (TR-I), Element #4 (LE), and Element #5 (IE).

“Element #1: Social/Rapport-building Designs for Interaction (that is, do course activities encourage students to get to know each other on a personal basis?)

Element #2: Instructional Designs for Interaction (that is, do the learning activities require students to interact with each other and with the instructor?)

Element #3: Interactivity of Technology Resources (that is, what level of interaction does the technological delivery system allow?)

Element #4: Evidence of Learner Engagement (that is, do students create good responses to each other’s messages and initiate new ones?)

Element #5: Evidence of Instructor Engagement (that is, does the instructor reply promptly and helpfully to students’ questions?)” (Roblyer & Wiencke, 2003)

CHAROLETTE DANIELSON’S 1996 FRAMEWORK FOR TEACHING, CODED SUBCOMPONENTS OF DOMAIN 1:

“Selecting Instructional Goals” (SIG), “Demonstrating Knowledge of Resources” (DKR), and “Designing Coherent Instruction” (DCI) (Danielson, 1996)

Basic quantitative measurements will be applied to the occurrences of coded observation data. The quantifiable interaction and preparation elements will be represented in terms of frequency, maximum, and minimum occurrences. The relationship between observed interactions and perceived interactions will be explored through a comparison of quantitative and qualitative data, in an effort to provide insight and direction into the overall significance of resulting interpretations and visualizations.

Reliability and Validity

“We never set out to observe it all” (Wolcott, 1994), but “we seek to see those things that others have overlooked, to hear those things that others have failed to notice, and, in general, to

find things that make our understanding richer and deeper” (Shank, 2002). That being said, all levels of consideration will be given to participant privacy, confidentiality and consent, ensuring that these factors have no impact on the trustworthiness and ethics of this study. Session recordings are available to provide a method of validating observation notes. Interview questions used to give structure to the dialogue were developed from the same theoretical foundation that is being used to code and analyze observational data. Within these questions, a measure of internal reliability was built in, by asking some of the same questions, multiple times and in different ways, in order to see if the same, or very similar responses are obtained. Within the process of interviewing/conversing the dynamics of the interview triggered different thought processes and reflections on past experiences and subsequently varying responses were received. Nonetheless, this method of questioning provides an added measure of validity. The observation data and interview transcripts will be triangulated with scored responses to the Roblyer and Wiencke interaction rubric, as well as the partial rubric selected from within the Danielson framework for teaching. Both of these rubrics have already been field tested within a number of different educational settings. This approach to multiple data source analysis provides a means to verify the data from individual sources.

Analysis

An analysis of research notes, observation data (Appendix A), and interview statements (Appendix B) brings to light several factors of interest. During the observation of a elementary grade level videoconference that used curriculum co-developed by two university’s (Duquesne University and Wheeling Jesuit Univeristy), it was evident that a considerable level of planning and preparation went into the selection of instructional goals and design of coherent instruction as described by Danielson in the framework for teaching. In the delivery of this lesson,

Instructors demonstrated knowledge of the classroom and student resources that facilitated student learning. In applying the Roblyer and Wiencke rubric to the observation data, high levels of Social/Rapport building, Instructional Designs, Interactivity of Technology, and Learner Engagement were noted, with somewhat lower evidence of Instructor Engagement.

Table 1: Observed Interaction Measures

Theoretical Interaction	Code	Observed Occurrences	Occurrences > 10
Teacher-Teacher	TT	3	No
Student-Teacher	ST	13	Yes
Teacher-Content	TC	2	No
Student-Content	SC	19	Yes - Max
Student-Student	SS	11	Yes
Content-Content	CC	1	No - Min
Teacher-Technology	T-Tech	5	No
Student-Technology	S-Tech	14	Yes
Technology-Technology	Tech-Tech	4	No
Teacher-Student	TS	15	Yes

Despite distinct differences in subject matter and grade level, a number of similarities were noted, between the observed videoconference and the interview data. With regard to teacher preparation and teacher-teacher interaction, it was noted that a team of content and instructional design experts developed the NASA E-mission that was observed and multiple facilitators were present in the classroom, with an additional instructor acting as Mission Control via videoconference. With that in mind, Dr. T said, “I think it is also better to have people who

really know what they are talking about and we all really know part of the area better than somebody else, or somebody else knows another part of the area better than we do” (E.W. McKaveney, personal communication, April 22, 2005).

Further similarities were observed with regard to student-student interaction. During the E-mission students were placed into groups and while they worked together to solve problems the instructors and Mission Control remained relatively silent. This pedagogical approach can be seen in Dr. T’s teaching in that “when you do group discussion, break them into smaller groups, I found out that you are better off shutting your monitors off, let the students do that in their own environment, and let’s get back together for the reports” (E.W. McKaveney, personal communication, April 22, 2005).

The use of varied instructional media elements in the delivery of courses is another factor that was found to be in both the observed and interview data collected. The E-missions utilized video graphics in combination with computer-based content, which did not differ much from the interview description of a college level Theology course given by Dr. T. Throughout the interview Dr. T, indicated that PowerPoint was used in conjunction with a SMARTboard and that videotaped materials were occasionally shown to students.

Interpretation

Based on the initial analysis of the observation data it can be conceptualized that the levels of instructor preparation go hand-in-hand with the levels of interaction. Also in observing videoconference based instruction and in reviewing responses to interview questions, certain areas of interaction do not appear to be as applicable to this media relative to other types of distance based instruction, such as online courses. As observed, there was really only one measure of what was loosely described as content-content interaction, and that was the

interaction of timed graphics with a projected on screen image. At the same time, this interaction was perceived as a form of technology-technology interaction. Anderson described content-content interactions as something that is increasingly occurring in automated/intelligent technologies, where content is programmed to interact with other content in order to keep itself up to date. Anderson used the specific example of “a weather tutorial [taking] its data from current meteorological servers, creating a learning context that is up-to-date and relevant to the learner’s context” (Anderson & Elloumi, 2004). While this particular instructional videoconference did not incorporate significant content-content interaction, the extent of the other interactions, more than compensates for this fact. In the course of the interview, Dr. T, appeared to perceive content-content interaction as a new concept and could only think of one minimally related occurrence of what could be considered this type of interaction in his teaching. However, there remains a great potential for incorporating this type of live data interaction into videoconferencing, because of its highly visual nature.

It is this observation and interview data that provides insight into answers to the primary research questions found in this study.

What preparation have instructors received, or should they receive, to provide quality interaction with students, when utilizing two-way videoconferencing systems in the classroom? There are varying factors involved in answering this question. First the instructor should be well versed in their subject area and capable of successfully delivering the lesson in a face-to-face environment. Second the instructor does not necessarily need to be well versed in the technology, provided that a trained technician is in the room for the purpose of facilitating the use of the technology. Third, exposure to the technology and the process of being on camera, enables instructors to observe themselves and their teaching habits, which can subsequently lead

to conscious improvements, by overcoming subconscious habits, such as “a tendency to talk with my hand over my mouth, or ... a tendency to keep brushing my hair” (E.W. McKaveney, personal communication, April 22, 2005).

How do instructors perceive their use of videoconferencing in the classroom? The observed case, provides us insight into the role of the instructor as a facilitator during a videoconference, “after some guided directional feedback from Mission Control, Alex checks their findings with another group, and comes back to inform M.C. that the location of ship was not near Pluto on Monday, but instead Tuesday”. It was this type of interaction that was observed throughout the observed lesson and the fact that the students did not appear to show any significant reaction to the distant instructor is supported by the interview, where it was said that the use of videoconferencing is viewed by the instructors as “transparent” and “in a certain sense the technology becomes part of your voice” (E.W. McKaveney, personal communication, April 22, 2005).

In what ways does two-way videoconferencing facilitate instructional interaction? In observing the levels of student-content, student-technology, and social/rapport building interactions, there were high levels of all of these elements in this lesson. Based on the types of mathematical, critical thinking, and social interaction tasks that were occurring during the lesson, the likelihood of successfully impacting learning outcomes and future student achievement should be high. This aspect of instructional delivery was further reflected in the descriptions of teaching practices that were provided by Dr. T when he said, “if you frame the question right as the teacher and kind of get them [students] in the right direction as the teacher. Usually then when you have a heightened degree of interaction at that level then you are also getting more personalized and interpersonalized” (E.W. McKaveney, personal communication, April 22,

2005).

Conclusion

The observations and interpretations provided in this study of interaction elements provide us with insight into the necessary teacher preparation with regard to the use of two-way videoconferencing and the implementation of pedagogical strategies. Furthermore, it is evident that the use of these elements in combination with each other can provide an engaging and interactive instructional experience for both face-to-face and distant students. It is also clear that the design, development, and delivery of the instructional content and mastery of the interconnected system of technology tools used in this environment, is critical to the instructional success.

Appendix A: Coded Observation with Analysis Notes

The following is an observation of a NASA e-mission developed collaborative by the staff of the Challenger Learning Center at Wheeling Jesuit University and the Instructional Technology department in Duquesne University's School of Education (DCI) (TT) (SIG). It is Friday April 1, 2005, I arrived at 9:50am just as the group of, approximately 20, third grade students fresh off their school bus, begin to file into room 328 Fisher Hall on the campus of Duquesne University.

The room is alive with movement and excitement that can initially be described as a group of third graders that recently escaped from their daily classroom routine and a number of concerned adults trying to maintain order while completing a few last minute adjustments and confirming that everything is ready to go (TT) (SS). A projected image of animated graphics repeats across the SMARTboard screen (CC) (Tech-Tech), wasting no time Commander Shiale, in a clear projected voice, hands folded tightly behind her back in a military like stance, introduces herself to the group (TS) (SR-I). Her dark blue NASA flight jacket (TC) and resonating voice, clearly has the attention of all the children in the room (TS). She asks them what have they been doing to prepare for today's lesson (TS) (ID-I) (SR-I). The students nod their heads and respond simultaneously with different yet similar answers (ST) (LE).

Moving on, Mission Control (Commander Frank wearing a light blue NASA jacket, linked to the room via an IP videoconferencing link (Tech-Tech), and appearing on a large TV monitor in front of the room), asks the students what name have they selected for their group (TR-I) (TS) (ID-I) (SR-I). The students respond in unison "Mustangs" (ST) (SR-I). Mission Control (M.C.) begins explaining the mission to the students (TS) (TR-I). It is the year 2080 and we are on the moon base refueling station and ship launch area. As M.C explains the mission,

relevant 3 dimensional animations of the moon base are played for the students (TR-I) (SC) (S-Tech). The mission will be to send a loaded supply spaceship to Mars (a video of an actual rocket launch plays back for the students (TR-I) (ID-I) (SC) (S-Tech).

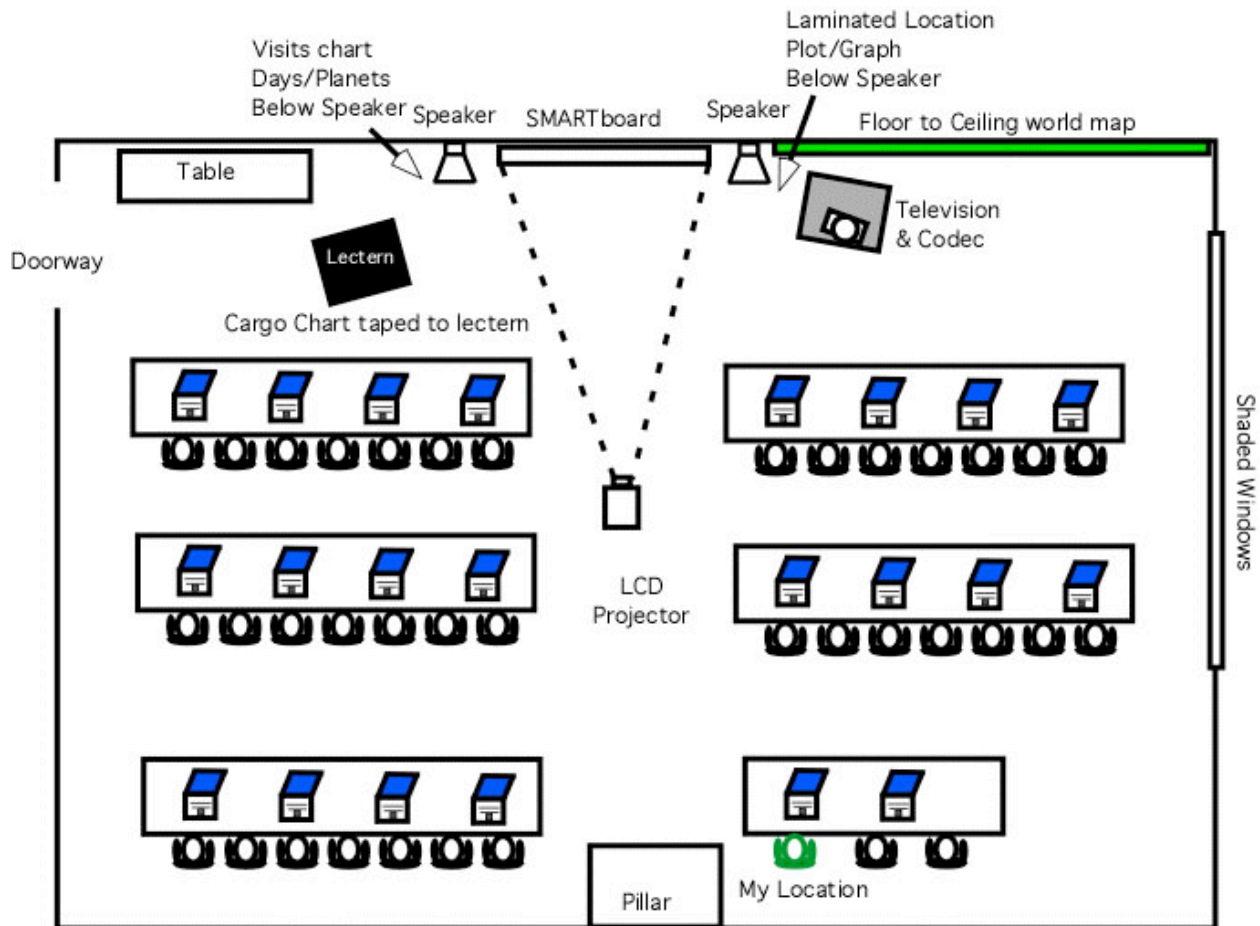
The students begin to prepare for their next task described in their work folder (LE) (SS) (SC), when M.C. breaks in and says we have an alert, “Distant Discovery has lost navigation and is a drift in space, we must locate and rescue” (ID-I) (TS) (T-Tech). A video of space satellites is played back for the students (TR-I) (SC) (S-Tech). It is here that we find that packets with the necessary tasks are in their student folders (SC). The students have already been divided into teams named for each of the planets in our solar system (ID-I) (SS) (SC) (SR-I). The students are told that there are 3 data sets contained on the laptop computers that sit in front of them (TR-I) (SC) (S-Tech).

M.C. informs the class, that students that have been selected to be “communicators” to say “copy” when they are done speaking (TS) (LE) (TR-I) (T-Tech). Anthony the Cargo communicator, introduces himself (ST) (S-Tech) (SR-I). The other adults in the room are moving from group to group helping the students (TS) get to the right place on their computers (S-Tech) (T-Tech) (SC) and answering questions the students have (ST). The students respond to M.C. in unison, “Yes” (ST) as she asks if they “understand, copy over” (TS) (IE).

Individual student groups are instructed to follow the lesson in their task book until they reach a Stop sign (SC) (ID-I). Students are allowed to get up and walk to other planet teams to discuss findings (ID-I) (SR-I) (LE) (SS), and consult the information charts hung in the front of the room (SC). Instructional assistants continue to move about the room helping individual students and groups (TS) (IE). A few of the adults are snapping pictures (T-Tech) as everyone proceeds with the assignment (SS) (SC). The current assignment is to determine where the

“Distant Discovery” was last located based on its scheduled shipping stops at each of the planets (ID-I). M.C. requests a status update (TS) and Alex responds, “yes I copy” (ST). Having spoken to a group of students (LE) (SS), Anthony then provides info on cargo to Jupiter (SR-I) (ST). After some guided directional feedback from M.C. (IE) (TS) Alex, checks findings with another group (LE) (SR-I) (SS), and comes back to inform M.C. that the location of ship was not near Pluto on Monday, but instead Tuesday (ST). With everyone moving about (assisting, taking pictures, talking to each other), I notice that there are eight adults in the classroom (2 NASA, 3 from the student’s school, and 3 from Duquesne) (ID-I). The hurried students, moving about the room report that the # of crates for Neptune is 54 from the Cargo ship (LE) (ST). Mady reports the location of the cargo ship on the master chart (LE) is 29Y and 14X (SC), and that it was not near Saturn on Monday (ST). The students complete this first task and a video of cargo being prepared and packed in a clean sterile environment, so as not to introduce any bacteria to the astronauts that could make them sick, is played back (TR-I). Everything is vacuum packed and even the M&Ms must be counted and weighed before being packed (SC) (S-Tech).

Task cards are handed out and task #2, how much water will be needed and plotting unknowns (meteorites, meteoroids, comets, or the lost Distant Discovery), is explained (ID-I) (SC) (TS). As the students progress in this learning process, checking with each other on findings (LE) (SR-I) (SS) and plotted locations on the wall charts (SC), I make notes of the room environment (see diagram). The air is warm, but not too hot, and sunlight filtered in through the windows. The fluorescent lighting in the room creates a bit of a light shadow waveform over the walls.



Anthony reports to M.C. “not near Saturn on Tuesday, I do copy” (ST) . Dr. Carbonara, wearing a black NASA polo style shirt (TC) walks about the room assisting students (TS) (IE) and discussing the program with the parents (SR-I) that came along on the trip.

I have noticed that when the student’s attention needs to be directed toward the front, the lights are dimmed (T-Tech) (S-Tech), so they can focus on M.C. and the videos she occasionally plays back for the students (TR-I).

The students have figured out (LE) that the ship is lost near Saturn (SC), everyone begins to clap and cheer (TT) (SS) (SR-I). It is now 11:23am and there was a slight audio break up when talking to M.C. An animation of the cargo being loaded on pallets by robotic arms is shown to the students (SC) (S-Tech). Everyone applauds the Cargo team (SR-I) (SS). The

Martian launch pad is loaded and ready for launch, live video of a launch plays for the students (TR-I) (SC) (S-Tech). Video of a space dock with the distant discovery is played the astronaut crew hugs and greets each other as they enter the stranded ship (ID-I) (SC) (S-Tech).

The students prepare their post brief reports (LE) (ID-I) (SR-I) (SS) and respond to M.C. with answers to questions in turn (ST). Students that did not previously get a chance to speak into the microphone (TR-I) are eager/yet hesitant and one student even wiggles his way into the middle for a chance to talk (ST) (S-Tech).

11:42am, far sight disconnected appears on the screen (Tech-Tech). Video reverts back to the local camera and students suddenly see themselves on the TV (S-Tech). In the excitement of seeing themselves on TV, some of the students begin to wave in order to be noticed by others (this has been one of this researchers experiences with videoconferencing in the past). About 30 seconds later, the far sight is reconnected (Tech-Tech) and M.C. is back and speaking about the wrap up (TS) (TR-I). Despite seeing themselves on TV (S-Tech), none of the students appeared to lose focus during the brief outage, this was probably do to their own confusion about what just occurred and the fact that other facilitators are present in the room.

Things wrap up and I excuse myself from the room, saying goodbye to Dr. Carbonara, my presence in the back of the room, like a fly on the wall, and departure appears to go relatively unnoticed by those in the room.

11:45am observation concluded.

Appendix B: Interview with Analysis Notes

[ed] Thank you for your willingness to take the time to help me answer some of my questions about teacher, technology, and student interactions in a videoconferencing environment along with what types of teacher preparation and skills are needed or required. No one but me will hear the tape, and your name will never be used in any of my papers or write-ups, without your prior written consent.

My interview with you today will cover two areas. First, I'll ask you some questions in order to get to know you as a person. Second, my questions will be guiding questions based on my research to date. If you can describe your reasons for the answers, as well as your beliefs in these areas it would be most helpful. This will not be used for anything but my class project, and if I should feel that it will later add value to my dissertation, I would contact you and get your written permission to use it.

[ed] **1. How many years have you been teaching?** [Dr. T] About 30 years at the University level

[ed] **2. What subjects do you teach?** [Dr. T] Theology

[ed] **3. When did you first start using videoconferencing?** [Dr. T] The year the Harrisburg program started, so that would have been 1996, ten years almost. With Dr. Smith.

[ed] **4. What training if any have you received to provide quality interaction with students, when utilizing two-way videoconferencing systems in the classroom?** [Dr. T] NONE!

[Ed] **5. How do you perceive your use of videoconferencing in the classroom?**

[Dr. T] It can be enormously valuable and is underutilized in terms of Universities tend to see them selves in a very centralized way, and what videoconferencing can do is decentralize the University, and make it a much bigger community than it can every be with a more traditional experience, so its kind of a way of expanding the university and decentralizing the university but it is underutilized, why should we limit people's ability to learn based on their geographical location. I mean that does not make any sense to me. Especially if they are going to pay. It changes the horizons. The horizon, so there is what I can see. Say I am teaching in a regular classroom I see that wall and that wall and this window **[transcription note: the interview room is an office with a meeting table, the interview took place at the meeting table, and the office had one wall made up of a window, with two other finished walls, and a third wall with the doorway that was to the back of the interviewee]**. When you are involved in videoconferencing, you see the walls, but you know it is beyond. Because you also see the beyond. So it changes the horizon of who can participate in the educational experience.

[Ed] **Getting back to training, so your experience has just evolved from being placed into that environment?**

[Dr. T] It has been inductive, I think there are some folks who can do this well because their teaching style was already what I would call participatory. It was rather than delivering content it was more analysis or criticism. It was more, I think those folks are more natural in this media, so they were not just talking heads, they were talking heads that asked questions. Or led people

to discovery, so the transition is much easier because you are not asking yourself the question in a kind of strange way. Uhh. How am I going to get them involved? If your methodology for teaching was one of getting people involved, you just did that, you knew how to do that. For me one of the ways that I know I am doing this particular class well is by watching the tech. If that tech is listening to me then I know it is working. Because they do not have any vested interested in paying attention to me, so their attention span is a way of measuring what is happening to those other people. There interested. If that person is disinterested. If they're really starting to pay attention, then I say ah ha.

[Ed] With regard to the tech, obviously I know mostly the answer because I used to facilitate that for you, but I am going to ask you anyway for the sake of recording it. **So in the classrooms you have taught there is a technician there to facilitate some of those interactions?**

[Dr. T] Yes, and usually I insist that, except when it is just showing a film. I insist that there be a tech at both ends. Otherwise should anything happen it just becomes an enormous distraction, it liberates me from having to think about what is going on and even if there is a problem, I know its going to be very quickly rectified. So they are very valuable, they make you or break you, you could have the best thing ready to go but its like as a teacher you are very dependent upon your voice and if you show up without a voice one day, you have laryngitis, you can't teach. In a certain sense the technology becomes part of your voice and having done this so long, I have gone from the six phone line that was just at times torturous to now where it is almost TV network quality. I am amazed at that. It has been a great change. Although you see its not just the technology, I am also somewhat concerned about the environment of the room. You can have great technology, but if the room is not built for videoconference learning and I don't mean here speaker system, monitor system, I mean the layout of the room, what the desks, the tables look like the comfort level of the seats the colors that are in the room, unfortunately my concrete experience, it is usually the distance site that has a more traditional classroom arrangement and I think that should be modified. I don't think that helps learning, you probably have to pay even more attention to how the distant site looks and is experiencing it as you are going through. I would imagine that most administrators when you give them a demonstration of videoconferencing, they are going to sit there for 10 or 15 minutes. Let them sit there for 2 or 3 hours. That is when you really get to know whether or not we need to upgrade our seating, upgrade our tables, maybe put different colors in the room. You really need to go through what is going to be experienced, it is not going to be 10 or 15 minutes. If you are going to run real classes, because of the nature of videoconferencing they are probably going to be between an hour and a half to 3 hours. So you need to design your environment for the experience in terms of that. So I think we also probably need to pay a little more attention to the professional networks, so we have some sense of, they have probably all done studies on how long can a person watch depending on what it is that they are watching, and so it may happen that we need breaks, like one of things I have done is not take a physical break, but throw in a joke. Absolutely nothing to do with anything we are doing, but its kind of like a little commercial, so you can at least go down a little bit, and alright now we are back. Because I just, especially for the folks that are not in the room with you, because watching someone live and watching someone live on video is a very different experience. The subtleties of what you see, are very different, see they are able to control more at what they are looking at when they are in the room, if they want to look at your left ear they can, I may not be able to do that on the monitor, so we have a very different dynamic and I would like to know more. I am sure the pros know, I mean

the networks know, we probably have a lot to learn from them. What can you do. What are the limits what should you be working within.

[ed] 6. How do you perceive your interaction with students through videoconferencing in the classroom? (Note: this is similar to questions 14 and 22)

[ed] You have pretty much answered this in some ways.

[Dr. T] Yes, but I have detected something else. We don't have a way of letting people know, we don't let the onsite students know that this is going to be a videoconference class. And some of them have a certain degree of resentment, they feel as though they are not getting everything they would get if it was not videoconferencing. I don't think it is true, but they think it is true. And so, I think what it is, is that as a teacher you have to consciously remind yourself to engage people at multiple sites, you have to plan, you have to have a plan in your head that I am going to, Dr. Smith, Dr. Smith does this, but the first couple of years, I actually had a sign in the back of the room that I would hold up "Ask Harrisburg a Question", because he became oblivious that there was Harrisburg, and he would nod and then ask them a question. You have to consciously train yourself to do that. Otherwise they become passive observers rather than active participants. But in making them active participants, I have noticed that in different courses, sometimes the folks on site have a negative evaluation of that. They write it, on evaluations, "I wish this had not been a videoconference" and I don't know what exactly is the reason for this, but it is there.

[ed] One of the things that I have read is that the technology in this environment, artificially creates a need to communicate with the distance students people that sometimes the in class people resent, that they feel they are being ignored.

[Dr. T] That's it, but they are not being ignored, the interesting thing is that they are not, but we have not found a way for them to be a community. How do you get these two groups that joined together only by technology to be a community? What I have done and then I have not done this, is sometimes I have done this, since this is a team taught course, but I have done it alone, where I have taught from the distance site back to the home site, and that seems to ameliorate things a little bit, it has not come up all the time, but it does come up.

[ed] That is another reason I thought you would be a good person to interview, because of the variety of things you have done.

[Dr. T] Yeah there are very different.

[ed] 7. Do course activities encourage students to get to know each other on a personal basis? (Note: This is similar to question 18)

[Dr. T] Well, I don't think so, I think they do that by themselves, as they do in any course. The way, that videoconference courses are arranged in general are that they are more condensed, they are not long, they are not 15 weeks, about half that, but because they are also 8 weeks or so, they tend to be a longer amount of time, so when you get students that have been in a class for 3 hours and 45 minutes, and its on a weekend, they tend not to hang around to the point where they would get to know each other better.

[ed] They are more the Saturday college, continuing education, non traditional type classes then?

[Dr. T] yeah, and I think it will have to be that way financially, it does not make any sense to have not have longer sessions less frequently, it just makes good financial sense to do it that way, especially with the group that does it this way. Now, I have thought for awhile to set something up with some European universities where we do a doctoral seminar videoconferenced, and that

would work because they of the time difference for them it is 4 o'clock in the afternoon, for us it is 10 in the morning, that is perfect, and that would be more leisurely, that could go on longer. The more technology that is introduced, the less you are going to find what I would call, Cross Interpersonal Relationships, now you could overcome that, you could kind of twin an onsite and distant site students together, but I don't think we should do that artificially, I mean if there is a reason to do that, I am all for it, but I don't think you could do that artificially.

[ed] 8. Do the learning activities require students to interact with each other and with the instructor?

[Dr. T] Oh yeah, but that I think is part of the classroom environment, although it is not pretty, when you do group discussion, break them into smaller groups, I found out that you are better off shutting your monitors off, let the students do that in their own environment, and let's get back together for the reports. Its chaos, it does not work, it is distracting, groups create a lot of noise, so you must turn off the monitors.

[ed] OK

[ed] 9. What level of interaction does the technological delivery system limit?

[Dr. T] I would say it more psychological in the sense that I am more inclined to, if I see that a student at the distant site is digging themselves into a pit that they can't climb out of I am more likely to respond much more rapidly, because I am afraid of them hanging out there, because I have got them with me in the room, I know that no matter what, I will be able to make sure that they get out of the pit. But when they are far away, I am very nervous they are going someplace that they are going to look like an idiot and I can not let them go there because I may not be able to get them out, and you don't want to wind up in that situation. So you don't have the extracurricular time, at the end the link is broken, now what do I do, they are driving home. They could be depressed or elated or whatever, where as if someone is in the classroom, I can say hey do you have a minute, are you ok, and something you said in there made me think about, do you want to talk about it. For 10 minutes, where with the distance I cannot do that, I think it has made me more conservative and there is a limit, of the technology, or empathy, I am able show much more empathy to someone live, how do you show empathy to someone on video. That is part of the translation, of three dimensional into a two dimension, I mean there is no depth, that is an interesting word there, that means depth in terms of background but depth in terms of uhhh, how do they evoke emotion in professional video. It is usually through music lighting, and we don't do that. I guess we could, but I am not sophisticated enough that at appropriate times the technician puts on this symphony and changes the lighting. That is kind of a challenge because then you are asking a faculty member to do generate all of the emotive experience and that is kind of a challenge. I guess in other subjects you could find other ways, but now you are really moving into sophistication. Which may not be a bad thing to do, but I know that I am not there, I would not even know how to do it.

[ed] That reminds me, several years ago, I worked on a grant proposal with Dr. VP and the School of Pharmacy, with a person that had been a Disney Imagineer, where we were looking at science education in the school where we discussed upgrading their technologies and restructuring their lectures to add visual and audio content to make it an

entertaining and interactive learning environment, but the logistics were so enormous that it did not pan out, but the idea remains.

[Dr. T] something like that, that would be undetectable, just as you don't pay attention to what music is playing in a film or TV show or how the lighting is effecting it, it is doing that, but it is undetectable, but then you would run the risk of when are creating a positive learning experience and when are you manipulating it.

[Ed] 10. What level of interaction does the technological delivery system facilitate?

[Dr. T] Well, it overcomes the limitation of distance and being in two places at one time, or multiple places at one time. You can not only view, but you can deliver information that way. It is not only you that goes there and comes back, it is also information.

Potentially, at times the students can enrich everybody at other sites, it is a transfer of experiences and their learning processes.

[ed] 11. Do students respond to each other's questions and initiate new ones in a way that enhances learning?

[Dr. T] Oh yeah, I would say so, if you frame the question right as the teacher and kind of get them in the right direction as the teacher. Usually then when you have a heightened degree of interaction at that level then you are also getting more personalized and interpersonalized. They begin to talk about what is important to them and what is growing out other life experience, that is usually the indicator, it is usually not simply a theoretical issue. It might appear that way, but then as the conversation goes on it is very clear that they are using their story, their narrative as a resource for data for the enterprise at this time.

[ed] 12. In a videoconferencing course, how do you see teacher to teacher interaction?

[Dr. T] I think courses are better if they are team taught or multiple taught, simply because of the amount of time, the variety that is necessary in order to continue, keep attention. I think it is also better to have people who really know what they are talking about and we all really know part of the area better than somebody else, or somebody else knows another part of the area better than we do. I think it exasperates the difference between average teachers, good teachers and excellent teachers, I think it just jumps off the page. So, if you are going to have multiple teachers it also important that they all be at the same level of excellence, otherwise the students begin tune in and tune out. They will just click and unlike the news stations you can't fire the announcer. So I think that while I would encourage, multiple teachers, with an accompanying evaluation of how is the educational experience going to be for the students if these two or three of four people do this enterprise together. I think that is a lot of the reason why people don't want to do that, they don't want to team teach, they don't want to have multiple teachers in a particular course, especially online. By necessity there is going to be a comparison.

[ed] You spoke before about Dr. Smith in terms of your holding up signs and things initially and now you are evolving. I have observed in the past times when you were at one site and he was at the other site, how do you perceive that in terms of team teaching?

[Dr. T] In the beginning we interacted a lot. And we learned that that was very confusing to the students. They were observing what we were doing they did not quite understand what our interaction was about, so we made a decision that we would show how we interact, by interrelating and commenting on what the other colleague has done. As we are talking , so it is

not in a sense a live interaction, it is an interaction that is taking place as so and so said about a half an hour ago while they were talking about _____. So the students have a sense that we are together. And that seems to be better, they want a consistent pattern to show unity and so there is your challenge how to keep it a unity, but have multiple actors who are doing it slightly differently so that students can appreciate the value of looking at it from different ways, but then to always make sure that they see, and I think what you have to is teach toward questions. Give them the question and teach in such a way that they can gradually work out, how one might go about giving a response to that question.

[ed] 13. In a videoconferencing course, how do you see teacher to technology interaction?

[Dr. T] I think it becomes transparent as you begin to understand it and utilize the technology, you need a lot of experience, there are problems. I noticed that one of the problems that I never knew before was when you use a whiteboard and where is the projector mounted for the whiteboard. You are videotaping yourself simultaneously and the lighting is impossible, we need to do a lot better on lighting. That A you are not blinded, and B if you do want to video tape you can. You have to remember that what you are watching on video tape is what the people who are at the distant site see. So they are seeing you lit up here, dark here, and we really have to say, and I have been saying this for awhile, is that you can't design the videoconference room outside of what is really happening in it, so before we bolt things down we should do some dry runs. And we watch the dry run, we say oh wow, we got to solve this problem and now if you got a professor who is adroit at trying new things and is adaptable, well they just go on that is a problem we will solve, don't worry about it. But I can see if you have a professor that is not exactly into technology and they also don't have a good memory, this could divert their energy away from teaching and more worrying about the technology. See, I think you have to screen who is going to video teach, and for the most part the people who only really know what they are talking about, they kind of carry it around in their head. If somebody is very heavily dependent on notes, wow that is a challenge, that is a real challenge. It is not the same thing, because you have to relate to the audience, not your page, not your notes, and so. I mean little things in technology that you have to worry about, I mean when you use the whiteboard, where is the projector, because the angle of the projector actually controls where your lettering of words goes on the board. If it is at an angle and you are trying to connect one and two, you have to know what the angle is to draw your lines otherwise one and two are never going to get connected if you draw them straight. There are these little little things that errr, and also you have to learn what your quarks are and to do that you have to watch your video. I have a tendency to talk with my hand over my mouth, or I have a tendency to keep brushing my hair, I saw a professor who when the students asked a question the professor always went (eyes rolling). (Laughter...) You have to know you are being watched, which is kind of different and then to be comfortable with that. One of the side projects, side things that I have been pushing is this is the way to do teacher evaluation in the classroom, you put a hidden camera in, you videotape it and you give it only to the teacher, nobody else will ever see unless the teacher wants to sit down with somebody and say could you watch this with me I want to improve. If you really want to see how you teach, you can, and for me to go in there and review is a good thing, but it is the hardest thing in the world to tell somebody you know you do this all the time, you stick your pencil in your ear and you grind it all the time, I don't want to tell a colleague that, or if you are incomprehensible, no one can understand what language you are speaking. You might be brilliant, but nobody understands you, you never say an English sentence. It would be so much easier to say hear,

take a look at yourself. And then as a supplement to whatever other evaluations you want to do. I think it could be a very healthy way and a very non intrusive way evaluating, because we have a record of and a sense of what is going on, not just recollection. I know if I was a young professor and I was going to be evaluated for teaching, I would want to have that.

[ed] You were talking about your interaction with the whiteboard, was that the traditional markerboard or was that the electronic

[Dr. T] the Smart boards.

[ed] So your interaction on that level has probably changed over the years.

[Dr. T] I must say that of all the technologies that is the one that I don't like and I don't know why. I just don't, it is not me, I use it, but I kind of forget it. Sometimes if I am doing a powerpoint and I accidentally touch it, it is so sensitive and I think that when I do that and I have to go back and sometimes I go back to far and I have to go forward, I think that I kind of get out of sync and it is my fault, but it is almost as though I don't have the control over that that I would like to have. Otherwise I kind of have control over what is going on. I myself would just prefer to tell the technician to advance, even though I could find a way to, well maybe I am just clumsy and you have to factor that in. Some people are better, some people don't talk with their hands, I talk with my hands and boom I hit the board and that breaks. It is not so much that that happened it is the effect of it. I breaks the focus of what is going on and then you have to back track and most of the time you never get to where you were in terms of the kind of focus interest emotion of the ... the flow, it is kind of like you are coming to, you are going down the river and you are going pretty quick and it is really fun and then you hit a rock, oh God, I got to go back and fix the whole in the canoe, I don't know if I want to go back in the river this time, so I guess I would prefer . I know I could probably have more control over it, I could have a laser thing maybe do it that way.

[ed] You are also talking about PowerPoint now, when you started in 96 did you also use a lot of powerpoint or is that something that

[Dr. T] No, we actually had a show, we had a problem because we had to show slides and we did not quite know how to do it any other way than to send it by the video and that was a problem.

[ed] So you had 35mm slides?

[Dr. T] Yeah, that was a real big problem and then our solution was well then we print them up and had them at the site. So they could look at it there. Depending on the quality of your projector and the size of the screen you still get some distortions. And sometimes that's only slightly important. Sometimes it could be significant. I mean, by and large I would say the limit of the technology is simply that we don't have large enough monitors. I don't see any reason why they shouldn't be 52-inch monitors. I don't know why anyone would even think of anything less in these kinds of conference centers. I just think you have to make it as easy as possible for people to watch and to participate and whether you like it or not, the larger the screen the more you feel like you are part of it. I'm bigger, so I look more real. See now, if you had a real large screen or if you had a dual screen so I think these are not hurdles that resist our efforts, we can overcome them; but I do think that you have to try to make it the best possible. I am not exactly sure, at least in my experience here, we are not where we should be at certain levels; but that might be because there may not be as many folks who actually use material that would work better with a large screen.

[ed] 14. In a videoconferencing course, how do you see student to teacher interaction?

(Note: this is similar to questions 6 and 22)

[Dr. T.] Well, they're a little bit more passive at the distant site. They can stay anonymous if they want to. There is more direct activity in the on-site. And some students learn better that way. I can see where some folks eventually...eventually what I think will happen is we will be able to devise tests where a student will have some kind of indicator, under what form of education would I learn best? Some will be face to face, some will be distance, some will be computer based and combinations of all of the above and we'll be able to say, okay for you from your answers to our 150 questions, we recommend that you not take any videoconferencing courses when you see a TV you go to sleep.

[ed] 15. In a videoconferencing course, how do you see teacher to content interaction?

[Dr. T.] Well, the teacher has to absolutely be a master of their content. It has to be something that is second nature to them. Because they are going to be much more of a story-teller, at least as I have experienced. So, you have to know the plot, backwards, forward, inside out. It is spontaneous. It's live. It's Saturday Night Live. It is a live show and it is being sent live. If you have a... in this media, a second at the distant site is 5 minutes. See because here with the people live, they still see your body, you are breathing. There, what's happening is there is a blank. So you absolutely have to know what you are going to say and exactly what you are going to talk about and have the facility to do that in much more of a narrative and with a great deal more flexibility than you would in a normal, traditional kind of mode. See because your other parts of you can carry you where as here it is really the story.

[ed] 16. In a videoconferencing course, how do you see student to content interaction?

[Dr. T.] Well, I don't think it's any different than a traditional course. You are going to have students who are very close to the content and have prepared you are going to find students who are moderately, you are going to have some students who are bored and some students who really don't deal with it well. That to me isn't really controlled by the technology. It's the student who has control over that. That's their decision.

[ed] 17. How do you see student to teacher interaction in a videoconferencing course?

(Note: This is similar to question 7)

[Dr. T.] I think they are a little bit more passive. You tend to see, I think, more as a package and everything is supposed to be in the package. And they may not, you know you see the condition. I don't know about this. See, this is where I am right now. They slip into their TV consumer mentality. Which means, I bought X and you are supposed to now deliver. I bought into it and you're supposed to deliver. So, I think, without thinking about it, they evaluate the course and the teachers very much like why they will watch this station the news or why they will watch that show as opposed to that show. There is this unconscious, pre-judged expectation about what is supposed to happen. I think it would be very interesting to give them an experiment. Give them all a clicker so they could shut it off. It would be very interesting to see a clicker and a volume control and monitor that. To see who, what or when. Who click what volume up when. It would be very... I'll bet some of them are looking for that clicker. That at some point they almost unconsciously go to grab it. They say, I've had it. I don't want to listen anymore. That is really interesting. I think you would learn an awful lot.

[ed] 18. In a videoconferencing course, how do you see student to technology interaction?

[Dr. T.] That is conditioned very much on the student's life experience. Some of them, this is their world, this is what they do. So, obviously for them it is second hand. And some of them, they wouldn't know a computer if it hit them in the head and they are just suspicious. How am I going to learn anything if I am not there? And then in the end there are some of them who would prefer that this had been another way. Which isn't a good way...see that overlaps the evaluation. I don't necessarily think people who teach in video-conferences should necessarily evaluate their teaching based on the video-conference course because the reaction to the teacher may have nothing to do with the teacher, the content of the course, or whether the students learned anything. It might just be a preference. I don't really like to learn this way. Until we come up with the test to let people know, I really shouldn't sign up for that. It is not really fair for the teacher. But then again, we have to have the ability to say, you are not going to teach in this program this way. I don't know why we let people teach video conference without any kind of screening. It is just beyond me. Or even telling them how to dress. I mean, you don't want to wear super extra white shirts. So, if you are going to be using the Smartboard with that projector, you don't want to do that. It makes you look like some dazzling white ghost or something. What kind of color would go well in this environment? Don't wear black. A black shirt with a black suit and a black tie. Don't do that. You have to pay some attention to things that most faculty wouldn't pay attention to. Or you might get away with teaching science in jeans and a torn sweater but not on TV and that really has to do with our expectations. TV is special. You are supposed to look decent on it. It doesn't so much have to do with the content or anything else. It has to do with, what are we bringing, what are students bringing when they undergo this experience. They expect to be entertained. I mean, we don't look at TV for torture.

[ed] 19. In a videoconferencing course, how do you see student to student interaction?

[Dr. T.] Well, it is less because of the monitors and the technology. Everything feeds into the technology and feeds out of the technology and have to go back into the technology. So, if I wanted to talk to you one on one. Unless I have a lot of practice the first time I do that. Do you ever notice when people are in a group and this camera zooms in on them they all turn to the camera and they stop talking.

[ed] 20. In a videoconferencing course, do you see any content to content interaction?

[Dr. T.] The only thing I can think of and this is not anything I do; but it would be the difference between lab experiment in the lab real chemicals as opposed to doing it on the computer. At the end, hopefully, you know the same, but the process is not. The replication, but unless you are doing Doctoral level material, you filter all the content already. You have picked out what is really important.

[ed] 21. In a videoconferencing course, how do you see technology to technology interaction?

[Dr. T.] That depends on the quality of it. It can be seamless and integrative and harmonious or it can be a disaster. It just depends. I mean to me, that's really not so much a faculty member's concern. That has to be the concern of the person that designs the technological environment. That it be as natural as possible. And to a certain extent, the teacher affects that. I'll give you an example. You can do text messaging on cell phones. If you asked me to do a text message on a

cell phone, to send a message, hello, how are you. It might take me 10 minutes. Because I don't know how, I might have to... I mean look at kids today. (Makes noises and gestures about how fast kids can do things like that) It is simply practice. The technology is practice. But it should be seamless. That is where it is a great asset. So that it flows and so that it is not perceived. It's there, it makes the whole thing work but nobody knows what is going on.

[ed] 22. How do you view the differences or similarities between this range of content and technology interactions?

[Dr. T.] Well there is more stuff going on at the originating site. So there is more activity. At the distance site there is necessarily less activity because basically you have a monitor. So the experience of the technology is different in both sites. I think the technology shouldn't be experienced. I mean you shouldn't see microphones, you shouldn't see cameras. We are going to reach a point where you aren't going to see these big TVs on stands. They will just be built into the walls.

[ed] 23. Do you find that your ability to reply promptly and helpfully to students' questions changes in this environment from a traditional face-to-face classroom?

[Dr. T.] No, I really don't see any difference there. When the technology works well, and now it works well almost all the time, the only difference that I can ever detect is that if you tell a joke there will be an eighth of a second delay. Otherwise, there is no...in terms of interacting with the students...there is one difference. In a traditional classroom one of the ways you show a student that you are really attending to their question is that you may take a step or two in their direction. And you can't do that. Now, the technician can help you at that point, if they are really attentive, by zooming in. That would do the same. See, now we are talking about something that we really haven't talked about and that is the need to choreograph the experience so that the technician knows when to zoom in, when to zoom out. Right now they know when to flip things on. And they are not really like a cameraman. You really do need a cameraman. But you have to be scripted for that. Or at least have some indicators of when. Now the guy in Harrisburg, Mike, is very clever. As soon as he hears a student ask a question boom, he zooms in on them. So that everybody knows we are all going to attend to what the student is saying. Now by zooming in, he makes the question important. So I think that is something to be thought about. You have got to find a way to create that spatial specificity. That you can do live by motion or you need to do that by the technologies capability. I never thought about that, but Mike always zooms in. So maybe technicians need to learn a little bit more about teaching. Maybe they are not merely a technician. Maybe they are more than a technician, to help facilitate.

[ed] 24. In this environment, how do you see students interacting with each other? (Note: this is similar to questions 6 and 14)

[Dr. T.] It is probably limited to the actual classroom time. We talked about that a little earlier. It is a long block.

[ed] 24. What goes into selecting instructional goals?

[Dr. T.] You can't separate the goals from the process. So the goals are the same but the process is a little different. When I do a videoconference class it is a little more like what I would call add water and stir. I find I am setting the course up so the students can actually pay attention to

the classroom experience and see how it all fits. So, I take on more of a burden in helping them formulate responses to the questions that are given ahead of time. That is one thing, Dr. Smith and I have figured out how to put the questions out there in a very clear way. That's what I said about teaching towards answering the questions. If you know the question, you can listen to and participate in what we are doing in a different way. These professors will tell you the question later. It is kind of like on TV when they show you the preview. When they show you the preview they are trying to tell you here is the way we want you to watch. Here is the way we want you to participate. Here are all the questions. As we go through the classes you will see that you are coming to the answer. It is like a movie trailer.

[ed] 25. What knowledge must you have of resources that can be applied to this environment?

[Dr. T.] I totally depend on the tech guys to tell me what I can do as far as the technology. I don't spend my time reading up on technology. The first thing I always ask at least once a year is to try to find out what is new out there that I can use. Although I do think in the future... I haven't used Blackboard in the videoconference courses and I can see that I will from now on because an awful lot of material that I have on the hard drive up in the videoconference room I can just put it on Blackboard and everybody'd get it.

[ed] 26. What preparations are needed to design coherent instruction for this environment?

[Dr. T.] I don't think we ever planned it. I think we've kind of gotten lucky. From having done what we call face to face, we already had an inkling of what worked and what didn't work. Then, we stumbled onto doing x, y, and z. If it worked, we kept it. If it didn't work we filtered it. So, I think there was an awful lot of trial and error. Unfortunately, I don't think...let me backtrack. I would say generally most faculty are very well trained in the content of their specialization. Most of them are not trained at all on how to teach. I never had a course in my entire academic career on how you teach. I do think that most faculty are very reluctant to listen to other faculty members. Talk about how to teach. So I think what we are going to have to do for videoconference teachers is show them a variety of folks doing a variety of things. How to do a self-assessment. What can I do? There are some people on camera, they're not photogenic. There is absolutely no way in the world someone is going to watch them on camera for a minute. I mean, what are they trying to do. I don't care if they are Einstein. That's just not it. Let them do the teaching and voice put a dummy up there anything. I think we have got to be very sober about this. We probably should screen. We need to find out how to screen. Then we need to screen and then we need to do workshops on how to teach in a medium that are not only here's the technology and here's how to use it but look at what you want to teach and who you are. What would be worthwhile and how would you go about your design so you maximize your strength and minimize the weaknesses. That would be a great. If somebody in the University could come up with a very good three or four week program. Boy would they make a lot of money on the University. I mean everyone would come. No one is doing that. I think I told you once that I have a friend who's chairman of the Drama Department at Carnegie Mellon and I would like to put him, me and someone who could do some stuff with the psychology of learning in this media together and come up with the...I've thought of it a variety of times because he knows it from the acting part and there are many kinds of different ways of acting, different

characters. Boy it would be great to set up an actual training program. And then we'd have a better program.

[ed] 27. Is there any other information that you feel will be useful to this study?

[Dr. T.] I think you need to know what to do when the technology fails. Do you go back to the beginning and start all over when it is up and running? Or do you pick up where you left off. Do you continue to teach to the people who are on site. I mean, what do you do? Now, I think one of the things that you do...I have a very good solution to this...I now have video-tapes of entire courses. That doesn't mean that is exactly what I am doing right now but the core content of it is that if the technology goes down, somebody can just go over and pick up the disc, video or CD and there we go. In fact, I can see the day where the distance sites unless there is a need for community and interaction and dialogue, they will just be sending it to the home computer. With the speed, Comcast is almost T1 now. So what distance site means in video conferencing in the future is to have a variety of mediums in the future and it is not going to be the same. What teachers will do...teaching will become more guidance. So, I'll send you my entire course on CD-Rom and what we'll do in class is reflect on and explain what you've already looked at. That becomes the content. That's what I think will happen. So we will become partially virtual professors. The only limit is how to split your monitor at home. They can do that, but not now. If you could do that, you could do even more. New technology will change what it is all about and that will make the competition between Universities, very vicious. Even DSL is pretty good.

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