

The Flexible Environments Project: Reviewing the Value of
Synchronous Interactive Media in Distance Communities of Inquiry

A Literature Review

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Introduction

Old Dominion University (ODU) has a long and proud tradition as a provider of education at a distance through its nationally known TELETECHNET system. This system uses a variety of technologies, primarily satellite technology, to provide access to a number of degree programs at a geographical distance from the University's primary location in Norfolk, Virginia. Delivery of the programs is largely synchronous, and site-based. Students participate in live classes delivered to their site location in a television format, and can interact with the origination classroom via return audio connection. For a subset of degree programs, largely at the graduate level, other technologies, such as two-way videoconference technology, are used to link remote sites with the origination classroom. In all cases an LMS (Blackboard) is available in support of interaction with students outside of classroom hours.

Recently, two new programs have been under development at ODU that have some unique and similar requirements. These PhD level programs are to be the first graduate degree available to distance students who are not located at a traditionally supported ODU distance site. In addition, these programs will not have a residency requirement. Faculty from both programs have expressed both real excitement and significant concern with regard to these programs. While this new structure offers access to a wider range of potential students, opening up the prospect of having access to the best and brightest students no matter where they reside, they also present real challenges. A primary challenge is with regard to providing for the type of academic and social interaction between faculty and student and from student to student, that the representative faculty insist is critical to a quality experience at the doctoral level.

Faculty from both new degree programs independently visited with ODU's Academic Technology Division and its Center for Learning Technologies (CLT) for help in finding ways to

allow for rich interaction, synchronous discussion and debate and live presentation at a distance while at the same time reducing the cost of establishment of a remote site, to the point that one could be established at a student's residence.

Both new programs had plans for fairly traditional classroom based courses to take place, but a seminar structure would be applied to most courses. Remote students would need the same capability as the classroom based students to discuss, debate and present their ideas on an equal footing with their peers. Faculty expressed the need for the development of an academic community within the degree programs – such communities had been a critical component of the face-to-face programs and faculty demanded that the remote students have equal role and access to that community.

After significant discussion, representatives from CLT agreed to develop a technology platform that would allow for synchronous video and audio interaction to and from multimedia PCs and the origination classroom, as well as between multimedia PCs outside of standard classroom hours. A new seminar shaped classroom would be built that incorporated some unique features including auto-gated microphones, a tablet PC for presentation and annotation, flat panel displays for presentation and inclusion of remote PC-based students, H.323 videoconferencing capability and the new interface to the remote students built within a Macromedia Flash Communicator-based system. This became known as the flexible environments project at ODU.

The specific and direct requests of the faculty were being answered with this system. The need for interaction between students at a distance and the participants in the origination classroom could potentially be met with this system, as could the need for after-hours group work and collaboration. The question remaining for this author was whether or not this system

would provide enough of the social presence required to allow for a real academic community of inquiry to be developed between all participants. The present review was undertaken to examine the available literature in the area of the value and efficacy of synchronous, interactive audiovisual environments, so called “rich media” in support of the development of real working communities of inquiry.

Literature Review

The primary goal of the systems under development at ODU is to create an environment where the higher education experience could be an effective, pleasant and successful one for all participants. Given that the programs of interest would be a mix of local students, and students at a distance, often with no other student local to their vicinity, the approach to development of virtual communities presented some interesting challenges. Not the least of these challenges is how to keep the remote students feeling connected with their peers, when many of the peers would be able to have face-to-face meetings as part of the academic and social components of the program. First we’ll investigate academic communities, or “communities of inquiry”, and then we’ll look at the approaches which seem to hold promise given this situation.

Communities of Inquiry

According to Garrison et al (2000) “a worthwhile educational experience is embedded within a “community of inquiry” that is composed of teachers and students – the key participants in the educational process”. This community of inquiry model asserts that the interaction of three key elements, teaching presence, social presence and cognitive presence are the critical

components for learning to occur within the community. According to the model the intersection point of these three components is the heart of the educational experience. As such, it is important to ensure that evidence of each of these components is present in our education program. Social presence is of particular concern for the new program, where individual students will be located geographically distant from their peers, and there will be no residency requirement during which they may have built important personal bonds.

A significant body of research now exists indicating that knowledge creation occurs through the interactions afforded by the community of learners working together toward common goals. Garrison and Cleveland-Innes (2004) stressed the importance of the community of learners by stating:

“Through focused interaction with the community comes the critical evaluation and synthesis of ideas. Thus, online communities of inquiry are crucial to successful higher-order learning outcomes. If the goal is higher-order learning, it is not a simple transfer of the traditional classroom role to that of the online learner” (p. 32).

Rovai found a “positive significant relationship between sense of community and cognitive learning” (p. 328). Palloff and Pratt note “collaboration enhances learning outcomes and reduces the potential for learner isolation that can occur in the online environment” (p. 1). Garrison, Anderson and Archer (2000) point to the importance of collaboration with regard to meta-cognitive processes, noting that collaborative inquiry provides for a qualitative dimension beyond acquiring specific content of a discipline. Gokhale (1995) asserts that collaborative exercises provide students with the opportunity to work at higher levels of thinking such as analysis, synthesis and evaluation.

Kanuka and Garrison (2004) cite several studies in support of collaboration having significant benefit to critical thinking. Specifically, Klemm and Snell (1996) found collaborative group processes where learners are required to think critically, creatively and integratively to be one of the most effective means to facilitate higher levels of learning. Chambers (1992) indicates that in general learners learn faster and retain more if they collaborate. Zirkin & Sumler (1995) also find that collaborative interaction facilitates higher levels of learning, and more specifically, critical thinking.

Social Presence Theory

A number of recent studies have shown that social presence is one of the most critical components toward successful instructional effectiveness and the building of communities of inquiry. Bibeau (as cited in Aragon 2003) states that “teaching and learning functions are inherently social endeavors; therefore it is beneficial to understand the various effects of the geographic, temporal and psychological distance between instructors and participants”. Aragon goes on to note “the lens through which these distances are examined is that of social presence theory”.

Social Presence Theory proposes “a critical factor of a communication medium is it’s “social presence”(Richardson & Swan, 2003), which in the context of a distance learning environment is defined as the “degree of salience of the other person in the interaction and the consequent saliences of the interpersonal relationships (Short, Williams & Christie 1976). Palloff and Pratt (2004) have reported that social presence “better known as a feeling of community and connection among learners, has contributed positively to learning outcomes and learner satisfaction with online courses”. Those authors cite several studies that support that finding (Gunawardena and Zittle, 1997; Kazmer, 2000; Murphy, Drabier and Epps, 1998; Picciano,

2002; Tu and Corry, 2002, as cited in Palloff and Pratt 2004). If therefore, social presence is a critical component of our distance education environment, we must examine what factors indicate the existence of social presence.

Brown (2001) indicates that “Although the term “virtual community” is in common use, few studies have been done to discover how adult distance learning students define community, whether they feel part of a community, and if so, how that phenomenon occurs. Garrison, Anderson and Archer (2000) assert “social presence marks a qualitative difference between a collaborative community of inquiry and a simple process of downloading information” (p. 96).

According to McIssac and Gunawardena (1996) two concepts that are associated with social presence are “immediacy” and “intimacy”. Gunawardena and Zittle (1997) find that immediacy is a “measure of the psychological distance that a communicator puts between himself or herself and the object of his/her communication”. According to Short et. al. (1976) the social presence of the medium itself contributes to the level of intimacy, which is dependent on such factors as facial expression, personal distance and eye contact. This notion of various media having differing and inherent capacity for support of social presence is controversial, and will be discussed later in this paper. What is clearly understood however is that social presence is that component of communication that involves “the degree to which a person is perceived as a “real person” in mediated communication” (Gunawardena and Little, 1997).

Garrison, Anderson and Archer (2000) developed three categories of indicators of social presence, those being emotional expression, open communication, and group cohesion. They found that a key aspect of establishing social presence in face-to-face settings is visual cues. They note that given the reliance of computer conferencing on the written word, the

establishment of a community of inquiry can be problematic with regard to establishing social presence.

Brown (2001) undertook a study of graduate level educational administration courses conducted via the Internet within a text-based environment (Lotus Notes). She identified three levels of community (making acquaintances, community conferment and camaraderie), and fifteen steps to building community including self-assessment and judgments, supportive interaction, earning trust, respect and engagement. She noted, “of course, face-to-face meetings probably did the most to help cement relationships begun in virtual classrooms.

Given the highly affective, intimate and interactive nature of the activities involved in community building, it is important to develop specific instructional activities that include these attributes to allow for community building to occur, and to employ distance education systems and technologies that efficiently and effectively support those activities.

The” Richness” of Media

The Instructional Design and Technology program that this review is in support of has a unique challenge. The students will be a mix of local students and isolated remote students, and the challenge there will be to provide an appropriate level of interaction and inclusiveness for the remote students to attempt to compensate for the isolation they will feel from their peers. The program will be a mix of live courses taught in a two-way videoconference environment, and asynchronous online courses. Courses taught in the videoconference environment are simultaneously video streamed to remote students, but this does little to enhance the remote students feeling of sense of community, as little live interaction is possible (outside of instant

messaging or email exchange). Given these realities it is important to find approaches and technologies that support the needs of all of the instruction and all of the students.

Technology selection must be informed by the literature in the area of social presence and communities of inquiry. One of the most widely reviewed, discussed, and most controversial theories regarding selection of technology to support certain types of communications activities is “Media Richness Theory”. Originally presented by Daft and Lengel (1986) in their seminal work entitled “Organizational Information Requirements, Media Richness and Structural Design”, this theory proposes that communication media vary in the capacity to process rich information, and proposed a hierarchy of increasing “richness” of the technology from numeric documents (lowest richness) to face-to-face communication (highest richness).

Garrison, Anderson and Archer (2000) agree that written communication might be termed a lean medium in comparison to face-to-face communication, which they find “socially and emotionally” (p.90) to be a rich medium. The primary construct of this theory is that the content of the communicated message drives media choice (Webster, Trevino and Stein 1996), and that communication is expected to be more effective when the medium “matches” the message content.

Richness in this context was defined to be “the ability of information to change understanding within a time interval” (Daft and Lengel, 1986). The theory contends, “the reason for richness differences include the medium’s capacity for immediate feedback, the number of cues and channels utilized, personalization and language variety” (Daft and Wiginton, 1979). The theory asserts that rich media work better for dealing with communications with a high level of equivalence (defined as ambiguity, the existence of multiple and conflicting interpretations),

and that thinner media work better for communications with a high level of uncertainty (meaning the absence of information).

With regard to this theory, it is tempting to think of communications with high equivalence as being similar to the higher level tasks associated with Blooms' (1956) taxonomy such as evaluation and assessment, and high levels of uncertainty as being associated with Bloom's knowledge level where information transfer is the key requirement. In this line of reason a taxonomy of technologies could be proposed that ties certain attributes of varying technologies with a related cognitive level of communication that could be associated with them. The concept being that richer media, described as media that easily and effectively facilitated a high number of channels and cues, had the capacity for immediate feedback (real time, synchronicity) and had the capacity for personalization and language variety would be the most appealing to use for the communication of complex concepts, with face-to-face communications being the most effective method.

The literature points to a number of studies that have been undertaken that variously support and refute the claims made by Media Richness Theory. One well-known study undertaken by Dennis and Kinney (1998) resulted in findings that were contrary to the theory in that no relationship between media richness and quality of decision, consensus and communication satisfaction were found. The study did, however, agree that richer media allowed quicker decision making to take place. It may well be that while no relationship between media richness and cognitive level exists, the efficiency associated with the increase in speed of processing higher level (equivocal) communication makes a compelling case for the use of synchronous approaches and "richer" media.

The original work by Daft and Lengel was developed prior to the arrival of the World Wide Web and proliferation of networked multimedia home computers. A number of efforts in more recent years (Newberry 2001) have attempted to support the notion that so called “richer” media would have an increased capacity to support social presence due to the media’s ability to provide feedback cues such as body language and facial expression. Newberry presents a table comparing media with its ability to deliver feedback, multiple cues, message tailoring and emotions.

A very recent study was conducted at Syracuse University by Christina Finneran and Robert Heckman (2004) and presented at the November, 2004 Sloan Consortium Asynchronous Learning Networks conference. Their findings were in support of the basic premise of media richness theory. The study found that given choice, most collaborative groups would mix media, sometimes in complex ways. They found that users migrated toward richer media for problems that involved creating shared meaning, clarifying complex tasks and expressing creativity. Asynchronous communication was used more often for less ambiguous tasks such as editing and sharing information. Interestingly they also found that asynchronous media was used more often for issues involving apology and self-disclosure. The authors attribute this to the idea that apology and self-disclosure (expressing personal details about ones self) are sometimes difficult tasks that require the time and reflective capacity that asynchronous methods allow.

Quite a number of these studies look at media selection versus media performance. In other words, the empirical studies supporting Media Richness Theory tend to be those that look at the media an individual selects for a task, versus looking at the actual ability of the technology to support the task. This is a key argument made by Dennis and Kinney (1998) in their paper

critical of media richness theory. This same paper, however, supports the notion that richer media transmits social presence more efficiently than thin media.

In a more recent study Dennis and Valacich (1999) propose moving away from any further research and development of media richness theory in favor of development of a new theory they call “Media Synchronicity Theory”. Spencer and Hiltz (2003) explain, “media synchronicity theory predicts that as the needs of the group change over time and task, the characteristics of the media needed will also change”. Dennis and Valacich propose five characteristics to the evaluation of media “richness”, which are: immediacy of feedback, symbol variety, parallelism, rehearsability and reprocessability. Essentially this theory argues that the richness of the communications will need to change with the needs of the group as their needs change, and that the relative “richness” of a media is only assessable in the context of the current needs of the users and the exact situation at the time. “Thus concluding that face-to-face communication is the “richest” media is inappropriate” (Dennis and Valacich 1999). Again, this theory does not dismiss face-to-face communication as “not the richest”, it simply implies that it is “not always the richest”. It certainly has its benefits however, with regard to social presence, and therefore should be considered when social presence is a concern.

The Benefits to Asynchronous Learning Technologies

It would be one-sided to present a case for rich synchronous technologies without presenting some of the obvious negatives and limitations inherent within them. A primary consideration and benefit toward the use of asynchronous learning technologies is the “anytime, anywhere” nature of their access. Especially in graduate level distance education, where students are frequently working adults with busy and complicated time schedules, having access to education through asynchronous methods can be the difference between furthering their

education or not. A major benefit to the asynchronous nature of the communication is the ability for reflection, allowing the participants the time to think, reflect, write, read and re-read and edit their thoughts into more well structured concepts than is often the case in real-time communication.

Cost is a major consideration when attempting to determine the necessity of certain technologies and approaches. Neither private nor public universities can afford to spend more money on infrastructure than they take in in tuition dollars. In addition, if technology platforms or requirements are in place that are out of financial reach of the student population, the approach may be pedagogically valid, but needs will still not be met.

In a similar vein, access issues must be taken into consideration when designing learning systems and approaches. Technology may be available at reasonable cost, but only in certain areas. Students with certain disabilities such as sight or hearing disability may have problems with certain technologies. All of these needs must be considered prior to investing significant time and money in developing educational programs.

In the case of the new PhD programs at ODU it has been decided that asynchronous approaches will be used for a significant amount of the communication and information exchange. It is the desire of the faculty, however, to maintain the face-to-face environment for both classroom activities and group work for much of the instruction. Therefore it is important to consider how to handle that through technology for the remote students, and whether the approach can be expected to work reasonably well to replace the actual physical face-to-face time the local students will be experiencing.

Best Practices – It's all about Teaching and Learning

Given the overwhelming data that points to no significant difference between online and face-to-face teaching environments as far as learning potential is concerned, why not simply use whichever tool is handy for the given population? If the student body is local, use face-to-face approaches, and conversely if the population is at a distance or separated by other barriers such as time, use an asynchronous approach. While this seems to be a presiding decision making process at many educational institutions it may not be as simple as that.

While there is clear data that shows no significant difference between traditional face-to-face learning and online learning, there seem to be areas where each approach has benefit for certain activities. Newman, Webb and Cochrane (as cited in Garrison, Anderson and Archer, 2000) found significant differences between computer conference and face-to-face seminars in critical thinking. “More specifically, computer conferencing students more often brought in outside material and linked ideas to solutions while face-to-face students were slightly better at generating new ideas” (p. 93).

Garrison, Anderson and Archer (2000) also found data that supports the notion that computer conferencing has the potential for facilitating deep and meaningful learning, but that there “seems to be a downside in that Newman et al. (as cited in Garrison, Anderson and Archer, 2000) found that face-to-face seminars seemed to facilitate more creative and higher volumes of interaction” (pg. 90). Casiello and Whalen (2004) pointed out that learner needs are a critical concern and that “one size does not fit all, and that various technologies should be deployed based on user need and pedagogical implication” (p. 38). Kanuka and Garrison note “While critical discourse in face-to-face settings is generally an accepted learning strategy that supports

higher levels of learning (such as critical thinking), it is not entirely clear how to support critical discourse in online environments” (p. 35).

Chickering and Gamson (1987) created a popular framework for quality in undergraduate education which is commonly known as the “Seven Principles” of effective teaching. One of the principles states that good practice encourages active learning. Chickering and Ehrmann (1996) followed up with a discussion on the principles. This article indicates that the technologies that support active learning are staggering, but that most fall into one of three categories: tools and resources for learning by doing, time-delayed exchange, and real-time conversation. As one of three primary categories of active learning, real-time conversation at a distance needs to be supported with appropriate technologies.

The no significant difference phenomenon does not indicate that all approaches will result in the same outcome, it simply indicates that outcomes that are possible using one approach, are likely possible using another. We must *work* within the specific capabilities and attributes of each approach to achieve our desired outcomes, by understanding the nature of each approach, and its specific dominant plusses and minuses. By harnessing the specific strong capabilities of each approach such as ease of communication, interactivity, efficiency, persistence, lecture, cost, adaptation to various learning styles, and so on, and summing them together we can gain the best of all worlds.

There is currently significant interest in the industry in the area of so-called “blended-learning” environments, those environments that mix online education with other environments. Most blended-learning programs involve a mix of online and face-to-face activity, with many educators feeling that both environments offer significant advantages for different types of activities. Garrison and Cleveland-Innes (2004) find the notion of combining the strengths of

face-to-face and online learning “very promising” (p. 37). Understanding and exploiting the specific attributes of each medium is critical to maximizing the available potential.

Conclusion

Within the context of the distance education environment, educators, designers, technologists and administrators are faced with difficult choices and unclear and sometimes contradictory evidence with regard to the value implied of particular approaches and technologies. Whether in the long run certain media prove to have inherent capacity beyond other media, or may simply handle the same tasks with more or less efficiency can be left to the theorists to sort out. What matters in the day-to-day world of the working educator is finding clear choices for real problems. Given the desire to provide the highest quality of education possible within a cost structure that is reasonable, what instructional activities must be included, and, at a distance, what technologies are required to carry them out?

It is now reasonable to assume that many different types of instructional approaches can be managed successfully through totally asynchronous, text-based learning networks. It seems equally justified to feel that certain approaches may benefit from efficiencies made possible through the use of richer media, such as two-way desktop videoconferencing systems, in adding the visual channel and synchronous audio capability inherent in that environment.

Tang and Isaacs (1992) report that:

“The video channel is clearly a valuable resource in mediating interpersonal interaction. Not only does the visual channel provide cues that facilitate the mechanics of turn-taking, but it also naturally affords gestures and other visual information that convey how much is being understood, reasons for pauses in speed, participants’ attitudes and

other modifiers (e.g. humor, sarcasm) on what is being said. This support for interactional mechanisms make video-mediated communications more efficient, effortless and effective.”

While it may be incorrect to assume that certain media contain inherent capabilities to support higher levels of cognitive discourse than other media, it seems that certain media have the ability to transmit certain types of communications more efficiently, and that certain media have the capacity for more immediacy (synchronous versus asynchronous) other media. These attributes have been shown to be connected with social presence, and therefore are important to consider when developing systems and approaches where social presence is important.

Development of social presence is critical to the new distance PhD programs at Old Dominion University. Faculty want assurances that students, who may not be associated with a traditional ODU site, will have as equivalent an experience to the local students as possible during their graduate studies within the programs. Some instructional activities require synchronous discussion, debate and collaboration, and it seems that audio and visual channels may have the ability to efficiently support the development of the social presence component during those activities.

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