Creating effective ITV classrooms - factors that affect student learning

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Abstract

This article provides a review of past research on K-12 interactive television (ITV) programs in the United States. While the number of web-based distance learning courses is increasing, ITV is still widely used for K-12 learners. ITV allows students to communicate with remote teachers and classmates in real time and to create a learning environment that is similar to face-to-face instruction. The purpose of the article is to examine critical factors for successful interactive television programs and provide suggestions for how educators can best facilitate student learning in ITV environments.

Keywords

Interactive Television, Interaction, Social presence, Sense of Community

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Introduction

Interactive television (ITV) is one of the oldest delivery methods in K-12 distance learning and teaching (Thomas, 2001). Many researchers have studied ITV classrooms since it was born. ITV provides synchronous instruction that allows students to interact with the remote teacher in real time. As technology advanced, a variety of delivery formats in distance education have become available. Today, the number of web-based distance learning courses for K-12 learners is increasing (Cavanaugh, 2004). While researchers' interests seem to have shifted from ITV to virtual schools (Podoll & Randle, 2005), ITV is still widely used in K-12 schools across the nation (Ely, 2002). U.S. Department of Education has reported that 41 percent of K-12 distance education courses are delivered using ITV (Zandberg, Lewis, & Greene, 2008). As with other form of distance education, sharing qualified teachers in multiple locations is one major advantage of ITV. Because of the lack of qualified teachers, over thirty thousand non-certified teachers in California are teaching in high schools (Follo, Hoerr, & Vorheis-Sargent, 2002). Teacher's professional qualification significantly impacts on student learning (Heck, 2007). ITV can provide quality instruction for such disadvantaged schools in a cost effective way.

Musial and Kampmueller (1996) state that "ITV instructions are not dramatically different from traditional teaching" (p.30). Compared to face to face instruction, no significant disadvantages have been found in learning outcomes (Jucks, Paechter, & Tatar, 2003). Factors that affect student learning in a traditional classroom also affect student learning in an ITV classroom (Kirby, 1998; Martin, 2005). The purpose of this article is to discuss critical factors that affect students' success in ITV classrooms.

Interaction

Many researchers agree that interaction between the instructor and students, and between students affect student satisfaction with a course, as well as student learning (Chang & Smith, 2008; Lemak, Reed, & Montgomery, 2005; MacGregor & Atkinson, 2002-2003; Rifkind, 1993). For example, a high level of interaction promotes students' engagement in class activities and also decreases the drop out rate of ITV students (Gilles, 2008).

According to Moore (1989), there are three types of interaction: learner-content interaction, learner-instructor interaction, and learner-learner interaction. He states that the use of a single medium in instruction results in relying on one type of interaction, which in turn, decreases the overall amount of interaction. Additionally, Hillman, Willis, and Gunawardena (1994) have proposed learner-interface interaction, which is a new aspect of interaction that occurs in distance learning delivered using high technology, such as ITV and Internet. According to Hillman et al., successful interaction in distance learning is "highly dependent upon how comfortable the learner feels in working with the delivery medium" (p.32). For example, in the context of ITV, students who do not feel comfortable with using microphones to interact with the instructor and other students may not be involved in the class discussion during live broadcast as much as those who feel comfortable with the system. Larson and Bruning (1996) found that even though microphones are available for live interaction, ITV students feel that they cannot ask questions during broadcast as freely as they do in the regular classroom. Furthermore, Keheye (2000) identified camera shyness as a factor that interferes with classroom interaction. In her study on two-way compressed video, more than a half of students reported that they feel uncomfortable with asking questions when they are seeing themselves on the TV monitor.

On the other hand, Kruih and Murphy (1990) also proposed four different types of interaction that address
unique characteristics of the ITV environment. They are learner-instructor interaction, learner-learner interaction within a local site, learner-learner interaction across sites, and vicarious interaction (learner interaction). Vicarious interaction can occur both in distance learning or regular classroom environments. In ITV classrooms, this type of interaction may take place when students see or hear other remote students asking questions that they might have asked, or when students participate in the discussion between remote sites silently. Fulford and Zhang (1995) found that students' vicarious interaction within the class as a group is a critical factor affecting students' satisfaction with ITV courses. They divided interaction types into five groups: social, procedural, expository, explanatory, and cognitive interaction. The results showed that the interaction most frequently occurred in ITV is expository, which "involves answers to direct questions, either teacher or student initiated" (p.21). The level of cognitive interaction, such as teacher's feedback, to promote students' reflection was the lowest. They observed that many ITV instructors who participated in the study failed to further the communication to increase understanding and deepen the knowledge after the initial conversation with students. As a result, the duration of each exchange was short and this led to low levels of cognitive interaction. They suggest that while ITV is capable of facilitating cognitive interaction, creating exchanges that are in longer duration with students requires instructors to have skills and experience.

In addition to the perceived level of interaction, MacGregor and Atkinson (2002-2003) stress that the quality of interaction is equally important to enhance student learning. They examined interaction in two-way video ITV classrooms at the college level. The results showed that the highest level of interaction occurs when the instructor and the topic is given to students in a clear focus and the learners help students relate their own experiences to the topic, participation of students is increased. Oliver and McLoughlin (1997) also analyzed different forms of interaction that occur in ITV courses. They divided interaction types into three groups: social, procedural, expository, explanatory, and cognitive interaction. The results showed that the interaction most frequently occurred in ITV is expository, which "involves answers to direct questions, either teacher or student initiated" (p.21). The level of cognitive interaction, such as teacher's feedback, to promote students' reflection was the lowest. They observed that many ITV instructors who participated in the study failed to further the communication to increase understanding and deepen the knowledge after the initial conversation with students. As a result, the duration of each exchange was short and this led to low levels of cognitive interaction. They suggest that while ITV is capable of facilitating cognitive interaction, creating exchanges that are in longer duration with students requires instructors to have skills and experience.

Finally, research shows that remote students tend to have less interaction with instructors than host site students (Soromn & Baylen, 1999), and they are less involved in class activities. Rezabek & Sachs, (1995) also found that the size of the picture on the screen contributed to social presence of the visual media. The media with higher social presence were viewed as being more active rather than passive.

Social Presence

Social presence is one of the critical elements that affect student satisfaction and learning in ITV (Bowerie, Gunawardena, Lowe, Murrell, Zittle, & Zittle, 2000). It is defined as "the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationship" (Short, Williams, & Christie, 1976, p. 65). In the context of ITV, social presence refers to the degree of emotional closeness between the instructor and students, and among students across sites (Bowerie et al., 2000).

Short et al. (1976) state that although social presence can affect the way people perceive their communication, it is "a quality of the medium itself" (p.65). Thus, the level of social presence varies depending on the media. They compared the social presence of different media including face-to-face, television, multi-speaker audio system, telephone, and business letters. The results showed that the levels of social presence in visual media are much higher than those in non-visual media. The social presence of face-to-face communication was the highest, whereas business letters were the lowest. Television was ranked second, but the difference between face-to-face and television was significant. Multi-speaker audio systems were significantly higher on social presence than telephones. Short et al. (1976) also found that the size of the picture on the screen contributed to social presence of the visual media. The media with higher social presence were viewed as being more active rather than passive.

Based on their study, the social presence of ITV is assumed to be higher than those of text-based online courses. Among the ITV delivery formats, the level of social presence also can vary. One-way video systems are lower on social presence than two-way video format because two-way video provides visual communication channels for both the instructor and student, which is closer to face-to-face communication. Similarly, the use of compressed video and desktop videoconferencing systems is more likely to be lower on social presence than instruction using a full motion video. In addition, since students who view the class on tape due to schedule conflicts are unable to interact with the instructor and other remote students during live class broadcasts, they receive instruction more passively. Therefore, the social presence perceived by tape-delayed students is expected to be lower than the social presence perceived by students who participate in live classes.

It is important to note that the level of social presence with two-way video is not the same as the social presence of face-to-face. Even with a two-way video system, depersonalized instruction occurs because of a lack of physical contact with remote site students. In such environments, students tend to see other students as objects on the screen and enter a 'passive television watching' (Television Rezabek, & Sachs, 1995, p.134). MacGregor and Atkinson (2002-2003) further emphasize that although a two-way video format provides a visual connection between the instructor and students, the face-to-face contact is still mediated. As a result the number of communication channels such as eye contact and facial expressions is reduced, which creates a lower level of social presence.

According to Short et al. (1976), immediacy is related to social presence. Wiener and Mehrabian (1968) originally defined immediacy as "the degree of directness and intensity of interaction," which people perceive through verbal communication (p. 4). Later, the definition was expanded and researchers used the term "teacher immediacy" to describe teachers' verbal and non-verbal behaviours that minimize psychological distance between the instructor and the students (Gorham, 1988). The verbal immediacy behaviours include "actions such as using personal examples, using humour, addressing students by name, praising students, and initiating discussion" etc. (Hackman & Walker, 1990, p.200). The non-verbal immediacy behaviours include "gesturing, smiling, maintaining a relaxed body position, using vocal variety, and touching" etc. (p.200). By using immediacy behaviours, an instructor can create a warm and risk-taking learning environment, and reduce student anxiety in remote sites (Lester, 1996). MacGregor and Atkinson (2002-2003) stress that teacher immediacy increases interaction in ITV classrooms.

Richmond, Gorham, and McCroskey (1987) studied the effects of teachers' non-verbal behaviours in a
regular college classroom. Vocal expressiveness, smiling, and relaxed body position significantly influenced students’ cognitive learning. Furthermore, verbal immediacy behaviour also affected both students’ affective and cognitive learning (Gorham, 1988). His study showed that as class size increases, a teacher’s self-disclosure, encouragement, participation or asking questions, referring to class as “our” class, instead of “this” class, all become important factors for student learning. This suggests that in ITV with a large class size, such as satellite-based programs, instructors may need to use teacher immediacy more consciously in their lessons.

Hackman and Walker (1990) examined teacher immediacy in an ITV classroom. Their study results were consistent with the above research conducted in a more traditional face-to-face classroom setting. Among teacher immediate behaviours, individual attention, encouragement to remote students, encouragement of student expression and vocal variety were highlighted as the most critical factors in promoting student satisfaction and learning. In addition, their study revealed that teacher immediacy behaviours impact on student perceived system effectiveness such as “the clarity of audio/visual transmission, the technical ease of remote participation, and information accuracy” (p.200). For example, students found it easier to follow the lesson when instructors maintained a relaxed posture and used a variety of vocal expressions. Instructors’ humour and smile also enhanced perceived information exchange. Their study clearly suggests that teacher immediacy influences a student’s perceived quality of media, that is, social presence.

In summary, social presence impacts on student learning in ITV classrooms. To enhance social presence, instructors should increase the use of teacher immediacy and interaction. Social presence, teacher immediacy, and interaction can also develop intimacy between the instructor and students, which in turn minimizes negative effects of physical and psychological distance.

**Instructor’s Effectiveness**

Cyrs and Conway (1997) stipulate that ITV instructors should have effective verbal and nonverbal communication skills. Not only communication during the session on TV, but also communication outside the classroom is important. A variety of media such as email, fax, telephone, and printed materials should be used on a regular basis as a communication tool (Anderson & Kent, 2002; Clifford, 1990).

Generally, distance learning requires advance preparation and more time for designing and developing courses (Cyrs & Conway, 1997). Thus, strong organization skills are required. Moreover, creativity is critical for successful ITV programs (Gerstein, 2000). Providing a variety of activities is important (Sorensen & Baylen, 1999). For example, occasional group activities within a site (Tykwinski & Poulin, 1991) and opportunities to work together across sites allow students to learn multiple perspectives and obtain feedback from others (Squire & Johnson, 2000).

Pacing has also been mentioned as an important factor for sustained interest and attention of remote site students (Tykwinski & Poulin, 1991). While students have said that ITV instruction moves faster than regular classroom instruction and does at times make it difficult to catch up, (Harrell, 1996), students also state that pacing has had a negative impact on student attention and interest. The lengthy lecture type presentation, the slow pace of instruction, and the lack of entertaining elements lead to students being less attentive to the class presentation (Kubota, 1999; Martin 2005). Thus, ITV instructors should “make broadcast instruction as entertaining and attractive as possible for the young TV generation,” as well as pay attention to the pace of instruction (Kubota, 1999, p.339). It has also been suggested that instructors should make efforts to provide relevant and useful activities that can help students achieve their personal learning goals in order to increase student motivation (Oxford; Park-Oh, Ito, & Sumrall, 1993).

Moore and Thompson (1990) emphasize the importance of the use of printed materials in distance learning environments. Printed materials can enhance student learning as much as graphics or audio materials created using computer software. According to Cyrs and Conway (1997), many students have poor note-taking skills. Especially in an ITV environment, students have experienced more difficulties in note-taking during the televised presentation and seemed “less interested in topics presented” on TV (Denton, Clark, Rossing, & O’Connor, 1984, 1985, p.297). Moreover, Offir, Bezeard, and Barth (2007) report thatprintable handouts are required to feel a high level of tension during broadcasts. These handouts must be easy to follow and feel that they must write down every single word spoken by the instructor. The provision of class handouts can help direct students’ attention to key concepts of the lesson (Cyrs, & Conway, 1997) and reduce their anxiety for missing important materials (Offir et al., 2007).

It has also been stressed that ITV instructors “should be familiar with television technology” (Cyrs, & Conway, 1997, p.211). Instructor’s knowledge of the system greatly enhances the presentation and can minimize any problems that arise (Lester, 2000; Anderson & Kent, 2002). For example, if a problem with audio, computer display or overhead cameras occurs during live broadcast, instructors may not be able to use some materials prepared for the lesson. Thus, ITV instructors need to be more flexible and should always have a backup plan in case the technology fails them (Levitch & Milheim, 2003).

In addition, the use of effective feedback techniques is important to provide support for individual learners and to monitor progress (McKenzie, Witte, Guarino, & Witte, 2002; Moore & Thompson, 1990). In ITV with a one-way video system, non-verbal cues from students such as facial expressions are not available. Even with two-way video format, visual communication channels are limited (MacGregor & Atkinson, 2002-2003). Therefore, another system to obtain student feedback needs to be built into the course (Purell & Purell, 2000). Effective feedback, which is “prompt, focused, and constructive” (Repm & Rogann 1996, p.37), can promote student participation, enhance their motivation (Store & Armstrong, 1981), and minimize psychological distance (Purell & Purell, 2000). The promptness of returning graded papers also increases students’ satisfaction and significantly affects their academic performance (Riner & Dean, 1995; Lemley, Sudweeks, Howell, Laws, & Sawyer, 2006).
Finally, Barker (1991) maintains that distance education teachers should understand and model principles of effective teaching, and know how to best use the telecommunication medium to deliver their instruction. A recent study has revealed that while most ITV instructors receive technical training on how to use the equipment, few are provided with pedagogical training on creating effective ITV classrooms (Anderson, 2008). Especially in ITV environments, instructors' ability "to articulate, pace, image, and personalize" has been underlined (Cryer, & Conway, 1997, p.211). Instructors' behaviours seem to have comparatively higher impact in ITV classroom more than in regular classrooms (Optiz, 1996). Thus, ITV instructors should use corresponding strategies carefully, and always be well prepared for a lesson.

Sense of Community

In order to increase student participation, an instructor should "create an atmosphere that encourages questions and promote a sense of community" sense of community (p.45). A sense of community contributes to the quality of interactions, which in turn, facilitates student learning. Rovai and Lucking (2003) have found that a sense of community among ITV students is significantly lower than that of regular classroom students. Other studies also show that many of the high school students in ITV classrooms do not feel they are part of a larger group (Learnmont, 1990). Especially, remote students often express a feeling of exclusion (Lester, 2000; MacGregor & Atkinson, 2002-2003).

Classroom Facilitators

Classroom facilitators play an important role in ITV programs (Boverie, Murrell, Lowe, Zittle, & Gunawardena, 1997; Hakes et al., 1995; Holt, 1992; Kirby, 1998; MacGregor & Atkinson, 2002-2003; Moore et al., 1990; Willis, 1992; Yi & Majima, 1993). The maturity level of K-12 learners is obviously different from that of adult students. Therefore, the same level of self-discipline cannot be expected for K-12 distance learners. They need more support and learning guidance from adults (Boverie et al., 1997).

One of the most important roles of the facilitator is to mediate between the instructor and students to reduce psychological distance between them (Willis, 1992; Yi & Majima, 1993). Researchers suggest that
facilitators and instructors should establish "a close working relationship" (Yi & Majima, 1993, p.28) and work as a team (Boverie et al., 1997). Facilitators should be a mentor, or the role model that shows students how to participate in the class (MacGregor & Atkinson, 2002-2003). They must know how to bring enthusiasm to students (Hawkes et al., 1995). Reminders to students at ITV (Hawkes et al., 1995), are important for remote site students. Especially, when a large number of sites are involved, interaction decreases, and the facilitators' role becomes more important (MacGregor & Atkinson, 2002-2003). Yi and Majima (1993) also found that facilitators' active involvement and commitment affects their relationship with the learners. "The uneasy relationship between facilitator and students" cause students' negative attitudes towards the course, which in turn affect their learning (p.26).

As the finding presented above indicate, for students to be successful in ITV classrooms, a facilitator's role should not be limited to routine responsibilities such as turning on and off the TV, taking attendance, taping classes, distributing materials, posting test or quiz schedules, etc. However, many school administrators often perceive facilitators' roles as technical assistants who carry out routine clerical work (Yi & Majima, 1993). Because of such misconceptions, school administrators tend to select whoever is available. As a result the quality of facilitators and their level of involvement vary considerably across sites. Some schools select teachers of the content areas of the ITV courses as facilitators, whereas other schools select teachers outside the content areas, librarians, and school secretaries (Anderson, 2000; Moore et al. 1990). However, it is indispensable for making the entire ITV system work effectively. Selecting quality facilitators, providing motivation to keep up with the class work. Moreover, administrative support has been shown to be important for remote site students. Especially, when a large number of sites are involved, interaction decreases, and the facilitators' role becomes more important (MacGregor & Atkinson, 2002-2003). Yi and Majima (1993) also found that facilitators' active involvement and commitment affects their relationship with the learners. "The uneasy relationship between facilitator and students" cause students' negative attitudes towards the course, which in turn affect their learning (p.26).

One reason for the disparity in facilitator quality is that selecting teachers in the content areas of the ITV courses is not always possible (Yi & Majima, 1993). Many remote sites may not be able to find teachers in the content areas that are less commonly taught at schools. Even selecting teachers outside the content areas for facilitators may be difficult for some schools. Because of teacher shortage in public schools (Follo et al., 2002) all full-time teachers may already be assigned for other school related responsibilities in addition to teaching their own classes. Thus, schools may have to recruit to other available school personnel who can at least take care of routine work. Kirby (1998) observed that even school administrators such as assistant principals act as facilitators. In such cases, due to other responsibilities as administrators, they are often unable to be present in the classroom during broadcasts. Since they are administrators, no substitute fills in the position when they miss the class. Absence of facilitators in the classroom significantly affects student learning. High school students taking a satellite program have experienced more difficulties in concentrating in the ITV classroom than in a regular classroom (Levine, 1986). Yet, when facilitators are not present in the classroom, students find it even more difficult to pay attention and participate in the presentation (Kirby, 1998) and tend to talk with classmates during broadcasts (Robinson & West, 1986). A facilitator's function becomes even more important when students view the class on tape-delay (Moore et al., 1990). This indicates that the absence of facilitators' physical presence in the ITV classroom may impact more on tape-delayed students than on students who view the live class.

In summary, both instructors and facilitators need to be aware of the importance of facilitators in the ITV classroom and work cooperatively to enhance student learning. Remote schools should ensure a facilitator's quality to increase student success in ITV courses. Especially, students who are less motivated and lack self-discipline skills need more support from facilitators. If those students are forced to view the class on tape due to scheduling conflicts, a facilitator's physical presence is highly recommended.

Technical Support

Technical difficulties can lead to student frustration and dissatisfaction with the course (Anderson & Kent, 2002; Learmont, 1990; Lester, 2000). In ITV environments, poor audio quality is one of the major technical problems that hinder interaction, which in turn affects student learning (Azin-Manley & Olson, 1997). An audio echo is often inevitable when remote students talk back using telephones to interact with the instructor during live broadcasts (Barker, 1991). This makes it difficult for remote students to hear conversation through the TV. In order to minimize such problems, each local site should have a separate technical support person other than facilitators (Azin-Manley & Olson, 1997). This seems particularly important if the program is delivered using a two-way video system such as compressed video as more technical knowledge may be required to fix problems.

Kubota (1999) reported that the school participated in her study often had a problem with taping the broadcast. Sometimes, the beginning part of the program was cut off and the audio quality was poor. Azin-Manley and Olson (1997) have observed an interrelationship between student drop out and frequent technical problems. Their study illustrates that learners who were in the course with the highest drop out rate tended to have more technical problems. When schools had problems with receiving transmission, it often took 20 to 25 minutes for the system to be repaired. Consequently, students wasted class time. Thus, in ITV classrooms, technical difficulties can cause a long duration of "down time" in remote sites (Robinson & West, 1986). Without any doubt, such down time period can affect student attitude and motivation, especially low achieving students who tend to be less motivated from the outset of a course. Research confirms that as a result of technical hitches, "even the best of students tended to become discouraged and had trouble refocusing on the course once the technical problems were overcome" (Rohlyner & Marshall, 2002-2003, p.252). Thus, having trained technical staffs available for remote schools is critical in ITV classrooms. It is equally important that each local school has reliable equipment and should not neglect the regular maintenance.

In addition, inconsistency of the audio signals ranging from weak to loud has caused learners anxiety and distracts them from the presentation (MacGregor & Atkinson, 2002-2003). As described earlier, students' perceptions of visual and audio quality can affect a level of social presence (Short et al., 1976). Thus, technical staffs at the host site should be well trained and knowledgeable of the effects of the audio and visuals on reception sites.

Summary

The factors discussed in this article are interrelated. Instructors' effectiveness and quality of facilitators affect interaction, social presence, and sense of community. Technical problems impact on a student's motivation to learn, and learning within the class has been shown to be indispensable for making the entire ITV system work effectively. Selecting quality facilitators, providing technical workshop opportunities, and arranging technical support are administrators' roles (Cambre & Hawkes, 2001). Willis (1992) observed that "effective distance education requires the integrated efforts of several participant groups, including students, faculty, facilitators, support staff, and administrators" (p.35). The research on ITV classrooms presented and summarized in this article confirms the validity of
his statement. In order to increase student success in ITV classrooms all parties involved need to cooperate and make a conscious effort to create an effective learning environment.

References


education: An extension of contemporary models and strategies for practitioners. The American Journal of Distance Education, 8(2), 30-42.


