Facilitating Academic Achievement in High School Interactive Television Programs by Promoting Self-Regulated Learning

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Abstract

The study investigated the effects of self-monitoring on students' academic achievement and self-regulation in an interactive television (ITV) classroom. High school students taking the Japanese courses via ITV were asked to engage in self-monitoring activities, including goal setting, self-recording, and self-evaluation for 6 weeks using online databases. The study employed a quasi-experimental design with pre- and post-tests. and two groups: control and experimental groups, were formed to examine the effects of self-monitoring. Students' test grades and the Motivated Strategies for Learning Questionnaires were used to measure academic achievement and self-regulation. Hierarchical regressions were conducted to analyze the data. While no significant difference was found between two groups, the study provided directions for future research.

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INTRODUCTION

Interactive television (ITV) is one of the oldest delivery methods in K-12 distance learning (Thomas, 2001). Many researchers have studied ITV classrooms since it was born. ITV provides synchronous instruction that allows students to interact with the remote instructor in real time. As technology advanced, a variety of delivery format in distance education has 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, ITV is still widely used in K-12 schools across the nation (Ely, 2002; *Directory of Distance*, 2003). 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). ITV can provide quality instruction for such disadvantaged schools in a cost effective way.

Moore (1994) states that a goal of distance education is "learner autonomy" (p.2). Distance learners are required to be more responsible for their own learning. However, not every student has such skills. Students who lack motivation and organization skills may easily fall behind the class, and eventually drop out of the course. Research shows that due to schedule conflicts, many ITV students are forced to view the class on tape delay (Cavanaugh, 1999). Also, technical problems often cause students' frustration and make it difficult for them to keep up with the class (Azin-Manley & Olson, 1997). Such factors can decrease students' motivation, which in turn affects their academic

performance. Therefore, it is important that ITV instructors facilitate students' self-regulation and use of effective learning strategies.

According to a social cognitive theory, self-regulated learners are "metacognitively, motivationally, and behaviorally active participants in their own learning process" (Zimmerman 1986, p.308). They set goals, monitor their progress, and adjust use of learning strategies, emotions, and behaviors to achieve their goals without relying on teacher's instruction or parent's support (Schunk & Zimmetrman, 1997).

Many researchers agree that self-monitoring is the most important process in self-regulated learning. Facilitating a self-monitoring process increases students' self-regulated strategy use (Lan, 1998). Goal setting is a critical factor that enables self-monitoring. Students monitor their progress by comparing their performance with their goals. Accomplishment of goals brings students satisfaction, which enhances students' motivation and self-efficacy (Bandura, 1986). Self-recording is the most commonly used self-monitoring strategy. Keeping a log of academic activities and time spent for study improves time management skills (Zimmerman, Greenberg, & Weinstein, 1994). Monitoring self-efficacy in learned materials helps students assess the effectiveness of their learning strategies (Zimmerman, Bonner, & Kovach, 1996).

A number of studies on self-regulated learning have been conducted in a regular classroom setting. The results have provided evidence that self-regulated learning is effective in enhancing student academic achievement. Research also shows that self-regulated learning can be taught and incorporated into instruction (Butler, 1997, 1998; Cennamo et al., 2002; Corno & Randi, 1999; Lan, 1998; Schunk 1983; Zimmerman & Kitsantas, 1997).

The purpose of the study was to examine the effects of self-monitoring on students' academic achievement and self-regulation in a high school ITV classroom. As mentioned earlier, self-monitoring is the core component of self-regulated learning. Although earlier studies show that self-monitoring improves academic performance in regular classrooms (Belfiore & Hornryak, 1998; Lan, 1998), no research is conducted in the K-12 ITV context. In this study, various self-monitoring activities were incorporated into the ITV classroom. Those activities included goal setting, study schedules, self-recording, and self-evaluation. As in the research conducted in regular classrooms, the researcher expected that providing ITV students with an opportunity for self-monitoring would enhance students' academic achievement and self-regulation.

LITERATURE REVIEW

The following literature review provides theoretical framework of the present study. First, interactive television (ITV) is defined, and then development and characteristics of ITV, and various factors that affect student learning in ITV classrooms are discussed. Finally, a theory of self-regulated learning and its association with student academic achievement are examined.

Interactive Television Defined

Formerly, ITV was “a term used to describe interaction between a person and prerecorded instructional television program" (Portway & Lane, 1994, p2).
As the definition indicates, there was no real time interaction between the instructor and the students involved.

Later, the definition has changed when synchronous delivery format became a popular trend to increase interaction between teachers and students (Barker, 1996). Barker (1987) defined interactive distance learning as the learning environment where “the student is able to communicate directly with the instructor and other students at different sites, regardless of the distance, during the time of instruction" (p13).

During the 1980s, the term, ITV was primarily used to describe live one-way video broadcast with two-way audio communication using telephone systems (Kitchen & Kitchen 1988, Portway & Lane, 1994; Oliver & McLoughlin, 1997). In the 1990s, as compression technologies became more available, the use of two-way video format increased. Researchers began to describe compressed video with a two-way video system as another possible format of ITV (Oliver & McLoughlin, 1997).

With regard to technologies used, Morehouse, Hoaglund, and Schmidt (1987) state that systems of ITV can vary depending on the technologies available in each site. Thus, whatever the technology used, ITV "allows a teacher in one location, with or without students present, to be simultaneously seen and heard by students in one or more remote locations. Students in each site can similarly respond to the teachers and to one another" (p119).

Recently, because of increased use of two-way video systems, researchers tend to use the term, ITV to describe only live two-way video instruction (Anneta, 2003). Among the latest definitions of two-way video instruction system, Gerstein's definition includes the possible use of computer application sharing and emphasizes collaboration. She described videoconferencing, which is a synonym of ITV (Gunawarden, 1990), as an instruction that "involves two or more people in separate locations who share audio and video, and can additionally collaborate utilizing shared computer" (Gerstein, 2000, p182).

In the present study, ITV is defined as instruction using either one-way video with two-way audio or two-way video with two-way audio communication systems. Regardless of the technologies used, the system connects multiple sites and allows students to interact with instructor and other students in remote sites in real time. Outside classrooms, interaction between instructors and students can also occur using toll free telephone lines, fax, and email systems. Instructors may assign students collaborative activities over the Internet. In addition, the study focuses on school-based ITV programs for credit, that is, students view the program at schools under adult supervision such as classroom facilitators, and the program is used as a full course, not as occasional supplementary instruction.

Development of Interactive Television and Technology

Today, a variety of new technologies have become available to connect schools in different geographical locations and have made possible to create an interactive distance learning environment. In addition to traditional one-way and two-way video formats, desktop conferencing and application sharing are also a current trend. This chapter discusses the history and development of ITV along with technology advancement.

One-way Video Instruction

The first educational television programs began in the 1950s. In 1951, the City College of Chicago started to offer degree programs via instructional television and had served over 200,000 students. In the early 1950s, Iowa State University built the first television station owned by the educational institution and broadcasted televised courses for adult students. In those days, since the U.S. mail system was used to submit assignments and provide feedback, interaction between instructors and students were limited and feedback was often delayed (Portway & Lane, 1994).

In 1963, the Federal Communications Commission developed Instructional Television Fixed Service (ITFS) system that can provide television programs with one-way audio and full motion video using microwaves (Portway & Lane, 1994). Microwaves are high frequency radio waves that transmit audio, video, and data through the air. High frequency radio waves provide better picture and audio quality (Bludnicki, 1998). Unlike cable systems, microwave signals are transmitted from point-to-point, that is, the signals are sent specifically from the transmitting site to the receiving site or sites. Therefore, classes delivered via microwaves are more secure and have more privacy. Some school districts use both microwave and cable to deliver television programs. For example, in

Minnesota, microwave signals were transmitted to seven different school districts, and then distributed to each high school using cable systems (Kitchen & Kitchen,1988).

During the mid-1980s, because of possible cost effectiveness and a need for improvement of rural education, educators became interested in satellite-based instruction (Jordahl, 1989). Universities, private corporate, and non-profit organizations began to produce a variety of satellite programs for K-12 students (Barker, 1987). The basic format of satellite programs is one-way video, two-way audio communication (Barker, 1996). Satellite-based instruction allows full motion pictures of the instructor and any visual materials displayed. Since programs are broadcasted live, real time communication is possible by using telephone lines (Barker, 1987).

In 1985, Oklahoma State University started a German program for high school students, which was one of the first satellite courses delivered for K-12 students. In the following year, a physics course was added and the programs served for 101 districts in 6 states (Barker, 1987). In the same year, TI-IN Network of Texas, a private satellite vendor of high school credit courses also began to offer programs to 53 downlinks. One downlink redistributed the signal to multiple sites by using ITFS. Therefore, the courses were available for a large number of K-12 learners (Jordahl, 1989). Later, TI-IN Network expanded their course offerings to 14 states across the nation and offered 23 different high school credit courses (Barker, 1987, 1991). Furthermore, in 1986, the satellite telecommunication educational program (STEP) was established in Spokane, Washington. STEP is also a national satellite network offering programs for elementary and middle school students in over 100 schools (Barker, 1991).

During the 1980s, several states also established state-wide satellite networks. In 1986, Kentucky's state government created a statewide network system. Thirteen-hundred and twenty public schools in Kentucky were equipped with satellite dishes to receive televised instruction. Missouri also established their own satellite network system and installed 200 satellite dishes at K-12 schools in the state (Barker, 1987). In 1989, Virginia began to offer satellite courses for middle and high school students in the state (Moore, Dodl, & Burton, 1990). Both Kentucky and Virginia currently offer their courses nationwide (*Directory of Distance*, 2003).

Star Schools Project

The popularity of satellite-based instruction was further boosted by the federal funded Star Schools project that began in 1988. The Star Schools project was originally proposed by Edward M. Kennedy, Senator of Massachusetts in 1987. He was concerned that students' achievement levels in math and science were significantly lower than those of students in other developed countries. He also stated that in order to compete in the future global economy, it is important for children to acquire foreign languages skills. Thus, his intent of the Star School Project was to make advanced courses available to every student in the U.S. using technology and to provide quality instruction to increase student achievement in those subject areas (Kitchen & Kitchen, 1988). According to U.S. Department of Education, the purpose of the star schools project is to:

- Encourage improved instruction in mathematics, science, foreign languages, and other subjects.
- Serve underserved populations, including disadvantages, non-reading, and limited English proficient populations and individuals with disabilities.

> Star Schools grants are made to eligible telecommunications partnerships, to enable such partnerships to: (a) develop, construct, acquire, maintain, and operate telecommunications audio and visual facilities and equipment; (b) develop and acquire educational and instructional programming; and (c) obtain technical assistance for the use of such facilities and instructional programming. (U.S. Department of Education, Star Schools Program, Purpose, para. 1)

As shown in the statement, the Star School Project emphasizes not only reinforcement of the weak content areas, but also provision of educational opportunities especially for underserved students. Among the recipients of the Star School funding, satellite based distance education was the most widely accepted distance learning medium (Barker 1996). The first grants were awarded to four satellite program providers including Technical Education Research Centers (TERC) in Massachusetts, Satellite Educational Resources Consortium (SERC) in South Carolina, The Midlands Consortium in Oklahoma, and TI-IN Network in Texas (Bruder, 1988). In 1990, the second funding was awarded to an additional four programs: Reach for the Stars (RFTS) in Massachusetts, Educational Service District 101 in Washington, The Central Educational Telecommunications Consortium (CETC) in Washington, DC, and Telecommunications Education for Advances in Mathematics and Science (TEAMS). All these programs offered math, science, or foreign language courses for K-12 learners (U.S. Department of Education, Star Schools Program). A study showed that the majority of students taking the courses provided by Star Schools were rural school students or disadvantaged students (Tushnet & Fleming-MacCormick, 1995). Thus, the project has accomplished its

primary goals. The Star Schools project still continues at present and provides funding in two year cycles (U.S. Department of Education, Star Schools Program).

Two-way Video Instruction

The idea of two-way video communication has existed since 1964 when AT & T introduced their first videophone in the New York World's Fair. In those days, since there was no advanced compression technology available, signals were transmitted through analog format. Therefore, the transmission cost was extremely high and the available districts were also limited (Portway & Lane, 1994). In 1971, Trempeleau County's Western Wisconsin Communications Cooperative developed the first rural cable system delivering a two-way video instruction for public schools. The system connected eight schools and technical institutes (Hagon, 1985).

In the late 1980s, schools and universities began to use fiber optic cables to deliver two-way video instruction (Portway & Lane, 1994). A fiber optic cable is made of strands of fiber and allowed to produce broadcast quality audio and video (Hobbs & Christianson, 1997). Since a fiber optic cable can have wider bandwidth than copper cables, depending on the bandwidth selected, it can carry a large amount of information. Thus, the transmission speed is much faster than traditional copper cables (Kovacs, 1993). Furthermore, unlike a copper cable that transmits electrical signals, a fiber optic cable uses light signals. Therefore, a fiber optic cable is not affected by weather (Kovacs, 1993). However, installing connectors for fiber optic cables and the costs of equipment are expensive. In addition, a fiber optic cable is fragile and the signal path is more complex. Using adaptors can easily cause distortion of the signals (Kovacs, 1993).

In 1992, the Iowa Distance Education Alliance project was awarded federal Star Schools programs grants and established the Iowa Communications Networks, which is a statewide two-way video interactive telecommunications system using fiber optic cable. The network connects universities, colleges, and secondary schools throughout Iowa. (Simonson, Sweeney, & Kemis, 1993). In 1994, Utah also constructed a fiber optic based network system. Using this system, EDNET, which is the largest ITV network in Utah, provides the core school curriculum for high school students from 200 videoconferencing locations (Charp, 1999). In addition, Andrew and Marshall (2000) reported that the Collaborative Telelearning Center at J. Percey Page High School in Alberta, Canada offers a career and technologies studies course via ITV using high speed fiber optic cables. The facility also allows teachers and students to participate in international conferences connecting Switzerland, Ireland, and Germany.

As compression technology advanced, the cost was decreased. Thus, educators became more interested in use of compressed video to deliver two-way video instruction (Portway & Lane, 1994). In the compressed video system, audio is slightly delayed and distortion of video can also occur. Generally, the greater the compression and the more movement on the camera, the more noticeable distortion of the picture occurs (Hakes, Sachs, Box, & Cochennour, 1993). The compressed video is usually sent from point to point. Each reception site must have compatible compressed video systems including codec, audio and video hardware, and transmission links to receive signals from a host site. Transmission used for compressed video can be copper telephone lines, fiber optic, and microwaves (Hakes, Cochennour, Rezabek, & Sachs, 1995). Among them, compressed video via copper telephone wires is the least expensive means to provide

two-way video instruction. While the quality of compressed video through copper telephone wires is poorer than that of fiber optic cable transmission, use of standard interface increases interconnectivity between multiple locations, even between countries (Hobbs & Christianson, 1997). Mississippi Educational Network provides two way video instruction using compressed video. During the 1998-99 school year 4,224 high school students were enrolled in the compressed video courses. Virginia and Louisiana are also increasing use of compressed video (Thomas, 2001).

Integrated Service Digital Network (ISDN)

In 1990s, invention of integrated service digital network (ISDN) systems had a significant impact on two-way video distance learning programs (Portway & Lane, 1994). While the regular telephone system requires separate telephone lines for each device, such as telephone, fax, computer, or cable television, ISDN can provide these services through a single network (Fox, Loutsch, & O'Brien, 1993). Transmission speed of ISDN is faster than the regular dial up connection and it can be increased up to 384 Kbps (Sheach & Wood, 2005). Another advantage of ISDN is its cost effectiveness. Unlike expensive fiber optic cables, ISDN uses existing copper telephone lines (Klinck, 1993). Therefore, there is no need to wire additional cable lines.

In 1993, Appalachian State University in NC, Southern Bell, and AT & T installed ISDN in Watauga County Public schools. It was the first distance learning program using ISDN. Because of the ISDN installation, the program became able to provide Watauga County Public Schools with integrated access for interactive audio and video with acceptable quality at a speed of 112 Kbps (Klinck, 1993).

Currently, ISDN is available in most major cities, but not in rural and many suburban areas (Wahlstorm, Williams, & Shea, 2003). Some researchers suggest that because of the additional cost for installation, use of ISDN for distance learning may not be appropriate if there are too many sites involved (Fox et al., 1993). Further, as with other transmission technologies, ISDN also has potential problems. Losing audio or video can easily occur when the line that connects all sites is unexpectedly disconnected (Annetta, 2003).

Desktop Videoconferencing

Desktop videoconferencing is the latest technology used to deliver two-way video instruction. In addition to a computer, required hardware includes a microphone and a speaker for audio communication, and also a small video camera, which allows participants to see each other during live conferences over the Internet (Hobbs & Christianson, 1997).

Generally, desktop videoconferencing employs ISDN or Internet Protocol (IP) for transmission media (Sheach & Wood, 2005). IP address is an unique identification number assigned to each computer. In IP-based transmission, the data is sent to a specific IP address. Both IP- and ISDN-based transmission require a codec to receive or send data. The codec may be built-in to a computer or hooked up to a computer as an external device (Indiana Higher Education Telecommunications System, 2003). Research shows that if sufficient bandwidth is available, IP-based transmission can produce better video quality than ISDN (Sheach & Wood, 2005).

On the other hand, ISDN-based transmission has a different advantage. Using video over the Internet can cause data traffic, which slows down the transmission speed.

To ease the data traffic, a new technique called Quality of Service (QoS) was developed. The QoS allocates a fixed amount of bandwidth to video calls during the conference sessions. In IP-based transmission, the QoS is not always possible, but ISDN transmission can provide a guaranteed QoS. For example, if a user dials via ISDN with 384Kbps, the 384Kbps of transmission speed is guaranteed until the session ends (Sheach & Wood, 2005).

In contrast to satellite based ITV courses, instruction via desktop conferencing is appropriate for individual or a small group of students (Furr & Ragsdale, 2002). In order to maintain an optimum level of interaction and instructor control, the enrollment of a course should limit to 15 to 20 (as cited in Furr & Ragsdale, 2002). Andres (2004) also suggests that since it is important to see each participant's facial expression, no more than 2 or 3 students should share one computer in desktop videoconferencing.

CU-SeeMe is desktop videoconferencing software for Mac and IBM computers developed by Cornell University (Hobbs & Christianson, 1997). The software has been used in different distance learning programs. The CU-SeeMe allows users to communicate in audio and video in real time, and share documents or presentations on the computer screen from remote sites (Wahlstorm et al., 2003). The capability of such application sharing facilitates collaboration among the participants in different locations (O'Connor, 2003). In 1997, Washington State's Central Kitsap School District offered two math classes for credit via desktop videoconferencing system with live two-way audio, a shared interactive white board, and occasional use of live video for demonstrations (Gilbert, 1999)

In addition, Sharpe, Hu, Crawford, Gopinathan, Khine, Moo, and Wong (2003) recently reported that the multipoint desktop conferencing using CU-SeeMe with digital video streaming was successfully implemented in a teacher education program in Singapore. In the program, pre-service teachers in remote sites created their own lesson video clips and uploaded them to the class web page. During the live conferences, the video clips were played. While playing the video, the pre-service teachers could also see themselves in small windows on the screen, and they received feedback from peers and the instructor. Both the instructor and the students generally had positive attitudes towards the system. The students enjoyed creating video clips and appreciated the opportunity to share ideas with remote classmates.

In K-12 classrooms, a desktop videoconferencing system is mostly used for virtual field trips or supplementary lessons, such as inviting guest speakers in remote locations. There are at least over 100 desktop videoconferences available for K-12 students. These programs provide students with opportunities to visit museums, zoos, and national parks over the Internet. During the live session, students can ask questions and interact with the guest speaker or the guide in remote places. In order to attend these desktop conferences, IP or ISDN connection with 384Kbps or higher speed is generally required (Knowledge Network Explorer, 2005).

Some researchers state that “desktop videoconferencing is not, nor is it likely to be, a viable alternative to two-way interactive television” until the quality of video and audio are further improved (Hobbs & Christianson, 1997, p.48). In desktop videoconferencing, the frame rate is decreased due to the restriction of bandwidth. Higher frame rates produce smooth transition on a video. The frame rate of broadcast television

is about 30 frames per second (fps). To produce the same quality of video, 140 Mbps is required (Agius & Angelides, 1997). This is far more than that ISDN can provide. Research shows that the acceptable lowest frame rate in desktop videoconferencing is 5 to 6 fps. However, if frequent motion is required during live videoconferencing, a higher frame rate should be used (Kies, Williges, & Rosson, 1997). Kies et al. (1997) studied effects of the video quality in desktop videoconferencing on students' academic performance and satisfaction of the course. The results showed that lower resolution and decreased frame rates did not significantly affect students' performance, but did have impact on students' perception of the instructor and the media. Students in the lower resolution and decreased frame rate group tended to have negative attitudes towards the course. Additionally, Furr found that college students taking desktop video conference courses had a high level of frustration due to technical problems, including delay of audio and video signals (as cited in Furr & Ragsdale, 2002).

Further, desktop videoconferencing may not be feasible in all school districts. According to Anderson and Becker (2001), technology accessibility widely varies depending on the student's socioeconomic level. Schools in high socioeconomic communities invest on technology three times as much as poorer schools. Leigh (1999) also found that while students of high economic status are more likely to have high levels and fast types of Internet access, "students of low economic status are more likely to have low-level and slow types of access" that allow text transmission only (p.120). This indicates that students of low economic status are unable to access audio, movies, and other multimedia objects with interactive features. Thus, desktop videoconferencing may not be possible for those students.

Summary and Current Status

As described above, each technology used for ITV has both advantages and disadvantages (Barker, 1989, 1991; Kitchen & Kitchen, 1988; Kovacs, 1993). Therefore, in choosing ITV programs, school administrators must make a decision based on their needs and available technology in their schools. Formative evaluation to assure the effectiveness is important. If the same student outcomes are obtained, using two-way video format may not be necessary (Hakes et al., 1995).

According to a recent publication, currently 19 institutions and consortia in 14 different states provide ITV programs for K-12 learners (*Directory of Distance,* 2003). The total number of schools subscribing to those programs is unknown. Among the nineteen programs, nine of them are offered throughout the nation via satellite. The others are statewide or multi-state networks.

A study of the National Center for Educational Statistics in 1999 shows that the three most used delivery media are asynchronous web sites, ITV, and prerecorded video (Ely, 2002). Recently, a combined use of several media has also increased (*Directory of Distance*, 2003). Providing distance learning courses in different delivery formats allows a school to choose a program delivered via the medium that fits the most in their school districts, which in turn increases an equal educational opportunity for every student. Thus, along with other media, ITV will continue to be a viable option of delivery method for K-12 distance learning programs.

Characteristics of K-12 Interactive Television

Kitchen and Kitchen (1988) state that ITV is a transparent technology because it makes technology invisible. It is assumed that ITV instruction is not too much different from a regular classroom instruction. Thus, ITV has been widely accepted as an effective distance learning format for K-12 learners (Barker, 1996). This chapter discusses characteristics of ITV classroom including format, classroom atmosphere, class size, and courses offered. In addition, research on effectiveness of ITV instruction is also examined.

Classroom Characteristics

The instructional format of interactive television is less flexible than other distance learning formats such as online courses, pre-recorded video programs, and mail correspondence courses. This is because ITV employs a group learning system (Garisson, 1987). Students are required to be in a certain place at a certain time to receive instruction because specific equipment is needed for class participation (Garisson, 1987). During class broadcast, classroom facilitators monitor students. Tests or quizzes are administered under facilitators' supervision on assigned dates (Kirby, 1998). Such a synchronous and group learning environment makes it possible to provide learners with opportunities for more direct forms of interaction. It is also assumed that ITV students feel less isolated than those with other types of distance learning. A lower dropout rate for ITV is partially attributed to the interaction opportunity and students' less isolated feelings (Garrison, 1987).

One most distinctive characteristic in ITV is the low anxiety learning environment (Yi & Majima, 1993). One of the factors lowering student's anxiety is the "absence of an

authority figure", that is, a teacher is not physically present in the classroom (p.27). Yi and Majima (1993) state that in satellite classrooms, "the separation of teacher and learner enabled individual students to feel 'safe' with a sense of anonymity" (p.27). Such a relaxed classroom atmosphere develops cooperative attitudes among students within a site as a group. When one student is asked a question during the broadcast, usually other classmates in the same site try to help the student. Azin-Manley and Olson (1997) found that when students are lost with class content, they are more likely to ask their classmates in the same site for help. Thus, more peer tutoring may occur in ITV classroom than in regular classroom. Furthermore, research shows that communication between students across sites tends to be more open and honest than communication between students within the same site because they are in a different social community (Squire & Johnson, 2000). Squire and Johnson (2000) observed that in peer evaluation of students' projects, they seem to feel at ease critiquing students' work at other remote sites.

The class size of ITV courses can vary depending on the school. One of the misconceptions that many educators possess is that ITV courses can be offered to many sites and have a large number of students (Musial, & Kampmueller, 1996). But, actually there is a limit to the number of sites and students that ITV programs can serve. For two-way video systems, "how many sites places can be shown depends not only on how many monitors are present but also on the technical capabilities of an individual system" (p.30). For example, one university is limited to four, whereas in North Dakota, their system can show as many as 13 sites simultaneously (Musial & Kampmueller, 1996). In using compressed video with a two-way video system, two to ten sites are usually involved in one course (Azin-Manley & Olson, 1997). On the other hand, satellite programs usually

serve a larger number of students than locally operated ITV programs. The number of students enrolled in one course could be 200 or more (Barker, 1991). Since it is not possible to have all sites on line at a time, students call in the host site studio only on assigned dates (Yi & Majima, 1993). Thus, it is obvious that as the number of sites increases, the frequency of live participation in each site decreases, which in turn lowers the level of interaction (Azin-Manley & Olson, 1997). In addition, research shows that the site size, which refers to the number of students in a site, affects students' satisfaction of courses and their motivation (Biner, Welsh, Barone, Summers, & Dean, 1997). The smaller site size produces the higher levels of students' performance and motivation.

Moore and Thompson (1990) state that most ITV programs for K-12 students have focused on serving high achieving students. This trend still seems to be prevalent across the nation. Currently offered ITV courses for K-12 learners are mainly the Advanced Placement (AP) courses, especially advanced math and science, and foreign language courses (*Directory of Distance*, 2003). This is not surprising because it is difficult to find a qualified teacher for those subject areas. Today, over fifty-percent of high schools in U.S. offer AP courses in regular classrooms (Santoli, 2002). In many cases, students who took AP courses are awarded extra grade points and most schools grant college credit to those who have passed AP exams (Klopfenstein, 2003). However, students in low socioeconomic status may not have an opportunity to take AP courses because their schools are less likely to offer such courses (Santoli, 2002). Thus, offering AP courses via ITV can contribute to providing an equal chance of future academic success for disadvantaged students.

Effectiveness of K-12 Interactive Television

As described earlier, because of the federal funded Star Schools Project that began in 1988, ITV became a popular delivery method in K-12 education. Thus, a number of studies on K-12 ITV programs have been conducted between the late 1980s and the 1990s. Those studies were mainly intended to prove the effectiveness of ITV programs in comparison to regular classroom instruction. In addition to student achievement, researchers examined attitudes of students, facilitators, and administrators, and also issues related to ITV programs.

Morehouse et al. (1987) summarized the results of evaluation research on ITV reported between 1985 and 1987. They found that students had generally positive attitudes towards ITV courses and felt comfortable with the system. They enjoyed interacting with students at other districts. Fifty-percent of students in this study felt that cheating and discipline are not major problems in the ITV classroom. One half of the dropped students stated that they dropped the course because the class was too hard or did not like the instructor. In terms of student achievement, no significant difference was found between traditional classes and ITV classes taught by the same instructor.

Levine (1989) examined the attitudes of students, facilitators, and school principals participating SERC ITV programs. The results showed that almost all students enjoyed the opportunity for taking courses that are not usually available at their schools. While fifty-percent of students expressed that ITV instruction is too impersonal, most of the students felt that they learn content as much as they learn in a regular classroom. Furthermore, the majority of the students expressed that they preferred viewing the class live to watching it on tape. At the beginning of the course, facilitators tended to have

some concerns regarding ITV instruction. However, at the end of semester, more than 75 percent of the facilitators expressed that ITV is as effective as regular classroom instruction. Many school principals also had positive attitudes towards the ITV program. With respect to student discipline problems, inconsistency was found between perceptions of students and perceptions of school principals. Many of the school principals perceived that ITV classrooms had less discipline problems than regular classrooms, while half of the students stated that their classmates did not pay attention to the class as much as they did in a regular class (Levine, 1989). One plausible explanation of this inconsistency is that since students in ITV classrooms are likely to be average or high achieving students, principals' pre-conceptions about those students (that is, they have less behavior problems) may have resulted in positive perceptions of students behaviors.

Moore et al. (1990) conducted research on Virginia Electronic Classroom (currently, Virginia Satellite Educational Network). They found that student attitudes were generally positive. Students enjoyed the opportunity to know other students from different schools. Parents also had positive attitudes towards ITV. Both school administrators and classroom facilitators stated that parents' support impacts on the success of ITV classrooms. Research shows that parents' academic expectations for their children influence their children's academic achievement (Zimmerman & Matinez-Pons, 1992). Thus, parents' positive attitude towards ITV should be considered as one important component of ITV programs. Furthermore, Moore et al. (1990) identified scheduling conflict as a major issue and emphasized the importance of classroom facilitators in the ITV classroom.

Martin and Rainey (1993) examined student attitudes and achievement in a satellite based high school anatomy and physiology course offered through the TI-IN Network, currently StarNet. ITV students and regular classroom students taking the same anatomy and physiology class participated in the study. Pre- and post-tests were given to both groups to compare change in their attitude and achievement at the beginning and the end of the semester. The results showed that there is no significant difference in students' attitudes towards anatomy and physiology between regular classroom students and ITV students. In contrast, the achievement score in the ITV students group was significantly higher than that of regular classroom students. However, both the achievement and the attitude scores were widely varied within the ITV students group. This suggests that ITV may not be effective for all students. Qualitative data obtained in this study also indicate that the satellite course may not be suitable for students with an average or below average academic level.

The U.S. Department of Education conducted an evaluation study to examine the effectiveness of the Star Schools programs funded between 1990 and 1994 (U.S. Department of Education, Star Schools Program). The results showed that taking challenging classes via distance learning increased students' confidence and prepared students for college classes. Teachers involved in the programs stated that they increased use of collaborative teaching methods and multimedia materials. Several issues identified in this study include the limitation of two years funding from the Star Schools project, the lack of interaction among students across sites, the providers' less attentiveness to local school concerns, and the need for more effective use of distance learning system in instruction.

STEP is one of the Star Schools programs offering satellite courses for 500 schools. A survey was conducted with 6,000 students and 440 school administrators participating in STEP ITV programs (Yap, 1996). The major advantage perceived by school administrators was an increase in learning opportunities. One half of the students said that they took ITV courses because courses were not offered at their schools. Also, ITV contributed to improving classroom teachers' teaching skills. By observing ITV instruction, teachers learned various teaching techniques. Issues found in this study included schedule conflict, upgrading equipment, maintenance costs, and staffs' negative attitudes towards technology.

Wyoming's pilot project offered ITV courses for four rural high schools using compressed video with a two-way system (Azin-Manley & Olson, 1997). The results of the evaluation study were consistent with earlier research. Students generally had positive attitudes towards ITV and felt that they had a sufficient amount of opportunity to participate in class. Parents, staff, and administrators all viewed ITV favorably. However, students expressed that they still preferred face-to-face instruction and felt that they can learn more in regular classrooms than in ITV. Many students stated that they would like to have more interaction with students at other remote sites. Approximately one-third of students said that they had difficulty in contacting the instructors.

Urven, Yin, and Bak (1998) examined AP science courses for high school students delivered via ITV and the web. Pre- and post-tests were administered to compare students' academic achievement between the host site and remote sites. In both groups, student attitudes were mostly positive. However, achievement of host site students was higher than those of remote students. The study also showed that the lack of the

instructor's physical presence at remote sites makes it difficult for students to pay attention to the class. The instructor also found it difficult to monitor or give adequate attention to remote students during TV sessions.

The Ohio SchoolNet offered ITV courses for students and teachers in Ohio schools using a two-way video format (Hawkes, Cambre, & Lewis, 1998). The evaluation study showed that one major advantage of ITV is access to a variety of current information. This increased students' interests in foreign cultures and societies. In addition, ITV students became more responsible for their own learning and had a higher level of self-esteem. They produced a better quality of class work and their classroom behaviors were also improved. Furthermore, use of ITV also enhanced students' motivation, improved their communication and presentation skills, and facilitated collaboration among students. However, some students expressed that they prefer regular classrooms because of schedule conflicts and uneasiness in using technology. Nonetheless, the study provided evidence that ITV has a positive impact on student learning.

Finally, Cavanaugh (1999) has conducted a metaanalysis of the effectiveness of K-12 interactive distance education via videoconferencing and telecommunications for academic achievement. Nineteen studies including 929 students have been examined. For each study, standardized tests or teachers designed instruments have been used to measure students' academic achievement. The test scores of distance learning students were compared with those of traditional classroom students. The results showed that there was no significant difference in achievement between ITV students and regular

classroom students. Furthermore, no significant difference was found in effectiveness between grade levels, subject areas, technologies used, and instructional format.

In summary, except for one study, the above research showed that there was no significant difference in student achievement between ITV and regular classrooms. ITV also enhanced students' positive learning experiences. Researchers suggest that in evaluating distance learning programs, not only student performance but also student attitudes should be investigated because students' positive attitudes directly impact various important factors that affect student success (Biner et al., 1997). In examining the studies described above, students, facilitators, school administrators, and parents had generally favorable attitudes towards ITV. Thus, although some issues related to ITV classrooms were found, it may be fair to say that ITV can provide students with effective instruction.

Factors Affecting Student Success in K-12 Interactive Television Programs

Musial and Kampmueller (1996) state that "ITV instructions are not dramatically different from traditional teaching" (p.30). Factors that affect student learning in a traditional classroom also affect student learning in an ITV classroom (Kirby, 1998). As described in the previous section, ITV has been used as one effective delivery method for K-12 learners since the late-1980s. Although researchers have reported mainly positive aspects of ITV classrooms, they also found some issues that interfere with students learning. In order to find how educators can best facilitate students' success in ITV classrooms, those issues, as well as other critical factors, need to be examined closely.

Interaction

Many researchers agree that interaction between the instructor and students, and between students affect student satisfaction with the course, as well as student learning (Ritchie & Newby, 1989; Ritkind, 1993; MacGregor & Atkinson, 2002-2003). For example, in their study on K-12 ITV classrooms, Morehouse et al. (1987) found that a high level of interaction is correlated to a high level of students' engagement in class activities. Another study also shows that the higher level of interaction can decrease the drop out rate of ITV students (Ritchie & Newby, 1989).

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. 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 can not ask questions during broadcast as freely as they do in the regular classroom. Furthermore, Kelsey (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, Kruh 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 intraaction). 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 (1993) found that students' vicarious interaction within the class as a group is a critical factor that affects students' satisfaction with ITV courses. Their study showed that perceived overall interaction as a group impacts on student satisfaction more strongly than perceived individual interaction with others. Furthermore, they found that both perceived level of interaction and students' satisfaction decreased as students were more exposed to ITV environments. According to Fulford and Zhang (1993), this is because students' expectation of interaction increased as they became familiar with the system, and novelty effects diminished over time. Thus, their study suggests that ITV instructors may need to focus more on overall group dynamics and provide a variety of activities to keep students motivated.

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 discussion has a clear focus and the topic is given to students in advance. Also, when teachers 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 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. Oliver and McLoughlin (1997) 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 in long 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 (Sorensen & Baylen, 1999), and they are less involved in class activities (Ritchie & Newby, 1989). Furthermore, students in remote sites perceive that the quality of interaction in remote sites is significantly different from that of the host site (Lester, 2000). To sum up, all the studies described above suggest that in order to enhance interaction in ITV classrooms, instructors should design lessons carefully considering various aspects that are unique to ITV environments.

Social Presence

Social presence is one of the critical elements that affect student satisfaction and learning in ITV (Boverie, 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 relationships"(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 (Boverie 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-speakers audio systems were significantly higher on social presence than telephones. Furthermore, Short et al. (1976) found that the size of 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 described above, 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 students, which is closer to the face-to-face communication. Similarly, the use of compressed video and desktop videoconferencing systems is more likely 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 class.

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' mode" (Hakes et al., 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. Therefore, 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 a term, teacher immediacy, to describe teachers' verbal and non-verbal behaviors that minimize psychological distance

between the instructor and students (Gorham, 1988). The verbal immediacy behaviors include "actions such as using personal examples, using humor, addressing students by name, praising students, and initiating discussion" etc. (Hackman & Walker, 1990, p.200). The non-verbal immediacy behaviors include "gesturing, smiling, maintaining a relaxed body position, using vocal variety, and touching" etc. (p.200). Research shows that by using immediacy behaviors, an instructor can create a warm and risk taking learning environment, and reduce student anxiety in remote sites (Hakes et al., 1995). MacGregor and Atkinson (2002-2003) also found that teacher immediacy increases interaction in ITV classrooms.

Richmond, Gorham, and McCroskey (1987) studied the effects of teachers' non-verbal behaviors in a regular college classroom. They found that vocal expressiveness, smiling, and relaxed body position significantly influenced students' cognitive learning. Furthermore, Gorham (1988) found that verbal immediacy behavior also affected both students' affective and cognitive learning. His study showed that as class size increases, teacher's self-disclosure, encouraging students' participation or asking questions, referring to class as "our" class, instead of "this" class, become more 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.

In addition, Hackman and Walker (1990) examined teacher immediacy in ITV classroom. Their study results were consistent with the above research conducted in a regular classroom setting. They found that among teacher immediacy behaviors, individual attention, encouragement to remote site students, and use of vocal variety are

the most critical factors in promoting student satisfaction and learning. Furthermore, their study revealed that teacher immediacy behaviors impact on student perceived system effectiveness such as "the clarity of audio/visual transmission, the technical ease of remote participation, and information transfer" (p.200). For example, students find it easier to hear when instructors maintain a relaxed posture and use a variety of vocal expressions. Instructors' humor 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 addition to immediacy, intimacy is also related to social presence (Short et al., 1976). According to Argyle and Dean (1965), the level of intimacy between two people is determined by an equilibrium of various components, including eye contact, physical distance, intimacy of topic, amount of smiling, etc. Short et al. (1976) state that social presence is also one component that affects intimacy. In ITV classrooms, the lack of eye contact is often described as one of the major disadvantages (MacGregor & Atkinson, 2002-2003). Physical distance between the instructor and remote students is inevitable. Tape delayed students may perceive a lower level of social presence. Thus, the theory of intimacy suggests that to maintain the optimum level of intimacy, smiling, intimacy of topic, or other components must compensate for the deficiency of those elements.

Further, Saenz and Lockee (2004) state that interaction affects social presence. As described earlier, student attitudes towards a medium can influence the level of social presence (Short et al., 1976). Since student positive attitude towards courses is associated with the amount of interaction (Morehouse et al., 1987), the more interaction takes place

using a medium, the more positive attitude students may have toward the medium. As a result, the level of social presence is increased.

In summary, social presence impacts 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) state 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 as a communication tool regularly (Clifford, 1990).

Generally, distance learning requires advance preparation and more time for designing and developing courses (Cyrs & Conway, 1997; Kitchen & Kitchen, 1988). Thus, instructors' strong organization skills are required. Instructors' creativity is also critical for successful ITV programs (Gerstein, 2000). Providing a variety of activities is important (Gerstein, 2000; 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).

Furthermore, pacing is important to sustain the interest and attention of remote site students (Tykwinski & Poulin, 1991). While students express that ITV instruction

moves faster than regular classroom instruction and makes it difficult to catch up (Harris, 1997), slow paced instruction also decreases student attention and interest. Kubota (1999) found that the lengthy lecture type presentation, the slow pace of instruction, and the lack of entertaining elements make students less attentive to the class presentation. 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). Also, to increase student motivation, researchers suggest that instructors should make efforts to provide relevant and useful activities that can help students achieve their personal learning goals (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 high technology. According to Cyrs and Conway (1997), many students have poor note-taking skills. Especially in an ITV environment, students have more difficulty in note-taking during the televised presentation and "less interest in topics presented" on TV (Denton, Clark, Rossing, & O'Connor, 1984-85, p.297). Therefore, providing class handouts is helpful to direct students' attention to key concepts of the lesson and improve students note-taking skills (Cyrs, & Conway, 1997).

Researchers also suggest 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). 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 should always have a backup plan in case the technology does not work (Kitchen & Kitchen, 1988; Levitch & Milheim, 2003; Optiz, 1996). Flexibility is a must for ITV instructors.

In addition, Moore and Thompson (1990) suggest that in designing courses, constructing feedback devices is important to provide support for individual students and to monitor students' progress. 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 must be built into the course (Purcell & Purcell, 2000). Furthermore, effective feedback, which is "prompt, focused, and constructive" (Repman & Roganm 1996, p.37), can increase student participation, enhance their motivation (Repman & Logan, 1996; Store & Armstrong, 1981), and minimize psychological distance (Purcell & Purcell, 2000). Biner and Dean (1995) also found that in ITV classrooms, the promptness of returning graded papers increases students' satisfaction and significantly affects their academic performance.

Finally, Barker (1991) states 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. Especially in ITV environments, instructors' ability "to articulate, pace, image, and personalize" is magnified (Cyrs, & Conway, 1997, p.211). Thus, instructors' behaviors greatly impact in ITV classroom more than in regular classrooms (Morehouse et al., 1987; Optiz, 1996). Therefore, ITV instructors should use such strategies carefully, and always be well prepared for a lesson.

Sense of Community.

Levitch and Milheim (2003) state that to increase student participation, instructor should "create an atmosphere that encourages questions and promote a sense of community" among the students (p.45). A sense of community contributes to the quality of interactions, which in turn, facilitates student learning. Rovai and Lucking (2003) 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 (Learmont, 1990; Levine, 1989). Especially, remote students often express a feeling of exclusion (Lester, 2000; MacGregor & Atkinson, 2002-2003).

Sarason (1974) first introduced the theory of sense of community. Based on the theory, MacMillan and Chavis (1986) described elements involved in a sense of community: membership, influence, integration, fulfillment of needs, and shared emotional connection. Later, those elements were rearranged and renamed as spirit, trust, trade, and art (MacMillan, 1996).

Spirit consists of three categories: emotional safety, boundaries, and sense of belonging. To create a community, people must feel safe to tell “the truth” to other members. Boundaries develop such emotional safety and provide “the logistical time/place settings for a group or to be a group” (MacMillan, 1996, p.317). Boundaries define who belongs to a community and who does not. According to MacMillan (1996), acceptance, caring, and recognition by a community promote emotional safety and sense of belonging. Trust involves shared responsibility and shared authority. To develop trust, each member of a community must know what they are expected to do in the community,

and share authority among members. Once the trust is established, a community begins to trade. Self-disclosures are the media of trade. When people trust each other and find a social setting where they feel safe from shame, they begin to share their feelings with each other. Finally, art refers to shared experiences and it is essential for developing a community. To share experiences among members, contact and high quality of interaction are required.

According to Hill (1996), the communities that influence people most are not necessarily connected within the same geographical location. This suggests that it is possible to develop a higher level of sense of community in an ITV environment where remote sites are spread in different geographical areas, even across the nation. Furthermore, Hill states that psychological sense of community is setting-specific. What aspects of communities can facilitate a sense of community vary depending on the context. Therefore, factors promoting a sense of community in ITV classrooms are assumed to be different from those in regular classrooms. Even within ITV, characteristics of individual programs including students' age, content areas, the number of sites involved, and one-way or two-way video are different. Thus, educators may need to consider the uniqueness of an individual ITV program in order to facilitate a sense of community.

Researchers recommend several techniques to increase a sense of community in ITV classroom. Use of teacher immediacy is one effective technique to create a sense of community (MacGregor & Atkinson, 2002-2003; Rifkind, 1993). Since teacher immediacy enhances personalized instruction, it is certainly effective to increase the level of "emotional safety" and "sense of belonging" described by MacMillan (1996). Also, as

suggested earlier, instructors who use immediacy techniques can promote relationships with remote students and decrease psychological distance between instructors and students (Hackman & Walker, 1990).

Collaborative learning is another effective way to develop a sense of community. Many researchers emphasize the importance of collaborative learning to increase student interaction (Cavanaugh, 1999, Levitch & Milheim, 2003). A study shows that the interactions that take place "in a supportive and collaborative context" promote students' thinking and reflection in the learning process (Oliver & McLoughlin, 1997, p11). Collaborative learning provides an environment where students receive social support from each other. In such an environment, using the terms defined by MacMillan (1996), students become able to build “trust”, and facilitate “trade” and “art” between students. In addition, when distance students learn collaboratively with other students, dropout rates tend to decrease (Levitch & Milheim, 2003).

Similarly, a learner-centered classroom facilitates rapport among students (Walcott, 1996). In a learner-centered classroom, students become less dependent on the instructor. As a result, interaction among students is increased (Levitch & Milheim, 2003) and students become more involved in class activities (Squire & Johnson, 2000). In a learner-centered classroom, instructors are facilitators for student learning (Purcell & Purcell, 2000). As a member of the classroom community, instructors provide demonstration, feedback, and guidance (Squire & Johnson, 2000).

Finally, Pretty, Conroy, Dugay, and Fowler (1996) state that social support can facilitate a sense of community, but it is not necessarily dependent upon actual experience. If people feel that social support is available to them when they are needed,

such perceptions can promote a sense of community. Furthermore, individuals' perception of a sense of community affects acceptance of social support. According to Pretty et al. (1996), if adolescents feel that they are not accepted as members of a community, "they may choose not to access the resources and opportunities afforded by the community" (p.368). Research on ITV classrooms shows that while a toll-free number is provided to interact with the instructor for asking questions or receiving learning guidance, many ITV students do not use this system because they are not comfortable with calling (Levine, 1989; Kirby, 1998). This may indicate that those ITV students did not use such support systems because they felt that they were not accepted as members of the group. In other words, they did not perceive "a sense of community."

Learner Characteristics and Learning Style

Oxford et al. (1993) examined a relationship between motivation, learning style, learning strategies, and academic achievement in a high school ITV program. The result showed that motivation is the strongest predictor of success, and students' learning styles also directly affect motivation. Among the four learning styles (visual, auditory, hands-on, and haptic), the most popular learning style among ITV students was visual and a combination of visual and auditory. Visual learners had significantly higher achievement than students with other learning styles. In addition, researchers found that the use of learning strategy was the second best predictor for achievement and also strongly affected motivation. Students who used a variety of learning strategies performed better on the final exam. The more strategies students used, the more they were motivated. The strategies most frequently used were cognitive and metacognitive strategies, such as planning, organizing, and evaluating.

Burkman (1994) also studied the relationship between student learning styles and achievement in a high school ITV course. He divided both a host site and remote site students into three groups according to sociological learning types. Sociological learning types refer to students' preference in interaction with the instructor. Students with a high level of preference may try to interact with the instructor more frequently and look for feedback from the instructor. The result showed that the remote site students with a low level of preference in interaction with the instructor have achieved significantly less than the host site students in all groups. Burkman explained that this is because students who do not prefer interaction with the instructor are less likely to ask questions and seek help when they have difficulty with the class content. Since they are in remote sites, it makes the situation worse. Thus, this type of student with less academic capability may easily fall behind the class.

With respect to student personal characteristics, researchers pointed out that in using two-way video, instructors must consider students' attitudes towards being on TV. Some students may feel uncomfortable with being on the monitor. Quiet students become even quieter when they are on TV (Hakes et al., 1995). While one study shows that talking on the air is a strong motivating factor for students and increases their involvement (Larson & Bruning, 1996), such case may not apply to all types of students. Researchers suggest that instructors should consider students' personalities and provide enough structure to reduce the anxiety of quiet students (Hakes et al., 1995). In addition, Learmont (1990) found that students' prior levels of interest in the subject matter influence student's motivation and perceived positive learning experiences. In terms of

effects of gender and age, researchers found no significant impact on student achievement in high school ITV courses (Oxford et al., 1995).

According to a survey distributed to school administrators, 40 percent of the respondents stated that enrollment of ITV courses should not be open to all students (Reed & Doviak, 2001). School administrators tend to believe that ITV is only effective with self-motivated and self-diciplined students who can work independently (Yap, 1996). Students taking ITV courses also expressed that they need to be more self-deciplined to be successful in those courses (Lester, 2000). In addition, Martin and Rainey (1993) suggest that enrollment in ITV needs to be limited to high achieving students. Azin-Manley and Olson (1997) found that among the six high school ITV courses they studied, the courses restricted to the high achieving students had less dropout students.

As described earlier, many of the ITV programs offer AP courses. Klopfenstein (2003) states that AP classes should be offered only for “goal-oriented, motivated, and capable students"(p.40). Jordahl (1989) also emphasizes that in AP courses delivered via satellite, motivation is especially critical for student success. While it is generally assumed that AP students have high capabilities, selection of AP students varies depending on the schools (Klopfenstein, 2003). Thus, in an ITV classroom, less motivated students with an average or lower level of academic ability may need extra support from instructors and classroom facilitators.

In addition, Kirby (1998) identified good study habits as a factor that affects student success. Her study showed that many of the high school students who did not do well in the ITV course lack “adequate study skills and discipline” (Kirby, 1998, p.3). In

an ITV environment, students are required to make up their missed classes by viewing tapes. Research shows that many ITV students express difficulty in making up class work (Martin & Rainey, 1993). Kirby (1998) found that less motivated students do not make up the class. As a result, they are easily lost in the class.

Roblyner and Marshall (2002-2003) have conducted research on predictors of student success in high school on-line courses. Although the context is not ITV, the participants' age range is the same as the one in the present study. Therefore, their research is worth examining. In fact, the results were similar to those found in the ITV context. The predictors identified in their research include self-efficacy in school learning, a high degree of self-motivation, being responsible for one's own learning, being a self-starter, computer skills, technology accessibility, organization, goal oriented behavior, and study skills. Self-efficacy in school learning and self-motivation were the most significant predictors among those items.

In summary, instructors should be aware of individual differences among students and support them accordingly. Especially, remote site students need extra attention. To detect remote students' problems early, instructors should obtain feedback from students regularly. Providing a variety of means for communication may enhance students' help seeking. Levitch and Milheim (2003) found that asynchronous communication such as email makes students feel less self-conscious. Students tend to "ask questions that they might otherwise be afraid to ask" (p.45). In addition, a higher level of self-decipline, motivation, and academic capability are associated with student success in ITV environments. Developing good study habits and teaching learning strategies are important. Furthermore, as found in the study on high school on-line courses, self-

efficacy in school learning may also be a predictor of successful ITV students. To date, no empirical study on effects of self-efficacy in the K-12 ITV context is found.

Classroom Facilitators

Many researchers agree that classroom facilitators play an important role in ITV programs (Boverie, Murrell, Lowe, Zittle, Zittle, & Gunawardena, 1997; Clifford, 1990; 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 most important role of facilitator is to mediate between the instructor and students to reduce psychological distance between them (Willis, 1992; Yi & Majima, 1993). Therefore, 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). In addition, 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 (Hakes et al., 1995). Reminders and encouragements by facilitators are important for remote site students. As such, student interaction and satisfaction of the course are increased. Especially, when a large number of sites are involved, interaction decreases, and facilitators' role become more important (MacGregor & Atkinson, 2002-2003). Yi and Majima (1993) also found that facilitators' active involvement and commitment affect the relationship between facilitators and

students. “The uneasy relationship between facilitator and students” cause students’ negative attitudes towards the course, which in turn affect their learning (p.26).

As the above research indicates, for students to be successful in ITV classrooms, facilitators’ roles 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 assistance and routine clerical work. Because of such misconceptions of facilitator’s roles, school administrators tend to select whoever is available as facilitators without considering quality (Yi & Majima, 1993).

Moore et al. (1990) found that facilitators’ quality and their level of involvement varies across sites. Some schools select teachers of the content areas of the ITV courses for facilitators, whereas other schools select teachers outside the content areas, librarians, and school secretaries. According to Larson and Bruning (1996), students perceive having facilitators who are knowledgeable in the content areas as a great advantage because they feel that they can understand the class content better with their facilitator’s help. On the other hand, research shows that even if facilitators are not able to answer students’ questions about the content area, students feel that facilitators help them keep on track with their class work (Yi & Majima, 1993).

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 in 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 select other available school personnel who can at least take care of routine work. Kirby (1998) found that even school administrators such as assistant principals take on the role of facilitators. In such cases, because of other responsibilities as administrators, they are often unable to be present in the classroom during broadcast. 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. Research shows that high school students taking a satellite program have more difficulty in concentrating in the ITV classroom than in a regular classroom (Levine, 1989). When facilitators are not present in the classroom, students find it even more difficult to pay attention to the class presentation (Kirby, 1998). They tend to talk with classmates during broadcast (Robinson & West, 1986). Furthermore, researchers pointed out that when students view the class on tape-delay, facilitators play a more important role (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 should recognize the importance of facilitators' roles in the ITV classroom and work cooperatively to enhance student learning. In addition, remote schools should ensure a facilitator's quality to increase student success in ITV courses. Especially, students who are less motivated and lack self-decipline skills need more support from facilitators. If those students are forced to view

the class on tape due to scheduling conflicts, facilitators must be physically present in the classroom while students are viewing class tapes.

Scheduling

One of the major issues related to nationwide or large statewide ITV programs is scheduling conflicts (Barker, 1987, 1989, 1991; Harris, 1997; Kirby, 1998; Miller, 1997; Moore et al., 1990; Yap, 1996). When the class broadcast time is not synchronized with the school's bell schedule, students view the class on tape-delay or miss a part of the lesson constantly, which reduces opportunities for live interaction with the instructor and other students (Yap, 1996). Scheduling conflicts also leave some remote students off task during their class time (Kirby, 1998). For example, if the class broadcast ends 10 minutes earlier than the class time at a remote school, the remote students have 10 minutes of off broadcast time. While it is possible for the students to view the beginning section that they missed on tape using the off broadcast time, whether they actually make up the section often depend on the students or on the classroom facilitators. Kirby (1998) found that students tend to waste the off broadcast time on socializing with their classmates. Thus, the total amount of instruction for students with scheduling conflicts may be less than that of students who view the entire class broadcast in each lesson.

In addition to bell schedule, time difference, weather, school calendar, and block schedule can also cause problems (Kirby, 1998; Moore et al., 1990; Yap, 1996). Among them, block schedule greatly impacts on student learning. For example, if the class broadcast time follows a regular school schedule, which is 45 to 50 minutes long each lesson, "the 90 minute block schedule leaves a significant portion of the class time uncovered by the broadcast"(Yap, 1996, p.8). Furthermore, because students on block

schedules do not meet everyday, in order to keep up with the ITV class, they may view two taped classes in each lesson. However, in addition to the lack of live interaction, paying attention to taped classes for 90 minutes is obviously a challenging task for high school students. Research shows that the number of schools changing to block schedules is increasing (Yap, 1996; Wilson & Stokes, 2000). Wilson and Stokes (2000) found that the majority of students perceive the major disadvantage of block schedules is the difficulty in making up class work. For example, if students on block schedule miss one lesson, the amount of make up is doubled. ITV learning environments can compound the difficulty and requires more responsibility on the part of students.

Many school administrators believe that interaction during live broadcast is a critical factor to maintain student interest and motivation (Barker, 1987; Yap, 1996). Research also showed that students who view the class on tape are not involved in the class as much as those who watch the class live (Moore et al. 1990). However, Boverie, et al., (1997) found that viewing classes on tape does not affect student overall satisfaction of the course. They examined the impact of taped classes on student satisfaction, interaction, and social presence in ITV classrooms. Although social presence and interaction were identified as strong predictors of student satisfaction, the results showed that the relationship between the three factors is “not dependent on whether the programs were viewed live or taped" (p14). This indicates that whether interaction occurs during the broadcast or outside the broadcast does not affect students’ overall satisfaction of the course.

To sum, schedule conflicts negatively impacts ITV classrooms. Tape-delayed students are required to be more disciplined and motivated. However, interaction outside

of the class broadcast can compensate for the lack of live interaction during broadcast. Thus, to increase involvement of tape-delayed students, instructors should provide opportunities for interaction outside the broadcast as much as possible.

Technical Support

Technical difficulties result in student frustration and dissatisfaction of the course (Kitchen & Kitchen, 1988; 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 (Barker 1991; Azin-Manley & Olson, 1997). An audio echo is often inevitable when remote students talk back using telephones to interact with the instructor during live broadcast (Barker, 1991). This makes difficult for remote students to hear conversation through the TV. Azin-Manley and Olson (1997) suggest that each local site should have a separate technical support person other than facilitators. Especially, this is important if the program is delivered using two-way video system such as compressed video because 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) also found that student drop out was partially attributed to frequent technical problems. Their study showed that students 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 questions, such down

time period can affect student attitude and motivation, especially impact low achieving students who are originally less motivated. Research showed that when students experienced technical problems, "even the best of students tended to become discouraged and had trouble refocusing on the course once the technical problems were overcome" (Roblyner & Marshall, 2002-2003, p.252). Thus, having trained technical staffs available for remote schools is critical in ITV classrooms. It is also 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 causes student anxiety and distract students from the class 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 in the host site should be well trained and be familiar with the effects of the audio and visuals on reception sites.

Finally, facilitators' some knowledge about ITV technology may be helpful to solve minor problems that can frequently occur during live broadcast. However, Reed and Doviak (2001) found that 40 percent of the facilitators participated in their study did not have training for ITV technology. In the future, it may be important to increase opportunities of technical workshop for classroom facilitators to minimize negative effects of technical problems on student learning.

Administrative Support

According to Willis (1992), " administrative leadership and continuing interest and support are essential to the long-term nurturing and growth of distance education programs" (p.37). School administrators should be well familiar with ITV systems and

support the systems to work smoothly (Cambre & Hawkes, 2001). Administrative support indirectly impacts on student learning. For example, to minimize scheduling conflicts, school administrators must obtain the ITV course information as early as possible and plan for their school calendars and bell schedules (Kitchen & Kitchen 1988; Kirby, 1998). Delayed registration can also cause problems (Kubota, 1999). In her study, Kubota (1999) found that because of an administrative delay, the students could not receive broadcasts for the first few weeks. Furthermore, Kirby (1998) stresses that it is schools' responsibility to assure that students possess pre-requisite study skills.

In addition, selecting quality facilitators, providing technical workshop opportunities, and arranging technical support staffs are also administrators' roles (Cambre & Hawkes, 2001). Especially, selection of facilitators is critical if the courses are open to all students (Jordahl, 1989). In the host site, schools also should provide instructors for ongoing professional development opportunities to increase knowledge of effective curriculum applications in ITV environments to develop interactive and student-centered class activities (Cambre & Hawkes, 2001). Furthermore, Kitchen and Kitchen (1988) suggest that administrators should provide positive feedback to instructors, classroom facilitators, and support staffs to maintain their motivation.

Finally, Jordahl (1989) emphasizes the importance of human elements in ITV programs. Without strong administrative leadership, human elements, such as negative attitudes of facilitators and support staffs can " limit the success of even the most well-designed distance learning project "(p37).

Summary

Willis (1992) states that "effective distance education requires the integrated efforts of several participant groups, including students, faculty, facilitators, support staff, and administrators" (p.35). Research on K-12 ITV classrooms clearly suggests that his statement is true. To increase student success, all participants involved in ITV classrooms should work cooperatively and need to establish a good relationship. Many of the factors discussed in this chapter are interrelated. For example, instructors' effectiveness and quality of facilitators affect interaction, social presence, and sense of community. Scheduling conflicts and technical problems impact a student's motivation to keep up with the class work. Administrative support is indispensable for making the entire ITV system work effectively.

Research shows that high achieving students are more likely to be successful in ITV environments (Azin-Manley & Olson, 1997; Martin & Rainey, 1993). If so, should schools limit enrollment of ITV courses to high achieving students? As noted earlier, the primary incentive of K-12 distance learning is *equity*, which is providing an equal educational opportunity for *all students* (U.S. Department of Education, Star Schools Program). In addition, considering current issues in K-12 schools, such as teacher shortage (Follo et al., 2002), offering distance learning courses only for capable students may no longer satisfy schools' needs. Thus, what educators should do is not limiting enrollment to a certain type of students, but enhancing instructional effectiveness and providing support for at-risk students according to their needs.

In addition to a high academic ability, predictors of successful ITV students include self-decipline, self-motivation, the use of learning strategies (Oxford et al., 1993),

and study skills (Kirby, 1998). Organization, goal setting behaviors, and self-efficacy have also been found to be critical factors in the virtual high school context, which is assumed to be similar to ITV environments (Roblyner & Marshall, 2002-2003). Taking all these characteristics together, it appears that student success in ITV classrooms is strongly associated with self-regulated learning. Thus, a theory of self-regulated learning and its relation to academic achievement will be discussed next.

A Theory of Self-Regulated Learning

Self-regulated learners are generally viewed as the most effective learners. They know how to learn and how to motivate themselves. Pintrich (2000) states that self-regulation is like a thermostat. Once you set a desired temperature, the thermostat begins to monitor the temperature of the room. The heating and air conditioning are automatically turned on or off to maintain the same temperature. This analogy explains key processes of self-regulation including goal setting, self-monitoring, and self-judgment and reaction. However, human's self-regulation is a more complex system than a thermostat and it does not always function in the same way. Various internal or external factors can dysfunction or facilitate the system. Those factors can be self-efficacy, interest, value, emotional state, or environmental conditions (Bandura, 1986).

Many researchers have described self-regulated learning based on different theoretical perspectives. While some common elements are found across the theories, each theory also addresses different views (Zimmerman, 1989b). In the present study, a social cognitive theory is chosen to examine self-regulated learning for the following reasons. First, a social cognitive theory emphasizes learning through social interaction

(Bandura, 1977b). As discussed earlier, ITV is group learning. Building a sense of community and facilitating interaction between students are important. Second, social cognitive theorists explain specific motivational sources such as self-efficacy (Bandura, 1986). Motivation has been identified as a strong predictor of success in ITV environments (Oxford et al, 1993). Third, a social cognitive theory helps to examine academic behaviors of the target population of the present study because it addresses not only younger children's development but also adolescents' self-regulation (Schunk & Zimmerman, 1997).

This chapter examines self-regulated learning based on the triadic model of social cognitive theory including the structure and sub-processes. Key motivational factors involved in the process of self-regulated learning are also discussed.

Self-Regulated Learning in Social Cognitive Theory

Zimmerman (1986) has defined self-regulated learners as "metacognitively, motivationally, and behaviorally active participants in their own learning process" (p.308). They set goals, monitor their progress, and adjust use of learning strategies, emotions, and behaviors to achieve their goals without relying on teacher's instruction or parent's support (Schunk & Zimmerman, 1997). They are also capable of managing study environments to optimize their academic performance (Bembenutty, McKeachie, Karabenick & Lin, 1998).

According to Bandura (1986), human functioning relies on interaction in a triadic system that involves personal, environmental, and behavioral processes. Zimmerman (1989a) states that self-regulated learning occurs to the degree which "a student can use personal (self) processes to strategically regulate behavior and the immediate learning

environment" (p.330). The strength that each domain influences on a person's self-regulation is not necessarily equal and it varies depending on the context (Bandura, 1986). For example, in some contexts, environmental factors may not be controllable. In such cases, the person may rely on personal (self) and behavioral domains to self-regulate.

Self-regulation is generated based on feedback loops in the triadic system. In behavioral self-regulation, students may proactively use a self-evaluation strategy to judge their progress. For example, taking a practice test can provide students with information that shows how well they understand the material. Based on the information, students decide whether they should take action to improve or maintain their present performance. An individual's self-efficacy significantly affects this decision making process (Zimmerman, 1989a).

Bandura (1993) states that motivation is created from discrepancy production and discrepancy reduction. Thus, both negative and positive feedback generated from the system can influence a person's self-regulation. When students receive negative feedback such as a low test grade, they may increase efforts to reduce a gap between their goals and actual performance. On the other hand, students may set a higher goal to create discrepancy once they obtain the desired achievement.

In environmental self-regulation, students may proactively adjust their environmental conditions. For example, they may look for a quiet place to complete homework or turn off the radio to concentrate on study. The environmental feedback influences students' perception of effectiveness of the environmental structures, and this

determines whether they continue to use the same structure or try another one (Zimmerman, 1989a).

Covert self-regulation occurs within a personal (self) domain. This process includes monitoring and adjusting their cognitive and emotional states. Based on the information obtained through self-monitoring, they may deliberately use cognitive strategies such as rehearsal or elaboration to enhance their memory. They may also try to decrease their test anxiety by thinking about positive outcomes (Zimmerman, 1989a).

Structure and Sub-processes of Self-regulated Learning

A structure of self-regulated learning consists of three cyclical phases (Zimmerman, 1998, 2000, 2002). These three phases include *forethought*, *performance or volitional control*, and *self-reflection*. Each phase also involves several sub-processes. According to social cognitive theory, these sub-processes are interrelated.

Forethought phase. A forethought phase involves task analysis and motivational beliefs. The major components in task analysis are goal setting and strategic planning (Zimmerman, 2000). Goals motivate students to expend efforts to complete a task and helps students select appropriate strategies (Schunk, 2001). Goal setting is important because students monitor and judge their progress or outcomes against their goals (Bandura, 1986). Accomplishment of goals brings students self-satisfaction, which in turn enhances their motivation and self-efficacy (Bandura, 1986). Self-satisfaction derived from the accomplishment of personal goals is the most valuable reward for students. When students set higher personal goals, their efforts expenditure increases (Bandura, 1988). The three important goal properties are specificity, difficulty, and proximity (Schunk, 2001). Clear and specific goals are more effective than general ones

(Bandura & Schunk, 1981; Schunk, 2001). Specific goals improve performance because they provide a clear standard for self-evaluation. Easily attainable or unrealistically difficult goals do not motivate students (Schunk, 2001). When goals are set extremely high and students experience repeated failure despite their strong efforts, this may decrease motivation and lower their self-efficacy (Bandura, 1986). Thus, teachers may need to assist students to set appropriate goals according to an individual student's ability (Schunk, 1983a). Proximal goals that are set hierarchically with sufficient level of challenge sustain students' motivation during the process of achieving distal goals (Bandura & Schunk, 1981; Bandura, 1988; Schunk, 2001). Progress evaluated based on proximal goals is more likely accurate, which impacts the self-reflective phase (Bandura, 1986). Zimmerman and Kitsantas (1997) found that by shifting process goals (proximal goals) to outcome goals as skills are developed, high school students significantly improved their performance and increased self-efficacy, intrinsic interest, self-regulated behaviors compared to students who only set outcome goals or process goals. Furthermore, a study in college ITV classrooms showed that goal setting promotes students' homework completion and motivation to take another ITV courses (King, Harner, & Brown, 2000).

Once goals are set, students plan and select strategies to achieve their goals. The use of appropriate strategy improves students' performance, whereas ineffective strategy use results in failure of mastering skills or poor performance (Zimmerman, 2000). Zimmerman (1994) states that for students to self-regulate, they must be allowed to select their own strategies including learning methods and use of time.

Selection of goals and strategies are significantly affected by self-efficacy as well as other motivational beliefs such as task value and goal orientation. Students who are not motivated and perceive low self-efficacy may not choose a challenging task or expend less effort on the task (Bandura, 1993). These motivational factors are discussed later.

Performance or volitional control phase. According to Corno (1989), volition is different from motivation. She states that "motivational processes mediate the formation of decisions and promote decisions, whereas volitional processes mediate enactment of those decisions and protects them" (p.114). Thus, key concepts of the performance or volitional control stage are initiating action based on goals and strategies planned in the forethought phase, regulating their attention, and sustaining motivation to achieve goals. Sub-processes in this phase include self-control and self-observation.

Self-control refers to one's efforts to focus on a task during the process of performance (Zimmerman, 2000). There are various strategies to control attention such as self-instruction and attention focusing (Schunk, 1998). Self-observation refers to self-monitoring of one's performance (Zimmerman, 2000). When students are learning complicated skills, tracking the entire process often results in disorganized self-monitoring. Thus, self-monitoring is effective when students focus on only specific aspects of the performance rather than entire processes (Zimmerman, 1998). The quality of-self monitoring depends on the regularity, proximity (Bandura, 1986), informativeness, accuracy, and valence of feedback (Zimmerman, 2002). Regularity means that students constantly monitor their performance. Proximity refers to monitoring performance close to the time when it occurs (Bandura, 1986). Informativeness is determined based on the amount of information obtained through self-monitoring

(Zimmerman, 2002). Accuracy is important because inaccurate information can lead to misjudgment of performance. Valence of feedback affects motivation to maintain self-monitoring. For example, recording the number of questions answered correctly is more encouraging than recording the number of questions answered incorrectly. Therefore, self-monitoring should focus on positive aspects of performance. The most commonly used self-monitoring strategy is self-recording (Zimmerman, 2002).

Self-reflection phase. A self-reflection phase involves self-judgment and self-reaction. Self-judgment consists of two stages: self-evaluation and causal attribution. In the self-evaluation process, students compare information obtained through self-monitoring with their goals or standards. Self-evaluation can vary depending on students' interpretation of outcomes and standards they selected (Zimmerman, 2002). Generally, outcomes are measured using self-reference or normative criteria. In a self-reference criterion, students' current achievement level is compared with their previous performance. A normative criterion involves social comparison, which is comparison with other people's performance (Zimmerman, 2000). In the normative criterion, people tend to compare themselves with those with similar or a little higher ability level (Bandura, 1986). When people observe the high achievement of others with a similar ability level, they may devalue their own accomplishment (Bandura, 1988). The self-reference criterion is more desirable than the normative criterion because students can focus on improvement of their performance (Zimmerman, 2002). Social comparison tends to cause aversive effects on learner's self-efficacy, which in turn affects their motivation (Bandura, 1988).

Attribution refers to "a causal explanation for outcomes, experiences, and events" (Garcia & Pintrich, 1994, p. 138). Causal attributions are a critical component in the self-judgment stage because it directly affects the following self-reaction process (Zimmerman, 1998). According to attribution theory (Weiner, 1985), there are three types of causal attribution: internal or external to individuals, stable or unstable over time, and controllable or uncontrollable. When students attribute their failure to external, unstable, and controllable factors, they are more likely to sustain their motivation. In contrast, students who attribute their failure to internal, stable, and uncontrollable factors may give up quickly. Ability is viewed as internal and stable factors, whereas efforts, mood, and luck are external and unstable factors. Research shows that self-regulated learners tend to attribute failure to unstable or controllable factors such as insufficient efforts and attribute their success to their ability (Zimmerman & Kitsantas, 1997).

The self-reaction stage involves self-satisfaction and adaptive or defensive inferences. Self-satisfaction refers to one's satisfaction or dissatisfaction of the performance. Students' satisfaction of their performance brings a positive affect and motivates students to continue their efforts to improve their performance. On the other hand, students' dissatisfaction of the performance can lead to a negative attitude and discourage them from continuing courses of the action. Self-satisfaction also influences self-efficacy. Satisfaction of outcomes enhances self-efficacy, whereas dissatisfaction of performance decreases it (Zimmerman, 2000). The level of self-satisfaction can vary depending on the goals or standards individuals set (Zimmerman, 2002) and intrinsic value of the task (Zimmerman, 2000). For example, students who received the same

grades may not perceive the same level of satisfaction because of the difference in their judgmental criteria.

Adaptive and defensive inferences are the stages that students determine if they need to modify their strategy to improve their performance. Causal attribution, self-satisfaction of outcomes, and motivation affect this process. In adaptive inferences, students may shift their goals to a higher level or alter their strategy depending on the outcomes. Therefore, adaptive inferences are important to facilitate self-regulated learning. On the other hand, defensive inferences protect students from future dissatisfaction or failure, which often leads to self-handicapping (Zimmerman, 2000). Self-handicapping may occur when students experience continued failure in achieving goals and attribute poor performance to limited ability (Garcia & Pintrich, 1994). For example, students with low expectation of success may purposely expend less effort on their homework assignments. In doing so, they can attribute their poor performance to insufficient efforts rather than ability. Thus, they can justify their failure and maintain their self-esteem. Other forms of self-handicapping include setting unattainable high goals, task avoidance, and procrastination (Garcia & Pintrich, 1994).

Motivational Factors in Self-regulated Learning

Task value. As noted earlier, task value is one of the motivational sources that affect student's selection of tasks in the forethought phase. If students do not value what they are learning, they will not be interested to learn and will not be motivated to self-regulate (Schunk & Zimmerman, 1997). Task value refers to student's perceived value of the course or the course materials (Pintrich & Schrauben, 1992). Three components of task value are importance, utility, and interest. Importance addresses how significant the

task is for the student. The level of importance is determined based on the students' self-worth and self-scheme, which is a conception of self (Garcia & Pintrich, 1994). For example, a student who views himself as a good writer may value learning English literature more than learning science. Thus, he may choose to take an advanced English class over physics class. Utility value is associated with usefulness of tasks (Pintrich & Schrauben, 1992). In selecting or pursuing a task, students might consider how helpful the task is for them to achieve their future goals. In the previous example, students who want to be a medical doctor in their future are most likely to take a physics class rather than an advanced English class.

Interest is defined as students' personal preferences of the course material. It is closely related to intrinsic motivation (Pintrich, Roeser, & De Groot, 1994). According to Deci (1975), when people are intrinsically motivated, they enjoy the task or the activity without extrinsic reward. Research shows that there is a strong positive correlation between students' academic performance and their intrinsic interest (Zimmerman & Kitsantas, 1997). The level of interest in a certain topic or content can be affected by situational factors (Pintrich & Schrauben, 1992). For example, students who are interested in math may not always display the same level of interest in all tasks or activities in all math classes. A student who doesn't like the instructor or the structure of a class may lose or lower their interest even if they generally like math. On the other hand, students who don't like math may increase their interest when the instructor provides interesting activities.

Research shows that high task value students are more likely to use both metacognitive and cognitive strategies (Pokay & Blumenfeld, 1990). In particular,

students with high interest in course materials use more metacognitive strategy than those with low interest (MacWhaw & Abrami, 2001). In addition, high task value is related to low test anxiety (Eccles, 1983). Benbenutty, MacKeachie, and Lin (1998) also found that test anxiety is negatively correlated to self-regulated strategy use. Thus, task value, test anxiety, and strategy use are all related.

Furthermore, researchers found that task value is associated with academic delay of gratification (Benbenutty & Karabenick, 1998). Academic delay of gratification refers to a student's self-control of delaying an immediate enjoyment or a preferred activity to engage in an academic task that brings them future academic rewards. For example, students may choose to study for tomorrow's test rather than go to a party tonight because studying for a test brings them a reward that is a high course grade. Students with high preference of delay of gratification tend to perceive high task value. They are also likely to have high intrinsic interest, self-efficacy, and use more learning strategies (Benbenutty & Karabenick, 1998; Benbenutty & Zimmerman, 2003).

To sum up, task value influences self-regulated learning processes including selection of task in the forethought phase and self-control and strategy use in the performance and volition phase. Research indicates that task value is not necessarily a stable construct. A teacher's instructional effectiveness such as assigning interesting activities can enhance students' perceived value of the course materials.

Goal orientation. Goal orientation refers to "the reasons or goals students have for engaging in learning tasks" (MacWhaw & Abrami, 2001, p.313), and it creates different motivational effects in self-regulated learning (Shunck, 1994). Goal orientation is similar to task value. According to Pintrich and Schrauben (1992), goal orientation provides

students with directions of behavior in their learning process, whereas task value strengthens or weakens the behavior.

While researchers use different terms to describe goal orientation models, models generally include two types of goal orientation. One focuses on learning and the other focuses on performance (Ames, 1992; Dweck & Legget, 1988; Elliot & Church, 1997). Ames (1992) labels these two types of goal orientation as mastery and performance goals. Mastery goals focus on the development of new skills and the improvement of one's current performance. Therefore, achievement is measured based on self-reference standards. In contrast, performance goals are associated with one's ability and self-worth. A student's performance is assessed based on normative criterion, where social comparison is emphasized. Students value performing better than others. Receiving the highest grade in the class or public recognition is an example of performance goals.

Performance goal orientation can be further divided into two groups: performance-approach goal orientation and performance-avoidance goal orientation (Pintrich, 2000). Performance-approach goal orientation is the same as Ames' original description of performance goal orientation (1992). Performance-approach students try to demonstrate their ability to others. In contrast, performance-avoidance goal students focus on avoiding failure. For example, they may work harder to avoid receiving a low grade or looking stupid in comparison to others (Elliot & Church, 1997).

Research shows that students with mastery goals are more likely to use self-regulated learning strategies than students with performance goals (Ames, 1992). Mastery goals orientation increases the use of cognitive strategies such as memory and organization (Meece, Blumenfeld, & Holye, 1988; Pintrich & De Groot, 1990), and also

metacognitive, behavioral and environmental strategies including planning, monitoring, reviewing, and seeking help (Ablard & Lipschultz, 1998). Furthermore, Ablard and Lipschultz (1998) found that mastery goal students increased self-regulated strategy use as the difficulty of the material increased. Their study also showed that while performance goals alone were not related to self-regulated strategy use, the combination of performance and mastery goals affected student's self-regulated strategy use.

Mastery goal orientation also has a positive impact on self-efficacy, attributions, task value, interest, and affect (Pintrich, 2000). Research shows that mastery goal students are more likely to use adaptive attribution (Dweck & Legget, 1988). They tend to attribute their failure to external and controllable factors. Thus, when they encounter difficulties, they will try different strategies or increase their efforts. Furthermore, mastery goals produce less test anxiety and more positive attitudes towards learning than performance goals (Ames, 1992; Dweck & Legget, 1988).

While mastery goal orientation is generally viewed more positively than performance goal orientation (Ablard & Lipschultz, 1998; Ames, 1992; Dweck & Legget, 1988; Meece, Blumenfeld, & Holye, 1988; Pintrich & De Groot, 1990), Wolters, Yu, and Pintrich (1996) found that performance oriented goals that emphasize social comparison can increase students' motivation and improve performance. They examined a relationship between goal orientation and academic performance of junior high school students. Students were divided into three groups according to the type of goal orientation including learning goals (mastery goals), extrinsic goal orientation that focuses on receiving high grades, and relative ability goal orientation that emphasizes social comparison, that is doing better than others. The results showed that a relative ability goal

orientation is positively related to student's academic performance, self-efficacy, task value, and self-regulated strategy use. Positive effects of learning goals on students' motivation and performance are consistent with earlier research. Extrinsic goal orientation showed a negative impact on student motivation and academic performance. Additionally, Ee, Moore, and Atputhasamy (2003) studied goal orientation of 566 Singaporean gifted 6th graders and found that ego goal oriented students (relative ability goal students) performed better and displayed less task avoidance behaviors than other students. Thus, the results of those two studies support some positive effects of social comparison on student learning.

Students' goal orientation is also related to academic delay of gratification (Benbenutty, 1999; Benbenutty & Karabenick, 1998). Benbenutty (1999) divided college students into three groups according to their goal orientation types including task goal orientation (mastery goal), performance-approach goal orientation, and performance-avoidance goal orientation. The results showed that high task goal orientation was strongly related to high preference of academic delay of gratification. In addition, a positive correlation was found between performance-approach goal orientation and academic delay of gratification. Performance-avoidance goal orientation was negatively correlated to the delay of gratification.

Finally, research shows that a teacher's classroom goal orientation influences a student's goal orientation (Ee et al., 2003). Mastery goal orientation enhances student self-regulated learning, but to stimulate student's motivation, teachers may also provide performance focused class activities that generate a moderate level of competition among students. In such activities, group competition may be more desirable than individual

competition because group competition may ease negative effects of social comparison on self-efficacy (Bandura, 1988) and enhance cooperative learning. However, providing so many activities that directly affect grades may encourage students to be grade conscious, which may decrease their intrinsic interest in materials and direct students to performance-avoidance goal orientation.

Self-efficacy. Self-efficacy refers to personal judgments of one's capability to achieve a certain level of performance (Bandura, 1986). Self-efficacy significantly affects student's selection of activities, motivation, and academic performance (Schunk, 1994). Self-efficacy is domain specific (Bandura, 1993). For example, students with high self-efficacy in math may perceive a lower level of efficacy in other subject areas such as English. A student's academic self-efficacy is mainly developed during the junior high school years. Younger age children are not capable of judging their ability accurately. As children grow and are more exposed to learning environments that emphasize social comparison, they begin to judge their ability in relation to others' performance (Zimmerman & Martines-Pons, 1990).

According to Bandura (1977a, 1986), self-efficacy does not simply reflect one's past performance. It is formed through various sources including previous performance achievement, vicarious experiences, and verbal persuasion by credible persons, and physiological states (Schunk, 1994). Among these efficacy sources, the strongest factor that affects efficacy appraisals is previous performance achievement. Successes increase self-efficacy, while failures decrease it. Repeated successes strengthen self-efficacy. Strong self-efficacy students are less likely to be influenced by occasional failure, whereas the same failing experience can have a significant impact on a low self-efficacy

person for a long period of time (Bandura, 1993). Vicarious information sources include social comparison and modeling. Observing the success of others similar in ability or age increases students' self-efficacy, while observing those people's failures lowers their self-efficacy (Bandura, 1986, 1993). Teacher modeling is effective to enhance student's academic self-efficacy. Since students generally view teachers as skilled persons, they tend to believe that if they follow a teacher's course of actions such as the use of cognitive strategy skills, they can succeed as well (Schunk & Zimmerman, 1997). Teachers' verbal persuasion or encouragement makes students believe that they are capable of doing a task (Bandura, 1986, 1993). However, self-efficacy developed through verbal persuasion can be easily affected by subsequent failure or poor performance (Schunk, 1985). In addition, physiological states such as anxiety or fear can affect one's perception of self-efficacy. Some students may perceive their anxiety as an indicator of their insufficient skills to perform a task, and this results in a lower level of self-efficacy. In contrast, students who view their nervousness as an usual reaction are more likely to sustain their self-efficacy (Bandura, 1986).

Self-efficacy is also influenced by situational factors such as task difficulty, effort expenditure, and social support. For example, students may perceive higher levels of self-efficacy when they achieve a goal with less effort because this suggests that success is attributed to their ability. They may feel more efficacious when they solve a math problem by themselves than they do with a teacher's support. Thus, perceived self-efficacy can vary depending on how people weigh personal and environmental factors for the attribution of success and failure (Bandura & Schunk, 1981).

As described earlier, self-efficacy significantly affects goal setting in the forethought phase of self-regulated learning (Zimmerman, 2002). High self-efficacy students tend to set higher goals than low self-efficacy students and increase the difficulty level once their goals are achieved (Bandura, 1988). Thus, high self-efficacy students continuously motivate themselves to improve their performance.

Outcome expectation is also a motivational factor that influences the forethought phase and it is formed based of one's self-efficacy (Bandura 1993). Outcome expectation refers to personal beliefs about the ultimate consequences of performance (Bandura, 1997), which is associated with the utility value discussed earlier (Benbenutty & Zimmerman, 2003). If students do not believe their capability, they are less likely to expect positive outcomes (Bandura, 1986, 1988). When, students can visualize positive outcomes, they are more involved in tasks and their interest increases, which bring improved performance (Schunk, 1994).

In addition, self-efficacy contributes to student's persistency that is critical in the performance and volition phase (Bandura, 1993). Various studies have provided evidence that possessing skills only does not ensure successful performance. Self-efficacy is required to use skills appropriately in an academic environment (Bandura, 1986, 1993; Collins, 1982; Zimmerman, Bandura, & Martinez-Pons, 1992). Collins (1982) divided students with the same academic ability into three groups according to self-efficacy levels and compared their performance in math problem solving. The results showed that the high self-efficacy students displayed greater persistency in solving difficult math problems and performed better than the low and medium level of self-efficacy students.

The study also showed that a positive attitude towards math was more associated with student's self-efficacy in math rather than their actual math ability.

On the other hand, with respect to levels of self-efficacy required to perform skills, Salomon (1984) found that self-regulation does not require an extremely high level of self-efficacy. As long as students possess optimum levels of efficacy, they expend more efforts than high efficacy students who strongly believe in their capabilities. Thus, both possession of skills (Schunk & Zimmerman, 1997) and sufficient level of self-efficacy (Salomon, 1984) are required to enhance student achievement.

Self-efficacy is also related to self-regulated learning strategy use (Bouffard-Bouchard, Parent, & Larivee , 1991; Pitrich et al, 1994; Zimmermand & Martinez-Ponz, 1990). Zimmerman and Martinez-Ponz (1990) found that gifted students with a high level of academic self-efficacy used self-regulated strategies more than regular students. Similarly, Bouffard-Bouchard et al (1991) found that high self-efficacy students at secondary schools used effective time management skills when working on the task and identified appropriate strategies more than low efficacy students. In addition, Zimmerman et al (1992) found that efficacy for self-regulated learning significantly influenced level of academic self-efficacy. Students with high level of self-efficacy in self-regulated learning also perceived high level of academic efficacy.

Finally, self-efficacy indirectly affects the self-reflection phase through causal attribution (Zimmerman, 2002). Self-efficacy and attribution are reciprocally related to one another. High self-efficacy students tend to attribute their failure to situational factors such as insufficient efforts and attribute their success to their ability (Schunk, 1994).

Research shows that among various attribution types, the attribution of success to ability enhances self-efficacy the most significantly. This is because students are more proud of their success when they relate their success to their ability (Schunk & Gunn, 1986).

In summary, self-efficacy is the most critical factor that affects a student's motivation in self-regulated learning. It also influences other motivational sources and students' academic performance. To enhance students' self-efficacy, teachers should provide students with quality modeling and encouragement, decrease students' anxiety, and emphasize adaptive attribution when students experience difficulties or failures.

Self-Regulated Learning and Academic Achievement

Researchers have developed various strategies or instructional models to regulate motivation, cognition, and behaviors. As discussed in previous chapter, students' motivational beliefs significantly affect all phases of self-regulated learning. Thus, not only training students to use self-regulatory skills, but also create classroom environments that increase a student's motivation to use such strategies are important. This chapter addresses self-regulated learning in relation to academic achievement. In addition to self-regulated learning strategies, developmental processes and instructional models to promote self-regulated learning are discussed.

Self-Regulated Learning Strategies.

Motivational strategies. Motivational strategies help students enhance and sustain their motivation to engage in academic tasks (Wolters, 1999). Self-consequating refers to promising oneself an extrinsic reward as a consequence of completing academic task (Zimmerman & Martinez-Pons, 1990). Such rewards can be watching TV after

completing their homework or going shopping after finishing the exam. Zimmerman and Martinez-Pons (1990) found that self-consequating was the most used motivational strategy among gifted students. Interest enhancement is also a motivational strategy in which students manipulate materials to make them more interesting or challenging. For example, students may change a task to a game format or use a different strategy to solve problems. Research shows that college students use this type of strategy to increase their interest (Sansone, Wiebe, & Morgan, 1999). Self-talk refers to verbal self-encouragement (Wolters, 1998). To motivate themselves, students emphasize a reason for completing a task such as receiving a good grade. College students tend to use self-talk strategies frequently when they are studying for a test or working on difficult or boring tasks. Research shows that students who use self-talk strategy are more likely to use cognitive and metacognitive strategies (Wolters, 1998).

Wolters (1999) examined high school students' motivational regulation strategy use and its impact on motivation, effort expenditure, cognitive and metacognitive strategy use, and academic achievement. In his study, he identified two different types of self-talk. Mastery self-talk emphasizes mastering materials, whereas performance self-talk emphasizes receiving good grades. Several other motivational strategies such as self-consequating are also examined. The results showed that high school students used performance-self talk most frequently to regulate their motivation. Environmental control and self-consequating were the second most used strategies. Motivational strategy use as a group was positively correlated to effort expenditure and cognitive and metacognitive strategy use. Among all motivational strategies examined in this study, performance self-talk was the strongest predictor of high academic achievement. Mastery self-talk strategy

use was not related to cognitive strategy use, but strongly related to metacognitive strategy use (Wolters, 1999).

To sum up, self-talk and self-consequating are effective motivational strategies. Performance self-talk is associated with performance goal orientation, whereas mastery self-talk is associated with mastery goal orientation. Thus, Wolters' study is consistent with earlier research (Wolters et al., 1996). Both types of goal orientation can enhance student learning. A recent study also revealed that use of self-consequeating strategy predicts high school students' academic achievement and resilience, which refers to a student's intention to pursue a higher educational degree (Nota, Soresi, & Zimmerman, 2004).

Cognitive strategies. Cognitive strategies include learning strategies to enhance memory such as rehearsal, imagery, elaboration (Garcia & Pintrich, 1994) and transformation or organization of materials (Zimmerman & Martines-Ponz, 1986). Rehearsals help students sustain information in their working memory (Garcia & Pintrich, 1994). For example, students may repeatedly write down new vocabulary words in their notebooks to remember spelling. They may also read aloud a text over and over to memorize phrases. Imagery refers to mental pictures that students form to enhance their memory. For example, to remember a group of vocabulary words, students may create a fictional story that represents the meanings of each vocabulary word. Students who use elaboration strategies relate a new concept to an old concept they learned previously. Transforming and organizing strategies include summarizing, outlining, or rearranging materials to make learning easier (Zimmerman & Martines-Ponz, 1986). For example, students may create a table to organize concepts they learned in class. They

may write outlines before writing a term paper. Effective note taking is also an organizing strategy; while listening to a lesson, students identify and write down key ideas.

Although knowledge of these cognitive strategies is essential to enhance learning, students may not use such strategies effectively in an academic context. Various motivational factors such as self-efficacy and intrinsic interest significantly influences cognitive strategy use (Garcia & Pintrich, 1994).

Metacognitive strategies. Metacognitive strategies generally involve planning, monitoring, and regulating. The most important planning strategies are task analysis and goal setting, which have been discussed earlier. These activities help students plan their cognitive strategy use and organize information, and also activate prior knowledge related to the task (Garcia & Pintrich, 1994).

As noted earlier, commonly used monitoring strategies are self-recording and self-experimenting (Zimmerman, 2000). Many researchers view self-monitoring as the most critical process in self-regulation (Butler, 1997; Butler & Winn, 1995; Lan, 1998; Schunk & Zimmerman, 1997). Schunk (1983b) examined the effects of self-monitoring on student achievement in elementary math class. The results showed that students who self-recorded their progress performed better and produced a higher level of self-efficacy and persistency than other students. Effectiveness of self-recording has also been evidenced in high school (Zimmerman & Kitsantas, 1997).

Self-experimentation is used when information obtained through monitoring is not sufficient. Students systematically vary their performance and test different strategies to find the most effective one for them (Zimmerman, 2000). Self-testing is also a

metacognitive strategy associated with self-monitoring and self-evaluation. Students may generate possible test questions and answer them to prepare for a test (Garcia & Pintrich, 1994). Research shows that students who were trained to use self-testing strategies are more likely to achieve higher on a test than students who do not use the self-testing strategy (King, 1992).

Self-instruction and attention focusing are strategies to monitor or control attention. Self-instruction refers to self-verbalization that students describe their learning processes either covertly or overtly as they engage in a task (Zimmerman, 2000). For example, students may verbalize the steps of multiplication while solving a math problem. Self-instruction is one form of rehearsal strategy that helps students focus on a task and enhance their encoding and retention of materials (Schunk, 1998). Research shows that self-instruction is most effective when it is used at the earlier stage of learning new skills or when students face difficulty in learning materials (Schunk, 1982). Attention focusing is a strategy to eliminate distraction in order to concentrate on a task (Garcia & Pintrich, 1994). This is probably one of the most important self-control strategies in current adolescents' learning environment because students need to manage so many distractions to concentrate on study (Zimmerman, 2002). Kuhl (1985) found that low achieving students are easily distracted during tasks and tend to ruminate about prior failure more than high achieving students. Strategies to control mind state and screen out extraneous events enhances student achievement (Corno, 1993; Kuhl, 1985).

Finally, regulating strategies refer to the regulation of cognition and behavior for improving learning (Garcia & Pintrich, 1994). General self-regulatory strategies in academic learning can fall into this category. For example, when students face difficulty

with understanding materials, they may go back and read a particular chapter in the textbook or review class notes. Test taking strategies such as skipping a difficult question and going back later are also regulating strategies (Pintrich & Schrauban, 1992).

Resource management. Resource management strategies generally include control of study environment, time management, and help seeking (Garcia & Pintrich 1994). Self-regulated learners can manage their study environment effectively and choose a less distracting place to complete assignments (Zimmerman & Martinez-Pons, 1986). A student's management of academic study time also influences academic achievement (Zimmermand, Greenberg, & Weinstein, 1994). High achieving students usually have effective time management skills. They know how much time is needed to complete a task, so they allocate more time for difficult tasks and less time for relatively easier ones. To improve time management skills, self-recording is generally used. Students trained to use effective time-management skills tend to continue to use such skills and maintain higher grades even after the intervention (Zimmerman et al., 1994).

Help seeking refers to students' behaviors to obtain social help from others when they encounter academic difficulties (Newman & Schwagner, 1992). Research shows high achieving students use help seeking skills more frequently than low achieving students and they are likely to go to adults to obtain academic support (Zimmerman & Martinez-Pons, 1986). Newman and Schwagner (1992) have identified factors affecting students' help seeking behaviors. High self-efficacy students tend to seek help more often than low self-efficacy students. Students who believe that their academic achievement is not controllable and who do not expect positive outcomes are less likely to display help seeking behaviors. Also, personal relationships, closeness between teacher and students,

or between students, affect student's selection of helpers. In addition, a teacher's instructional strategies such as encouraging students to ask questions increase students' help seeking behavior. Classrooms with mastery goal orientation encourage students to ask for help without feeling embarrassed. The structure of the classroom, including feedback and interaction, also affects student's help seeking.

Time management and help seeking skills seem to be important for ITV students. As discussed earlier, due to schedule conflicts, students are often required to possess strong time management skills. Teaching time management skills may be an effective way to help remote students keep up with the class work. Also, with regard to help seeking, research on ITV shows that remote students are less likely to use a social support system such as a toll free telephone line (Levin, 1989; Kirby, 1998). Some of the factors identified in the above study (Newman & Schwagner, 1992) are also associated with issues in ITV classrooms such as a low level of sense of community (Rovai & Lucking, 2003) and social presence (MacGregor & Atkinson, 2002-2003). Thus, Newman and Schwagner (1992) provide valuable information for enhancing ITV students' help seeking behaviors.

Developmental Model of Self-Regulation

Self-regulatory skills are not automatically acquired as children grow (Zimmerman, 2000). There are many adolescents with lack of self-regulatory skills, and this often results in poor academic performance (Belfiore & Hornyak, 1998; Zimmerman, 2002). Children may begin to develop self-regulatory skills when they enter schools. For younger children, the primary sources that develop self-regulated learning are teacher's homework assignments, opportunities to work with peers, and parents'support for their

children to succeed in school learning (Zimmerman, 1998). Grolnick and Ryan (1989) found that parents' autonomy support such as offering choice and respecting children's opinions are positively related to children's intrinsic motivation for school learning, their self-regulation, and academic achievement.

However, despite teachers' efforts and parents' support, elementary school children are often unable to develop self-regulation effectively because of insufficient knowledge of learning strategies and lack of self-evaluation skills (Zimmerman, 2002). In middle school, the amount of homework is increased. Students begin to learn in less structured classroom environments, which requires them to have more responsibility. In high school, such responsibility is further increased. In addition to teachers' assigned homework, they must prepare for various tests themselves, including exams for each class, SOL tests to meet graduation criteria, and SAT tests for college admission. Furthermore, they also have to manage various after school activities such as sports, social events with friends, and part time jobs. Thus, the need for academic self-regulation is significantly increased during the secondary school years (Zimmerman, 2002).

To promote self-regulated learning, various intervention methods have been developed for children, adolescents, and adult learners. Research shows that those interventions have successfully promoted students' self-regulated learning as well as their academic performance (Butler, 1998; Hofer, Yu, & Pintrich, 1998; Lan, 1998; Schunk, 1983b). This indicates that with effective intervention, self-regulatory skills can be acquired regardless of grade level.

Developmental stages of self-regulatory skills consist of four levels including observation, emulation, self-control, and self-regulation. In the observation and emulation

levels, students rely on social resources, whereas in the self-control and self-regulation levels, they become more independent of social support and use more self-resources (Zimmerman, 1998, 2000).

Observation level skills are acquired through modeling. Modeling provides learners with an image of successful performance. This helps students establish general performance standards that lead them to further learning. Modeling also conveys a strategy to control motivation during the process of acquiring a skill. Models' persistency and efforts expended to improve performance influence student's motivational beliefs (Zimmerman, 2000). Research shows that the quality of modeling also affects students' performance (Kitsantas, Zimmerman, & Clearly, 2000). Kitsantas et al. (2000) examined modeling effects on high school student's dart throwing skills. Three groups were formed including coping modeling, mastery modeling, and no modeling. Coping modeling group observed a model who demonstrates skills as well as strategies of self-monitoring and performance improvement. The mastery modeling group observed a model who only demonstrated dart throwing skills. The results showed that the coping model group improved their dart throwing skills more than the mastery and no modeling groups. The no modeling group showed the lowest improvement among all three groups.

In emulation level, students perform a skill using a general strategy learned through modeling. However, their performance is usually not an exact copy of a model. They extract the major elements of the performance and generalize the pattern (Zimmerman, 2000). Thus, in this level, teachers' feedback and guidance are critical to improve accuracy of performance. Such feedback helps build process goals of performance that are required in the self-control level (Zimmerman & Kitsantas, 1997).

In addition, social reinforcement such as praise or encouragement also increases students' motivation (Zimmerman, 2002).

Self-control level involves structured practice and self-observation. Students practice a skill in structured settings on their own. To determine whether a skill is performed well, students may covertly refer to a model's performance. In this level, teachers should have students focus on process rather than outcomes. Successful approximation to their process goals increases student's self-satisfaction (Zimmenman, 2000). Students in this level should fully internalize the model's performance (Zimmerman, 2002).

In self-regulated level, students perform skills in unstructured settings. They focus on effectiveness or quality of performance rather than mere execution of a learned skill. They also adjust their performance according to personal and environmental conditions. While students in this level are capable of performing skills independently, they still need social support occasionally. This is because learning new skills often require assistance from others (Zimmerman, 2000). In fact, research shows that self-regulated learners use this strategy more frequently than non-self-regulated learners (Zimmerman & Martinez-Pons, 1986). However, once students reach this level, they know when and from whom they should obtain support (Zimmerman, 2000).

Finally, Zimmerman (2000, 2002) states that to develop self-regulatory skills, following the hierarchical sequence from observation to the self-regulatory level is most effective. To sum, key factors in each developmental level include quality of modeling, effective feedback and guidance, structured practice and self-monitoring with an emphasis on process goals, and adopting or adjusting skills according to personal and

environmental conditions. The model suggests that teachers' assistance is gradually withdrawn as students acquire each level of skill.

Promoting Students' Self-Regulated Learning

Schunk (1998) suggests that to promote students' self-regulated learning, teachers should provide students with opportunities for self-reflective practice that improves student's skills to monitor, evaluate, and adjust their performance during the learning process. The self-reflective practice eventually helps students find their own learning strategies that enhance their achievement most effectively.

Strategy training. The strategic content learning approach (SCL) is one of the instructional models to promote self-regulated learning using scaffolding techniques (Butler, 1997, 1998). In the SCL, instructors or tutors do not provide explicit modeling, but use comments or questions to help students develop their own strategy. Students receive a few hours of individual tutoring per week. Each student chooses a task from various content areas such as writing and math. At first, the instructor assists students to analyze a task and set a specific goal. If instructors detect students' misconceptions of tasks, they may help students interpret a task requirement correctly so that students can set achievable performance goals. In strategy selection, students are encouraged to use their familiar strategies first, and then if the strategy does not work, instructors help students examine the problem and revise the strategy or try a new one. After selecting a strategy, students are asked to articulate the process in their own words. The written description of strategy helps students implement, evaluate, and revise their strategies. In addition, the instructor supports students in monitoring their progress based on their strategies used and goals. As students monitor their progresses, they may modify their

strategies and goals with the instructors' assistance. Finally, the instructor helps students establish their own strategy that works best for them.

Butler (1997, 1998) used the SCL for post-secondary students with learning disabilities. He examined effects of the SCL on student achievement, self-efficacy, and metacognitive skills. Pre- and post-tests were conducted using questionnaires and interviews. The results showed that the SCL is effective to promote self-regulated learning. Students improved their academic performance, increased perceived task-specific efficacy, and strategy use. In addition, students were more likely to attribute their success to their ability, effort, and strategy use rather than to support from others.

As described above, the SCL provides students with extensive social support through tutoring sessions. Therefore, this approach may also be effective for younger children who are at the observation and emulation levels in Zimmerman's developmental models (Zimmerman, 2000). While individual tutoring may not be feasible in distance learning environments, the research on the SCL suggests that providing assistance according to individual students' needs is important to enhance student's self-regulation.

Learning to Learn is a course offered for undergraduate students at the University of Michigan (Hofer et al., 1998). This is also one of the strategy training models to promote self-regulated learning. At the beginning of the semester, students complete the Motivated Strategy Questionnaire to learn about motivational strategies. Throughout the course, the instructor teaches various cognitive skills such as elaboration, organization, as well as note-taking skills to enhance memory. When preparing for exams, students use a self-testing strategy: writing possible exam questions and answering the questions written by other students. As in the SCL program, the Learning to Learn course also requires

students to set their personal goals. In this course, however, students set both distal and proximal goals ranging from goals for life to goals for today. The instructor encourages students to focus on proximal goals and attribute their performance outcomes to controllable factors such as efforts. To enhance time management skills, students are required to keep a journal of their daily activities.

Research on the Learning to Learn course showed that students who took the course focused on mastery of materials, decreased their test anxiety, and increased self-efficacy and interest. Those factors were also positively correlated to students' self-regulated strategy use (Hofer et al., 1998). Unlike the SCL, the Learning to Learn is a model for group instruction and the instructor teaches strategies more explicitly. Corno and Randi (1999) suggest that while self-regulated learning strategies can be taught both covertly and overtly, students with less self-regulatory skills may learn more effectively when strategies are overtly introduced. Since covert instruction requires teachers' close monitoring of individual students, overt instruction may be recommended in group learning environment.

Self-regulated learning embedded in instruction. Ley and Young (2001) proposed four principles for embedding self-regulated learning in instruction. They state that the four principles can apply to any instructional environments regardless of content areas, delivery methods, or a specific population. First, instructors should "guide learners to prepare and structure an effective learning environment" (p.94). Teachers may require students to record the time they spent on study and study environments, and submit the record. By doing so, students will pay more attention to environmental structuring. Teachers also should encourage students to select a quiet, comfortable, and less

distractive environment for study, and provide suggestions on how to eliminate distractions (Ley & Young, 2001). Second, instructors should "organize instruction and activities to facilitate cognitive and metacognitive processes" (p.94). Teachers may use advance or graphic organizer and concept mapping, provide chapter summaries, and ask students to write outlines and identify important concepts to enhance students' organizing and transforming skills. Third, instructors should "use instructional goals and feedback to present student monitoring opportunities" (p.95). Goals and feedback are two critical factors that enable self-monitoring. The effectiveness of goal setting and self-recording has been discussed earlier. Providing frequent and systematic process feedback is important to enhance self-regulated learning. Feedback that encourages students to compare their progress with their goals facilitates students' self-evaluation processes most effectively (Corno & Randi, 1999; Ley & Young, 2001). Fourth, instructors should provide learners with continuous evaluation information and occasions to self-evaluate (p 95). Ley and Young (2001) suggest that teachers should provide corrective feedback and review the graded tests or quizzes frequently. The use of checklists is another technique that is especially effective in distance learning environments. Students may use the checklists that include measurable evaluation criteria, while working on their assignment. This allows students to make sure of the quality of their work and self-evaluate their progress. Providing information that shows students' cumulative grades or mastery of materials also support students' self-evaluation. The following instructional models are examples of embedded self-regulated learning instruction.

Lan (1998) used self-monitoring intervention in his graduate level statistics course. He developed a protocol with seventy-five statistic concepts to facilitate students'

self-monitoring. Each day, students recorded the amount of time or frequency for studying statistics such as reading the text, completing assignments, and receiving help from others. They also rated their efficacy level for solving each statistical concept listed in the protocol. Students submitted their protocol sheets in each class. They were also allowed to try the questions that they missed on the test again to receive extra credit. Thus, the class focused on mastery goal orientation.

To examine effects of the intervention, Lan (1998) compared self-monitoring students with non-self-monitoring students in their academic achievement and self-regulated learning strategy use. The results showed that the self-monitoring group produced higher achievement. Self-monitoring students were more aware of the structure and organization of statistical concepts than others. In addition, self-monitoring students used other self-regulated learning strategies such as self-evaluation, memory enhancement, and environmental control more frequently than non-monitoring students. Furthermore, qualitative data indicated that the protocol helped students reflect the class content, identify their weak points, manage their time, decrease anxiety towards the class, and increase interest in the content (Lan, 1998).

Consistent with earlier studies on self-monitoring (Schunk 1983; Zimmerman & Kitsantas, 1997), Lan's study supports that self-monitoring facilitates student's self-regulated learning. However, he points out that even if teachers provide assistance for self-monitoring, such as providing a self-monitoring sheet, it may be difficult for students who do not usually self-monitor to change their old learning style. He observed that some students did not use the protocol sheet regularly or did not use it at all. Therefore, he states that at first, the instructor may need to force students to initiate self-monitoring.

And also, to encourage students to self-monitor, students may need to see benefits of self-monitoring. This indicates that self-monitoring may be incorporated into the course structure as a requirement. If self-monitoring tools such as a self-recording sheet provided by teachers are well designed, students should be able to find it useful and see improvement of their performance, which in turn, motivates them to continue self-monitoring.

Cennamo, Ross, and Rogers (2002) have developed an on-line program that incorporates self-regulated learning strategies for college students. The program is called GAME. This is an acronym of goal, action, monitor, and evaluate. Originally, the course had been taught entirely in a regular classroom. To provide students with a more flexible learning environment, the web component was added. In the new course structure, class attendance is optional and course materials are provided over the GAME web site. To facilitate goal setting, outlines of lesson topics and the study guides are included in the web site. Viewing materials on-line or attending the class meeting is an action component. Practice quizzes with immediate feedback are available to enhance self-monitoring. Actual quizzes are also given on-line and students can view their grades for self-evaluation. After conducting a pilot test and interviewing with students, two new features, Grades Online and Goals Checklist, were added. Grades Online allows students to view their cumulative grades. Goals Checklist is a system that students set their own goals within a specific time frame and receive email reminder automatically. The GAME program was successful and the results of the Motivated Strategy Learning Questionnaire showed that students' self-efficacy and metacognitive strategy use were significantly increased.

The underlying theory of the GAME system is scaffolding, that is making support available for students so that they can select a type of support depending on their needs (Cennamo et al. 2002). As described earlier, the SCL also employs scaffolding techniques (Butler, 1997. 1998). However, in the SCL, the instructor assesses students' needs through individual tutoring sessions and provides assistance, while the GAME allows students to make decisions independently and have more control of their own learning processes.

Azevedo, Cromley, Thomas, Seibert, and Tron (2003) found that adaptive scaffolding is effective to facilitate self-regulated learning. In adaptive scaffolding, a teacher provides learning goals and continuously assesses a student's understanding of materials to provide support during the learning process. A critical factor in adaptive scaffolding is that teachers must carefully balance the amount of support they provide while enhancing student's self-regulated behaviors. Thus, too much support for relatively high self-regulated learners may hinder student's self-regulated learning, whereas insufficient support may not foster self-regulated learning behavior of less skillful learners. Research shows that adaptive scaffolding enhanced students' self-regulated strategy use, including activation of prior knowledge, monitoring their progress using various strategies, and adaptive help seeking (Azevedo et al., 2003).

Thus, the above studies suggest that to promote self-regulated learning, teachers should provide support according to individual students' needs. The SCL is designed for learning disabilities students. Therefore, they need more social support to acquire self-regulatory skills. On the other hand, the GAME is developed for regular college students

and those students may improve their self-regulatory skills more effectively in an environment, which allows them to work independently.

Classroom structure that facilitates self-regulated learning. In addition to the above intervention models, it is important to emphasize that classroom structure can affect students' self-regulated learning (Ames, 1992; Corno & Randi, 1999; Eshel & Kohavi, 2003; Kinzie, 1990; Newman & Schwagner, 1992). Kinzie (1990) states that "provision of learner control allows students to tailor their instructional experience to suit personal needs and interests…"(p.8). Thus, perceived learner control in the classroom significantly influences students' motivation (Kinzie, 1990). In their recent study on classroom control, Eshel and Kohavi (2003) found that perceived student control and perceived teacher control in the classroom are more likely to have an additive effect on students' academic achievement. Their research shows that when students perceive both a high level of learner control and a high level of teacher control, they produce the highest achievement. In contrast, they found that to facilitate self-regulated learning, a different balance of teacher and student control in the classroom is more effective. These results indicate that how much structure is needed in the classroom may depend on the levels of students' achievement and self-regulatory skills. Research shows that low achieving students are likely to perform better in highly structured learning environments (Kulik & Kulik, 1991). Thus, taken all together, low achieving students with poor self regulated learning skills may learn effectively in teacher control classrooms, while students with high self regulated learning skills learn effectively in learning environments which are well structured, but allow them to control their own learning.

In addition, the way teachers evaluate students' performance significantly influences students' motivational beliefs, which in turn affect their self-regulated strategy use (Ames, 1992; Butler & Winne, 1995; Corno & Randi, 1999). Corno and Randi (1999) state that when teachers provide a specific and qualitative feedback frequently and deemphasize the importance of grades, students are more likely to take challenging tasks. Furthermore, Schunk (1984) found that teacher's attributional feedback affects students' self-efficacy and attribution. He identified two types of attributional feedback including ability feedback and efforts feedback. Ability feedback refers to teachers' feedback that focuses on students' ability, such as "you are good at this" (Schunk, 1994, p.83). On the other hand, effort feedback focuses on students' efforts, such as "you've been working hard" (p.83). Ability feedback conveys that students' successes are due to their ability, whereas effort feedback conveys that their efforts bring success (Schunk, 1994). A study shows that students who received ability feedback perceive a higher level of self-efficacy and performed better than students who did not receive any feedback or received effort feedback (Schunk, 1984). Schunk (1984) also suggests that effort feedback is effective when it is provided for students who experienced continuous failure in the past. This is because effort feedback makes such students believe that they can be successful if they work harder next time. Consequently, students will continue to try improving their performance. Thus, Schunk's study indicates that teachers should provide ability feedback and effort feedback according to the student's achievement level (Schunk, 1984). Butler and Winne (1995) also suggest that for effort feedback to be effective, it should relate students' efforts to a specific strategy that they used to complete a task.

Finally, teachers' instructional techniques can enhance students' motivation and promote students' self-regulated learning (Pintrich, et al., 1994). When teachers assign students meaningful activities (Corno & Rindi, 1999), provide a choice of task, and allow students to work cooperatively, students increase self-efficacy and lower test anxiety (Pintrich et al., 1994). Also, Benbenutty and Zimmerman (2003) stress that teachers are important social models that directly affect students' motivational beliefs and self-regulated learning strategy use. Therefore, they suggest that teachers should be knowledgeable about self-regulated learning strategies and demonstrate the strategies in the class.

In sum, in order to create a classroom that enables self-regulated learning, teachers should maintain optimum balance of learner and teacher control in classroom, provide effective feedback, deliberately employ instructional techniques that enhance students' positive motivational beliefs, and use various self-regulated learning strategies in the class to serve as effective social models to their students.

Conclusions

A number of studies on self-regulated learning were conducted in a regular classroom setting. The results provided evidence that self-regulated learning is effective in enhancing student academic achievement. If self-regulated learning is critical in regular classrooms, it is even more important in distance learning environments where the instructor and students are physically separated (King et al., 2000). Research shows that self-regulated learning can be taught and incorporated into instruction in regular classrooms (Butler, 1997, 1998; Corno & Randi, 1999; Hofer et al., 1998; Lan, 1998;

Schunk 1983; Zimmerman & Kitsantas, 1997) and online learning environments (Cennamo et al., 2002).

Moore and Thompson (1990) state that "the success of distance education in the schools depends largely on the effectiveness of the teacher" (p.37). This is also true in ITV environments. It is a teacher's responsibility to incorporate self-regulated learning and enhance students' success in ITV classrooms.

In conclusion, in order to promote self-regulated learning, ITV instructors should:

- Help students structure effective study environments.
- Teach students self-regulated learning strategies including motivational, cognitive, and metacognitive strategies.
- Organize instruction to enhance a student's cognitive and metacognitve strategy use.
- Provide opportunities for self-monitoring and self-evaluation.
- Have students set personal academic goals including proximal and distal goals.
- Encourage students to evaluate their progress against their goals.
- Provide constructive and meaningful feedback regularly.
- Allow students to make decisions on their learning.
- Create classroom environments that focus on mastery of materials.
- Provide a variety of meaningful activities including cooperative work within a site and across sites, during and out side of the class broadcast.
- Communicate with students using various media, such as email, fax, and telephone.
- Make social support always available for students.
- Work cooperatively with classroom facilitators.

- Demonstrate self-regulated learning strategies and be an effective social model to students.

To date, few studies have been done on self-regulated learning in ITV classrooms and no research is found in the K-12 ITV context. One possible explanation is that because ITV is similar to a regular classroom, it may be assumed that self-regulation is not so important in ITV classrooms compared to asynchronous instruction formats. However, research shows that various issues related to ITV classrooms, including a lower level of social presence and sense of community, schedule conflict, the disparity of facilitators' quality, and technical problems interfere with student learning. Therefore, students are required to have a higher level of motivation and self-discipline skills. This indicates that to be successful in ITV classrooms, students must be effective self-regulated learners who can self-motivate, monitor, evaluate, and regulate their own learning.

Among the components of self-regulated learning, the present study will focus on self-monitoring. Self-monitoring affects various aspects of self-regulated learning, such as goal setting, self-evaluation, and self-reaction. The study will investigate if providing an opportunity for self-monitoring enhances students' academic achievement and self-regulation in K-12 ITV environments. The next chapter will outline the method of conducting the study, which provides details on the participants, research design, instruments, procedure of implementation, and data analysis.

METHOD

The purpose of this study was to examine the effects of self-monitoring on students' academic achievement and self-regulation in a high school ITV classroom. The earlier studies in regular classroom settings have provided evidence that self-regulated learning promotes student academic achievement. Self-monitoring is the most important process in self-regulated learning. Goal setting is a critical factor that enables self-monitoring. Self-evaluation based on the personal academic goals enhances students' motivation and self-efficacy, which in turn affects students' learning strategy use. Thus, the researcher expected that providing ITV students with an opportunity for self-monitoring would facilitate students' academic achievement and self-regulation.

Research Questions

The study sought to answer the following research questions;

1. What is the relationship between self-monitoring and student's academic achievement in a high school ITV classroom?
2. What is the relationship between self-monitoring and students' self-regulation?

Participants

The participants of the study were high school students taking Japanese I, II, and III courses offered by Henrico County Public Schools in Richmond, Virginia. The courses are delivered using a live interactive television system with one-way video and two-way audio format. Japanese I started in 1989 and Japanese II and III were added to the program in 1991 and 1993, respectively. Originally, the Japanese courses were

offered only for students in Henrico County. In 1991, Henrico County Public Schools made an agreement with the Virginia Department of Education to offer the Japanese courses through the Virginia Satellite Educational Network (VSEN) and the courses became available for all high school students across the nation via satellite.

With regard to the enrollment policy, while some remote schools may have their own criteria for allowing their students to register for distance learning classes, the VSEN does not strictly limit enrollment of the Japanese courses to high achieving students. Therefore, unlike Advanced Placement (AP) courses, the academic level of students enrolled in the Japanese courses can vary.

A different instructor teaches each Japanese course. The site size, which refers to the number of students within a site, varies depending on the school. Some students may view the class alone, whereas others may have 5 or more classmates. Each lesson is 45 minutes long and broadcasted each morning, Monday through Thursday. During the broadcast, no student is physically present in the host site studio and the two-way audio system allows an instructor to communicate with remote students during the live broadcast. However, due to schedule conflicts, only a small number of schools are able to participate in live classes. Most of students view the class on tape delay. Every Friday is a non-broadcast day. On a non-broadcast day, students take either a written quiz or a test in each remote site, and practice Japanese conversation in groups over the telephone with conversation teachers. The conversation teachers help students improve oral communication skills based on weekly conversation topics provided by the course instructors. Classroom facilitators monitor students during the Japanese class time and collect students' work and mail or fax it to the instructors.

Interaction between the instructors and students outside of the broadcast can take place using a toll free telephone, fax, and e-mail. In September 2006, the program also started using an online course management system, called Angel. The Angel allows students to access the course information and materials and class video archives for passed class broadcast, and to post messages on the discussion board.

The study was conducted in the first semester of the 2005-2006 school year. Information of the study was sent to 281 students at 34 different schools enrolled in Japanese I, II, and III courses. Of the 281, 77 students signed up for the study and 35 students who completed all tasks assigned for the study were included for analysis. There were 26 female and 9 male students and most of the students were in 10th or 11th grade. More than half of the participants were at schools in Virginia and the others were in California, Pennsylvania, and Texas.

Before the study was conducted, approval from the Institutional Review Board (IRB) at Virginia Tech and consent from Henrico County Public Schools, parents, and students were obtained (see Appendixes A through J). The participants were free to withdraw from the study any time without penalty. For compensation, the names of all participants who completed all the tasks assigned for the study was entered into a drawing for Super Certificates, and the researcher drew the winning names. These certificates can be exchanged for a gift certificate at the store of their choice. Two students received $100. Six students received $50. Twelve students received $25. For the rest of participants who completed all the tasks, the researcher provided a small gift from Japan.

Research Design

The present study employed a quasi-experimental design with pre- and post-tests. The participants were assigned to either control or experimental groups on a school basis. Since the number of enrollments in each course level and the site size varied widely, the researcher selected schools and included an equal number of students from each course level in both groups as much as possible. Grouping participants on a school basis eliminated the possibility of interaction between the control and experimental groups during the treatment. This enhanced the external validity of the study (Gall, Gall, & Borg, 2003).

The independent variable was a self-monitoring intervention, which was given online for 6 weeks. The dependent variables were students' academic achievement and self-regulation. Academic achievement was measured by students' weekly quiz and test grade average. The grade averages before and during the treatment were calculated. Self-regulation was measured using the Motivated Learning Strategies Questionnaire (MSLQ), which is described later in the materials section. The MSLQ was administered to both groups online before and after the treatment. Pre-tests for academic achievement and self-regulation help the researcher examine if the post-tests scores are affected by participants' pre-existing level of academic achievement and self-regulation. The research design is depicted in tables below (see Table 1 & 2).

Table 1

Research Design: Effects of Self-Monitoring on Academic Achievement

	Control group	**Experimental group**
Pre-test	Weekly quiz and test grade average before the treatment period	
Treatment	Goal setting	Goal setting Self-monitoring
Post-test	Weekly quiz and test grade average during the treatment period	

Table 2.

Research Design: Effects of Self-Monitoring on Self-Regulation

	Control group	**Experimental group**
Pre-test	MSLQ	
Treatment	Goal setting	Goal setting Self-monitoring
Post-test	MSLQ	

In this study, the participants were identified by name, but their identities were not disclosed. The on-line databases for the treatment and the MSLQ were secured with a password and accessible only to the researcher.

Treatment

Goal setting. Both the control group and experimental groups were asked to set their weekly academic goals for the Japanese classes (see Appendixes K through Q). In accordance with the research results on effective goal setting strategies (Bandura &

Schunk, 1981; Schunk, 2001), the participants were asked to set specific and achievable goals related to the class lessons. They entered their goal statements into the on-line database each week.

Goal setting is one of the most commonly used self-regulated learning strategies. Therefore, whether they are assigned the goal setting task or not, the participants who are originally highly self-regulated may voluntarily set their academic goals as a habitual behavior. Thus, assigning goal setting to both groups minimizes a possible effect on the results due to the difference within the control group.

Self-monitoring. The self-monitoring intervention consisted of study schedules, self-recording, and self-evaluation. These tasks were assigned only to the experimental group. The study schedules are an extension of goal setting (see Appendixes P & Q). Every week, the experimental group students created study schedules for their Japanese classes. The study schedules included the day, the time, the place, and the specific content that they plan to study. In addition to goal setting, creating such specific study schedules is likely to promote effective self-monitoring.

The self-recording activity required the students to record their actual academic performance each week (see Appendixes R & S). The format was the same as the one used for the study schedules, which required students to enter specific information, such as the time, the place, the content they study. Comparing their original plans included in the study schedules with their actual performance promotes self-evaluation of their accomplishment. Monitoring the use of their study time will also improve their time management skills (Zimmerman et al., 1994). In addition, tape-delayed students were asked to record which class tapes are viewed during their class time. As described earlier,

many of the students taking the Japanese courses are viewing the class on tape delay. Therefore, recording such information helps tape-delayed students keep up with the class content. Also, both live and tape-delayed students were asked to record their make up information each week. If students missed classes or are unable to complete class assignments due to sickness, school closings, or technical difficulties, they recorded which class tapes or class assignments they need to make up. This make up information help students set goals and create study schedules for the following week.

The self-evaluation consisted of checklists and self-efficacy monitoring (see Appendixes T & U). Five items were included in the checklists. Students were asked to evaluate their accomplishments by responding to Yes-No questions (e.g. Did you accomplish your weekly goals?). The self-efficacy monitoring is important because it directs students to evaluate the effectiveness of their learning strategies (Zimmerman et al., 1996). Among the self-efficacy monitoring strategies, self-efficacy rating has been used effectively in various studies (Lan, 1998; Schunk 1983b). To monitor self-efficacy in learned materials, the experimental group was asked to rate the level of their confidence for successfully performing particular tasks related the class materials by responding on a 5-point scale. The higher number denoted the higher level of confidence. In addition, the experimental group was asked what score they expect to receive on a weekly test. Schunk (1983b) used the same strategy in his self-monitoring intervention for elementary students. Each week, the researcher obtained information of key concepts introduced in the lesson from the Japanese instructors via email. The concepts were entered in the database by the researcher and used for students' self-efficacy monitoring.

Participants were required to enter the information of goal setting and study schedules into the database at the beginning of each week. The information of self-recording were entered any time during the week, but all the data entry related to self-recording had to be completed before they entered new goals and study schedules for the following week. Information for self-efficacy monitoring was entered after participants viewed all lessons for each week.

Materials

Materials used for the study included written instructions for assignments for the study, an on-line version of the MSLQ, on-line databases for goal setting and self-monitoring, and demographic information sheets for participants. Weekly quizzes and tests were designed and developed by each of the Japanese course instructors.

Written Instructions for Assignments

No instruction for goal setting and self-monitoring tasks was given during the class broadcast. The participants were asked to read the written instructions for their tasks individually. If they had questions regarding their tasks, they were asked to contact the researcher via e-mail. In the materials, the researcher's email address was included.

The written instructions consisted of three parts: a brief introduction of the study, an explanation of tasks, and an explanation of the data entry procedures. In the material, the screen shots of the on-line database were included to help the participants understand the process of the data entry. Examples for each task, such as sample goal statements were also provided. The material for the control group did not include the procedures for self-monitoring tasks (see Appendixes V & W).

The Motivated Strategies for Learning Questionnaire (MSLQ)

The MSLQ is a self-report questionnaire that is designed to assess college students' motivation and learning strategy use (Pintrich, Smith, Garcia, & McKeachie, 1991). The MSLQ has been used in many studies and proven to be a reliable measure (Butler, 1998; Cennamo et al., 2002; Hofer et al., 1998; Pintrich et al., 1994). In the user's manual, Pintrich, et al (1991) reported that reliability and validity of the MSLQ were reasonable level. The Cronbach's alphas for each subscale ranged from .52 to .93.

Also, Barlia and Beeth (1999) used the MSLQ to assess motivation of 11 high school students in a physics class, but no coefficient alpha was reported in their study. Furthermore, Bong (1997) used the self-efficacy scale in the MSLQ along with other types of scales for 588 high school students. She reported that the alpha levels of each scale she used ranged between .84 and .97.

The original MSLQ consists of 15 subscales in two categories: motivation and learning strategies. The motivation category includes intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy, and test anxiety. The learning strategies category includes rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation, control of time and study environment, effort regulation, peer learning, and help seeking.

For the present study, the subscales of critical thinking and peer learning were dropped because the items included in those subscales do not fit in the classroom environment of the participants. The items in the critical thinking subscale are too difficult for high school students. Also, peer learning is not possible for students who view the class alone. In addition, some language used in the MSLQ items were modified.

"Class" or "course" were changed to "the Japanese class." "Readings" were changed to "class assignments" because there is no reading material other than textbooks in the Japanese classes. "Exam" was changed to "test" because 9th grade students have never taken an exam at school.

The total number of items used for the present study was 69. Participants were asked to respond to the items on a 7-point Likert scale, ranging from "not at all true of me" to "very true of me." An on-line version of the MSLQ was created using the Virginia Tech Internet Survey Maker. To access the MSLQ questionnaire, participants were required to login with a password provided by the researcher. In both pre- and post-tests, participants were asked to enter their name, school, and course level, and then responded to each item (see Appendixes X through Z). The data were converted to a text file and exported to the Statistical Package of Social Science (SPSS) for analysis.

After the data were entered into SPSS, reliabilities of each MSLQ subscale were assessed using Cronbach's alphas. The results showed that the alpha level for help-seeking subscale was extremely low (-.37). Thus, the researcher decided to drop the subscale for help-seeking. The alphas for the rest of the subscales ranged from .47 to .96 (see Table 3).

Table 3

Cronbach's Alphas for Subscales of MSLQ

Subscales of the MSLQ	**Cronbach's alpha**
Intrinsic goal orientation	.60
Extrinsic goal orientation	.47
Task value	.78
Control of learning beliefs	.80
Self-efficacy for learning and performance	.96
Test anxiety	.80
Rehearsal	.67
Elaboration	.73
Organization	.54
Metacognitive self-regulation	.80
Time and study environment	.75
Effort regulation	.59

On-line Database for Goal Setting and Self-Monitoring

The on-line databases for goal setting and self-monitoring were created using DreamWeaver MX and Cold Fusion. In the login page, participants were required to enter their names and passwords. Each participant was given a different password. Separate web pages were created for each control and experimental group. After the experimental group login, they select week and a type of task (goal setting, self-recording, or self-evaluation) from the pull down menus. For the control group, they were

asked to select week only. The web pages for the control group included the database for goal setting only, whereas the web pages for the experimental group included the database for goal setting, study schedules, self-recording, and self-evaluation. Thus, the participants did not know what kind of tasks the other group was assigned. In each web page, a brief explanation of the tasks and the procedures of data entry were also included. To access the databases, participants needed to enter their ID and password. When the treatment period ended, the data were entered into SPSS.

Demographic Information Sheets for Participants

All participants were asked to fill out a demographic information sheet (see Appendix H). They were asked to provide information about their school, grade level, gender, age, prior distance learning experiences, computer accessibility at home, e-mail addresses, and reason to take the Japanese courses. The question regarding whether they view the class live or on tape delay were also included in the demographic information sheet.

Procedures

At the end of August, the researcher had a meeting with the instructors to confirm the research procedures. Students' enrollment information for each course level and the name of facilitators were also obtained from the instructors.

As soon as classes began in September, consent forms for students and parents, and demographic information sheets were mailed out to facilitators in remote sites. A letter to facilitators explaining the procedures of the study was also enclosed (see Appendix D). To confirm that facilitators have received the packet and distributed the

forms to each student, a confirmation sheet, in which facilitators are asked to return to the researcher, were included in the packet (see Appendix E). The signed forms and the demographic information sheets were collected by the facilitators and returned directly to the researcher via U.S. mail by the last week of September. A brief note to remind the deadline for the consent forms were faxed to each school a few days before the deadline (see Appendix AA).

In the first week of October, students who agree to participate in the study were assigned to either a control or experimental group on a school basis. Both groups consisted of approximately the same number of students from each course level. After two groups were formed, written instructions for assignments for the study were mailed to the classroom facilitators. In each packet, a check sheet, which included the list of participants within a site, was enclosed. When facilitators distribute the materials to each participant, they marked the participant's name in the list. The list was returned to the researcher via U.S. mail (see Appendixes BB & CC).

In the second week of October, the researcher confirmed that all confirmation sheets were returned from the facilitators of participants' schools. In the third week of October, the MSLQ (pre-test for self-regulation) were administered online. Participants in both the control and experimental groups were asked to complete the questionnaire outside classrooms by the end of October.

From the fifth week of October to the second week of December, the self-monitoring intervention was given online. Passwords to access the self-monitoring database were faxed to facilitators and distributed to each participant (see Appendixes DD, EE, & FF). During the intervention period, the researcher monitored participants'

data entry and sent a reminder to each participant via email every Saturday and also faxed it to the facilitators at the participants' schools on Monday mornings and asked them to pass the message to each participant (see Appendixes GG through JJ). Also, every week, the researcher obtained the information about the key concepts that were taught in each class from each instructor and entered them in the online database for the self-efficacy monitoring task.

At the beginning of November, the researcher sent the information of the MSLQ (post-test for self-regulation) via e-mail to each participant. The participants were asked to complete the MSLQ online by the third week of December. In the second week of December, fax and e-mail reminders were sent to each participant again (see Appendixes KK & LL).

Finally, the researcher obtained students' quiz and test grades from the instructors and computed the grade average for each student. The data for students' grades were saved in an Excel file and stored in the researcher's laptop computer, which is only accessible to the researcher. Also, at the end of study, the researcher sent a thank you card to each facilitator and provided a small gift to the Japanese instructors.

Data analysis

The data collected through on-line databases, participants' demographic information, and quiz and test grade averages were entered into SPSS.

The descriptive statistics for each variable were analyzed, first. Then, hierarchical multiple regression analysis was conducted to examine the relationships between self-monitoring and academic achievement, and self-monitoring and self-regulation. Since the

study did not employ a random assignment, there is a possibility that the results of the post-tests were affected by pre-existing differences among the participants or other factors rather than by the effect of treatment. This may decrease the internal validity of the study (Gall et al., 2003). The hierarchical regressions allow the researcher to examine the relationship between independent and dependent variables, controlling for the effects of extraneous variables (Newton & Rudestam. 1999).

Site size refers to the number of students per remote classroom. Biner et al. (1997) found that smaller site size in ITV classrooms is associated with a higher level of student motivation and performance. Thus, site size was considered as a possible extraneous variable that might affect the results. The quiz and test grade average before the intervention and the pre-test score of the MSLQ measure participants' pre-existing level of achievement and self-regulation. Therefore, these variables were also entered into the regressions.

According to Newton and Rudestam (1999), extraneous variables should be entered into the regression analysis The variables included in the tables below are listed in the order of entering (see Table 4 & 5). Thirteen subscales of the MSLQ were analyzed separately.

Table 4

Variables Entered into A Hierarchical Regression for Academic Achievement

Independent variables	**Dependent variable**
• Site size • Quiz and test grade average before the treatment • Self-monitoring intervention	• Academic Achievement (Quiz and test grade average during the treatment)

Table 5

Variables Entered into Hierarchical Regressions for Self-Regulation

Independent variables	**Dependent variables**
• Site size • Pre-test score of the MSLQ • Self-monitoring intervention	• Self-regulation (Post-test score of the MSLQ) Subscales of the MSLQ o intrinsic goal orientation o extrinsic goal orientation o task value o control of learning beliefs o self-efficacy o test anxiety o rehearsal o elaboration o organization o metacognitive self-regulation o time and study environment o effort regulation

RESULTS

Demographics

There were 18 students in the experimental group, including seven Japanese I students, seven Japanese II students, and four Japanese III students. Of the 18, 12 were females and six were males. In the control group, there were 17 students, including eight Japanese I students, eight Japanese II students, and one Japanese III student. Fourteen students were females and three were males. In both groups, the mean age was approximately 16. Site size (the number of students enrolled in the Japanese courses per remote classroom) ranged from 1 to 20. The mean site size in the experimental group was 3.72 (*SD* = 2.34), whereas the mean site size of the control group was 9.59 (*SD* = 6.27). Among all participants, only four students were able to view live broadcast on a regular basis and the rest of them were tape-delayed students. There were an equal number of live students in each control and experimental group. All but three of the Japanese I students have never taken distance learning courses before, whereas Japanese II and III students had prior distance learning experiences. Most of the students were involved in one or two extra curricular activities and only a few students had part time jobs out side of school.

Relationship between Self-Monitoring and Academic Achievement

Descriptive Statistics for Academic Achievement

Table 5 shows descriptive statistics of the pre- and post-treatment grade averages. The means for both pre- and post-treatment grades in the experimental group were higher

than those in the control group. In both groups, the means of post-treatment grade were lower than the means of pre-treatment grade.

Table 6

Academic Achievement Descriptive Statistics

	Pre-treatment grade average		Post-treatment grade average	
Group	**M**	**SD**	**M**	**SD**
Control (*n* =17)	81.2	14.5	75.1	16.9
Experimental (*n* =18)	84.4	14.1	79.4	17.4

Hierarchical Regression for Academic Achievement

In order to test the regression assumption, casewise diagnostics were conducted using SPSS. There were no outliers or other influential cases that would skew the data. Three independent variables: site size, pre-treatment grade, and self-monitoring were entered into a regression using block entry.

In Step 1, site size explained only 0.1% of the variance in academic achievement (R^2 =.001, β= -.37, *p*=.831). In Step 2, after pre-treatment grade was entered, the R^2 significantly increased. In addition to 0.1% explained by site size, pre-treatment grade accounted for 82.3% of the variance in academic achievement (ΔR^2=.823, β= .908, *p*<.001). In Step 3, self-monitoring was entered, but the R^2 remained the same (ΔR^2<.001, β= -.021, *p*=.819). This indicates that there was no significant relationship between post-treatment grade and self-monitoring, controlling for site size and pre-treatment grade.

The negative value of coefficients (β) for site size and for self-monitoring indicates that in the context of smaller site size, student achievement was higher, and that the control group received higher post-treatment grades than the experimental group.

Relationship between Self-Monitoring and Self-regulation

Descriptive Statistics of Self-Regulation

Table 7 shows means and standard deviations for the pre- and post-test scores of each subscale. In both control and experimental groups, scores were increased in all subscales except for test anxiety and effort regulation. The experimental group increased self-efficacy the most (.32 increase) among all subscales. The post-test scores for intrinsic goal, task value, and self-efficacy in the experimental group were slightly higher than those in the control group. However, overall, the control group increased scores on most of subscales more than the experimental group did.

Table 7

MSLQ Descriptive Statistics

Subscale	Control (n=17)				Experimental (n=17)			
	Pre-test		Post-test		Pre-test		Post-test	
	M	SD	M	SD	M	SD	M	SD
Intrinsic Goal Orientation	5.30	1.00	5.75	0.90	5.59	0.87	5.83	0.90
Extrinsic Goal Orientation	5.08	1.37	5.11	1.32	4.87	0.85	4.98	1.06
Task Value	5.81	0.97	5.98	0.93	5.99	0.76	6.14	0.88
Control of Learning Beliefs	5.70	1.20	6.00	0.99	5.69	0.99	5.82	0.90
Self-efficacy for Leaning & Performance	5.11	1.36	5.75	1.27	5.45	1.53	5.77	1.21
Test Anxiety	4.14	1.68	3.96	1.56	3.83	1.72	3.96	1.39
Rehearsal	4.88	1.23	5.65	0.73	4.91	1.47	5.07	1.39
Elaboration	4.67	1.06	5.28	0.86	4.67	1.14	4.74	0.93
Organization	3.82	1.18	4.39	1.46	3.88	1.32	3.98	1.14
Metacognitive Self-regulation	4.51	1.01	4.98	1.03	4.64	0.94	4.75	0.93
Time & Study Environment	4.18	0.94	5.04	0.81	4.47	1.04	4.76	1.34
Effort Regulation	5.34	1.02	4.98	0.69	5.93	0.98	4.91	0.64

Hierarchical Regressions for Self-Regulation

Three independent variables: site size, pre-test score for MSLQ subscale, and self-monitoring were entered into regressions using block entry. No significant outliers were found from casewise diagnostics. Each MSLQ subscale was analyzed separately.

Intrinsic goal orientation. In Step 1, site size explained 3.5% of the variance in post-intrinsic goal orientation score (R^2= .035, β= -.187, *p*=.291). In Step 2, pre-intrinsic goal orientation score accounted for 24.9% of the variance in post-intrinsic goal orientation score (ΔR^2 =.249, β= .514, *p*=.003). In Step 3, self-monitoring explained 0.5% of the variance in post-intrinsic goal orientation score (ΔR^2=.005, β= -.084, *p*=.646).

Extrinsic goal orientation. In Step 1, the R^2 was less than .001. This indicates that there was almost no relationship between site size and post-extrinsic goal orientation score (β= -.017, *p*=.923). In Step 2, pre-extrinsic goal orientation score accounted for 55.9% of the variance in post-extrinsic goal orientation score (ΔR^2= .559, β= .748, *p*<.001). In Step 3, the R^2 remained the same. Self-monitoring explained less than 0.1% of the variance in post-extrinsic goal orientation score (ΔR^2< .001, β= .002, *p*=.990).

Task value. In Step 1, site size explained 8.9% of the variance in post-task value score. The coefficient for site size was close to a significant level (R^2=.089, β= -.229, *p*=.086). In Step 2, pre-task value score explained 29.6% of the variance in post-task value score (ΔR^2=.296, β= .574, *p*=.001). In Step 3, self-monitoring accounted for 0.1% of the variance in post-task value score (ΔR^2=.001, β= -.032, *p*=.850).

Control of learning beliefs. In Step 1, site size explained 0.2% of the variance in post-test score for control of learning beliefs (R^2=.002, β= -.045, *p*=.802). In Step 2, pre-

test score for control of learning beliefs accounted for 40.9% of the variance in post-test score for control of learning beliefs (ΔR^2=.409, β= .641, p<.001). In Step 3, self-monitoring explained 1.4 % of the variance in post-test score for control of learning beliefs (ΔR^2=.014, β= -.138, p=.405).

Self-efficacy for learning and performance. In Step 1, site size explained 1.1% of the variance in post-self-efficacy score (R^2=.011, β= -.106, p=.552). In Step 2, pre-self-efficacy score accounted for 47.6% of the variance in post- self-efficacy score (ΔR^2=.476, β= .693, p<.001). In Step 3, self-monitoring explained 1.7 % of the variance in post-self-efficacy score (ΔR^2=.017, β= -.156, p=.314).

Test anxiety. In Step 1, site size explained 1.7 % of the variance in post-test anxiety score (R^2=.017, β= -.132, p=.463). In Step 2, pre-test anxiety score accounted for 51.4% of the variance in post-test anxiety score (ΔR^2=.514, β= .744, p<.001). In Step 3, self-monitoring explained 0.6 % of the variance in post-test anxiety score (ΔR^2= .006, β=.094, p=.540).

Rehearsal. In Step 1, site size explained 1.9 % of the variance in post-rehearsal score (R^2=.019, β=.138, p=.442). In Step 2, pre-rehearsal score accounted for 39.1% of the variance in post-rehearsal score (ΔR^2=.391, β= .626, p<.001). In Step 3, self-monitoring explained 4.9 % of the variance in post-rehearsal score (ΔR^2=.049, β= -.258, p=.115).

Elaboration. In Step 1, the R^2 was less than .001 (β= .014, p=.938). There was almost no relationship between site size and post-elaboration score. In Step 2, pre-elaboration score accounted for 21.8% of the variance in post-elaboration score

(ΔR^2=.218, β= .476, *p*=.006). In Step 3, self-monitoring explained 7.8% of the variance in post-elaboration score (ΔR^2=.078, β= -.333, *p*=.078).

Organization. In Step 1, site size explained 0.1 % of the variance in post-organization score (R^2=.001, β= .035, *p*=.843). In Step 2, pre-organization score accounted for 40.8% of the variance in post-organization score (ΔR^2=.408, β= .638, *p*<.001). In Step 3, self-monitoring explained 2.3 % of the variance in post-organization score (ΔR^2=.023, β= -.180, *p*=.277).

Metacognitive self-regulation. In Step 1, site size explained 0.9 % of the variance in post-metacognitive self-regulation score (R^2=.009, β= -.092, *p*=.609). In Step 2, pre-metacognitive self-regulation score accounted for 48.6% of the variance in post-metacognitive self-regulation score (ΔR^2=.486, β=.697, *p*<.001). In Step 3, self-monitoring explained 3.9 % of the variance in post-metacognitive self-regulation score (ΔR^2=.039, β= -.231, *p*=.132).

Time and study environment. In Step 1, site size explained 0.1 % of the variance in post-test score for time and study environment (R^2=.001, β= -.027, *p*=.880). In Step 2, pre-test score for time and study environment accounted for 27.9% of the variance in post-test score for time and study environment (ΔR^2=.279, β=.531, *p*=.002). In Step 3, self-monitoring explained 5.9 % of the variance in post-test score for time and study environment (ΔR^2=.059, β= -.289, *p*=.113).

Effort regulation. In Step 1, the R^2 was less than .001 (β= -.015, *p*=.932). In Step 2, pre-effort regulation score accounted for 21.8% of the variance in post-effort regulation score (ΔR^2=.218, β= .503, *p*=.004). In Step 3, self-monitoring explained 4.8% of the variance in post-effort regulation score (ΔR^2=.048, β= -.265, *p*=.170).

In summary, no significant relationship was found between self-monitoring and post-test scores for any of the MSLQ subscales after controlling for site size and pre-MSLQ score. The pre-MSLQ score was the only variable that was significantly correlated to the post-MSLQ score. The negative value of βs for self-monitoring indicates that the control group reported higher motivation and learning strategy use than the experimental group. While the *p* value was not significant, site size was negatively correlated to the post-MSLQ score in many of the motivation subscales. This means that the level of student motivation was higher in smaller site size, which is consistent with the earlier study by Biner et al. (1997).

DISCUSSION

The study investigated the relationships between self-monitoring and academic achievement, and self-monitoring and self-regulation. The results of hierarchical regression analysis showed that self-monitoring tasks assigned for the study did not have impacts on student academic achievement and self-regulation. Nevertheless, the present study provided the directions for future research on self-regulated learning in K-12 ITV classrooms.

Limitations of the Study and Suggestions for Future Research

One of the limitations of the study is small sample size. In the present study, there were 77 students at the beginning. Of the 77, 55 students actually took the pre-MSLQ test, which was administered prior to the intervention and only 35 students completed all assigned tasks for the study. For hierarchical or stepwise regressions, one suggested formula to determine ideal sample size is multiplying the number of independent variables by 40 (Tabachnick & Fidell, 1996). In the present study, three independent variables: site size, pre-test, and post-test, were entered into the regressions. Using the formula, the ideal sample size for the present study was 120.

Originally, the researcher intended to include gender in variables of the study. However, due to the imbalance of gender in the participant groups (27 females 9 males), this variable was dropped. Research conducted in regular classrooms shows that female students are more likely to use self-regulatory skills (Zimmerman & Martinez-Ponz, 1990) and cognitive strategies (Wolters & Pintrich, 1998) than male students. Future research could specifically examine the relationships between gender, achievement, and

self-regulation in K-12 ITV classrooms. If gender is found to be a critical factor, researchers should investigate what types of approaches are effective for male or female students to develop self-regulated learning in K-12 ITV classrooms.

With regard to the quality of students' self-monitoring activities, the researcher found that a few students tended to enter the same information into the databases every week. Approximately one-third of the students did not describe specific content in their study schedules and self-recording as instructed in the written material. It appears that students focused on a completion of the assigned self-monitoring tasks and did not care much about the quality of information they entered. Zimmerman (2002) has described poor self-regulatory skills in adolescents. Considering the participants' age, sustaining students' motivation to engage in self-monitoring for six weeks could be naturally problematic. Even in graduate classes, Lan (1998) observed that some students did not self-monitor at all, even though they were asked to do so for his research in exchange for extra credit. Cho (2004) also conducted a similar study in a college level online course and provided an intervention for promoting self-regulated learning that includes goal setting, study planning, self-monitoring, and self-evaluation for four weeks. While her study did not find a significant effect on students' self-regulation, she found through interviews with the students that they felt the amount of work assigned for her study was too much and this decreased their motivation to use self-regulated learning skills. In the present study, student perceptions of the tasks are unknown. However, a large number of participant drop-outs and the poor quality of students' self-monitoring efforts may indicate that students did not perceive the value of the assigned tasks. Thus, the researcher suggests that if K-12 ITV instructors incorporate the same self-monitoring

intervention into their courses, the tasks should be mandatory, and especially at the beginning stage, the instructors should closely monitor students' performance on the tasks and provide suggestions to ensure effective self-monitoring. Zimmerman (2000) has described four stages in developing self-regulation: observation (modeling), emulation, self-control, and self-regulation. For K-12 students, following those steps is particularly important and will require guidance from the instructor. Simply giving opportunities for self-monitoring will not develop students' self-regulated learning.

The present study used the MSLQ to assess student self-regulation. While the MSLQ has proven to be a reliable measure (Pintrich et al., 1991), the scale was originally designed for college students and only a few studies have used the MSLQ for high school students. Thus, it is worth noting that the alpha levels for many of the MSLQ subscales were sufficient levels or close to those reported in the MSLQ manual (Pintrich et al., 1991) and the alpha levels for self-efficacy (.96) and control of learning beliefs (.80) subscales were even higher. However, the present study also revealed that some of the subscales, such as extrinsic goal orientation, organization, and help seeking may need to be revised if they are used for high school students. The alpha levels for those subscales were .54 or lower.

Finally, in the present study, the data were collected only from ITV students taking Japanese courses. Research shows that student's learning strategies use varies depending on the content area (Wolters & Pintrich, 1998). Mathematics and foreign languages classes tend to provide students with less opportunities for learning strategies use than social studies and English classes because the lessons are more structured and

sequential (Stodolsky & Grossman, 1995). Thus, the results of the study may not be able to apply to ITV classrooms of other content areas.

Summary

The self-monitoring intervention designed for the study consisted of three components: goal setting and study schedules, self-recording, and self-evaluation. These tasks were expected to facilitate self-monitoring processes, which promote self-regulated learning. However, the intervention impacted neither students' self-regulation nor academic achievement. It is hoped that future research in other areas may provide solutions that help K-12 ITV students succeed in their distance programs.

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APPENDIXES

Appendix A

IRB Approval Letter

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Institutional Review Board
Dr. David M. Moore
IRB (Human Subjects) Chair
Assistant Vice President for Research Compliance
1880 Pratt Drive, Suite 2006(0497), Blacksburg, VA 24061
Office: 540/231-4991; FAX: 540/231-0959
email: moored@vt.edu

DATE: August 31, 2005

MEMORANDUM

TO: Barbara B. Lockee Teaching and Learning 0313
Michiko Kobayashi

FROM: David Moore

SUBJECT: **IRB Expedited Approval:**"Facilitating Academic Achievement in High School Interactive Television Programs by Promoting Self-Regulated Learning" IRB # 05-502

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective August 31, 2005.

Virginia Tech has an approved Federal Wide Assurance (FWA00000572, exp. 7/20/07) on file with OHRP, and its IRB Registration Number is IRB00000667.

Appendix B

Letter to Program Administrator

July 5, 2005

Dr. Patrick Kinlaw
Assistant Superintendent
for Administrative Services
Henrico County Public Schools
P.O. Box 23120
Richmond, VA 23223

Dear Dr. Kinlaw:

I am Michiko Kobayashi, a doctoral student at Virginia Polytechnic Institute and State University. I am currently working on my doctoral dissertation and would like to collect data from your Japanese program in the next school year. The study has been approved by Dr. Barbara Lockee, my advisor and other four committee members.

The topic of my study is self-regulation of high school students in interactive television programs. I intend to examine how students' self-monitoring impacts their self-regulation and academic achievement. The data collection will begin in October 2005 and ends in December 2005. During the data collection period, students are asked to take online questionnaires and engage in self-monitoring tasks. I have already discussed the procedures for the data collection with the Japanese instructors and their supervisor. They have agreed to cooperate with my study.

I enclosed a consent form that contains an explanation of my study. After you read it and if you grant us permission to collect data from the Japanese classes, please sign the form and return it to me.

If you have questions regarding the study or need additional information, please let me know.

I appreciate your time and consideration.

Sincerely,

Michiko Kobayashi
Graduate Student, Instructional Technology
Department of Teaching and Learning
Virginia Tech
mkobayas@vt.edu

Appendix C

Consent Form for Program Administrator

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for Program Administrator in Research Projects Involving Human Subjects

Title of Project

Facilitating academic achievement in high school interactive television programs by promoting self-regulated learning.

Investigator(s) Barbara Lockee, Ph.D., Michiko Kobayashi

I. Purpose of this Research/Project

The purpose of the study is to examine the effects of self-monitoring on students' self-regulation and academic achievement in high school interactive television programs. The participants of the study will be high school students taking Japanese I, II, and III courses produced by Henrico County in Richmond, Virginia. The researcher will recruit participants from selected schools based on the number of enrollment in each course level. All students who agree to participate in the study and obtain parents' consent will be included as participants. The expected number of participants is 40 to 80.

II. Procedures

In this study, students will be asked to complete online questionnaires to assess their self-regulation twice and engage in self-monitoring tasks for 6 weeks.

1. In the third or fourth week of October, the online questionnaire, which requires 25 to 30 minutes to complete, will be administered.

2. After completing the questionnaire, students will begin self-monitoring. The self-monitoring involves tasks that help you monitor your learning process. In each week, they will enter the information related to your Japanese classes in the online database. The expected time required for these tasks is 15 to 20 minutes every week, but it can vary depending on the individual student.

3. After the 6 week of self-monitoring, students will be asked to respond to the same online questionnaire again.

4. The total hours required for all the tasks, including two online questionnaires

and 6 weeks of self-monitoring, will be approximately 3 hours.

Students may complete the online questionnaires and enter the information for your self-monitoring into the database either at school or out side of the school. However, they will not be allowed to use their class time to do these tasks. The study will end in the third week of December.

III. Risks

Participants will not encounter any risks other than those associated with regular school or class activities in this study.

IV. Benefits

Many studies show that self-monitoring enhances student academic achievement. While there is no guarantee that the tasks assigned to students in this study bring significant effects, we believe that the study provides the participants with an opportunity to learn self-monitoring strategies, and is more likely to have positive impact on their self-regulation and academic achievement.

V. Anonymity/Confidentiality

In this study, students are identified by their names, but their names will not be disclosed. To log in to the online database for the questionnaire and self-monitoring, a specific password will be required. Thus, access to the data will be restricted. Also, students' demographic information and test and quiz grades obtained from the instructors will be accessible only by the investigators for the purpose of analysis. The information will be stored in the investigator's laptop that is secured with the password. When the study ends, the data entered in the database and all forms that contain the names of students will be destroyed.

VI. Compensation

The names of all participants who complete all the tasks assigned for the study will be entered into a drawing for Super Certificates. The researcher will draw the winning names. These certificates can be exchanged for a gift certificate at the store of their choice. Two students will receive $100. Six students will receive $50. Twelve students will receive $25. For the rest of participants who complete all the tasks, the researcher will provide a small gift from Japan.

VII. Freedom to Withdraw

Students are free to withdraw from a study at any time without penalty. If they choose to withdraw, they will not be penalized by reduction in points or grade in a course.

VIII. Subject's Responsibilities

The students who voluntarily agree to participate in this study will have the following responsibilities:

- Complete online questionnaire at the beginning and the end of the study.
- Enter information for self-monitoring tasks into the online database for 6 weeks.

IX. Other Conditions

Consent from participants' parents will be obtained. Parents will be asked to sign a parent consent form if they wish to provide permission for their children to participate in the study. Also, the consent forms for student and parent will include a statement that the study is not affiliated with Henrico County Public Schools.

X. Administrator's Permission

I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my consent.

Administrator's signature Date

Should I have any pertinent questions about this research or its conduct, and research subjects' rights, and whom to contact in the event of a research-related injury to the subject, I may contact:

Michiko Kobayashi Investigator(s)	(xxx) xxx-xxxx xxxxxxxxxxx Telephone/e-mail
Barbara Lockee, Ph. D. Faculty Advisor	(xxx) xxx-xxxx xxxxxxxxxxx Telephone/e-mail
David M. Moore Chair, Virginia Tech Institutional Review Board for the Protection of Human Subjects	(xxx) xxx-xxxx xxxxxxxxxxx Telephone/e-mail

Appendix D

Letter to Facilitators Attached to Consent Forms

September 12, 2005

Dear Japanese facilitators:

I am Michiko Kobayashi, a doctoral student at Virginia Polytechnic Institute and State University. For my dissertation, I am planning to collect data from the Japanese classes. The study has been approved by Henrico County, the program administrator. I also have discussed the procedures for the data collection with the Japanese instructors and they have agreed to cooperate with my study.

Participation in the study is voluntary. Students who agree to participate in the study will be asked to engage in self-monitoring tasks for 6 weeks. They will be required to take on-line questionnaires twice, and enter information related to their Japanese classes into the on-line database every week. Students who participate in the study and complete all assigned tasks will have a chance to win gift certificates. The study will likely bring positive outcomes to your students and improve their achievement in the Japanese courses.

Please give **the attached forms (Assent to Participate by Students and Parental Permission)** to all Japanese students. These forms include a brief explanation of the study and contact information. To confirm that you have received this packet, I would appreciate if you return **the confirmation sheet** enclosed in a small white envelope immediately.

Students who wish to participate in the study will bring you **the signed forms** by **September 26**. As soon as you receive the signed consent forms from your students, please send them to me using a brown envelope included in this packet.

The study is not affiliated with Henrico County. If you have questions regarding the study, please feel free to contact me via email. I appreciate your cooperation.
Thank you.

Sincerely,

Michiko Kobayashi
The Center for Instructional Technology
220 War Memorial Hall
Virginia Tech
Blacksburg, VA 24061
mkobayas@vt.edu

Appendix E

Confirmation Sheet for Consent Forms

Confirmation Sheet

Dear Japanese facilitators:

Please sign and return this confirmation sheet using an enclosed white envelope as soon as you receive the packet. Thank you.

I have received the packet that contains assent forms for student and parental permission forms regarding the self-monitoring study.

School Facilitator's signature Date

Appendix F

Letter to Japanese Students Attached to Assent Forms

September 12, 2005

Dear Japanese I, II, and III students:

I am Michiko Kobayashi, a doctoral student at Virginia Polytechnic Institute and State University. I am planning to collect data from your Japanese classes for my dissertation. I have had permission for collecting data from the Japanese program administrator and your instructors.

Your participation in the study is voluntary. If you participate in the study and complete the assigned tasks, you will have a chance **to win $100, $50, or $25 in gift certificates** (**see compensation section in the consent form for the detail**). I have attached a consent form that includes a brief explanation of the study. Please read it carefully. If you agree to participate in this study, please sign the form, and ask your parent to read the consent form for parents (yellow sheets) and sign it. Both signed forms must be returned to your facilitator by **September 26**.

If you have questions regarding the study, please feel free to contact me via email. Thank you.

Michiko Kobayashi
The Center for Instructional Technology
220 War Memorial Hall
Virginia Tech
Blacksburg, VA 24061
mkobayas@vt.edu

Appendix G

Assent Form for Participants

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Assent to Participate by Students in Research Projects Involving Human Subjects

Title of Project

Facilitating academic achievement in high school interactive television programs by promoting self-regulated learning.

Investigator(s) Barbara Lockee, Ph.D, Michiko Kobayashi

I. Purpose of this Research/Project

The purpose of the study is to examine the effects of self-monitoring on students' self-regulation and academic achievement in high school interactive television programs. The participants of the study will be high school students taking Japanese I, II, and III courses produced by Henrico County in Richmond, Virginia. The participants will be recruited from selected schools base on the number of enrollment in each course level. All students who agree to participate in the study will be included as participants. The expected number of participants is 40 to 80.

II. Procedures

In this study, you will be asked to complete online questionnaires to assess your self-regulation twice and engage in self-monitoring tasks for 6 weeks.

1. In the third or fourth week of October, the online questionnaire, which requires 25 to 30 minutes to complete, will be administered.

2. After completing the questionnaire, you will begin self-monitoring. The self-monitoring involves tasks that help you monitor your learning process. In each week, you will enter the information related to your Japanese classes in the online database. The expected time required for these tasks is 15 to 20 minutes every week, but it can vary depending on the individual student.

3. After the 6 week of self-monitoring, you will be asked to respond to the same online questionnaire again.

4. The total hours required for all the tasks, including two online questionnaires and 6 weeks of self-monitoring, will be approximately 3 hours.

You may complete the online questionnaires and enter the information for your self-monitoring into the database either at school or out side of the school. However, you will not be allowed to use your Japanese class time to do these tasks. The study will end in the third week of December.

III. Risks

You will not encounter any risks other than those associated with regular school or class activities in this study.

IV. Benefits

Many studies show that self-monitoring enhances student academic achievement. While there is no guarantee that the tasks assigned to you in this study bring significant effects, we believe that the study provides you with an opportunity to learn self-monitoring strategies, and is more likely to have positive impact on your self-regulation and academic achievement.

V. Anonymity/Confidentiality

In this study, you are identified by your name, but your identity will not be disclosed. To log in to the online databases for the questionnaire and self-monitoring, a specific password will be required. Thus, access to the databases will be restricted. Also, your demographic information and test and quiz grades obtained from the instructors will be accessible only by the investigators for the purpose of analysis. The information will be stored in the investigator's laptop that is secured with the password. When the study ends, the data entered in the database and all forms that contain the names of participants will be destroyed.

VI. Compensation

The names of all participants who complete all the tasks assigned for the study will be entered into a drawing for Super Certificates. The researcher will draw the winning names. These certificates can be exchanged for a gift certificate at the store of your choice. Two students will receive $100. Six students will receive $50. Twelve students will receive $25. For the rest of participants who complete all the tasks, the researcher will provide a small gift from Japan.

VII. Freedom to Withdraw

You are free to withdraw from a study at any time without penalty. The study is not affiliated with Henrico County and the Virginia Satellite Educational Network. If you choose to withdraw, you will not be penalized by reduction in points or grade in the Japanese courses.

VIII. Subject's Responsibilities

I voluntarily agree to participate in this study. I have the following responsibilities:

- Complete online questionnaires at the beginning and the end of the study.
- Enter information for self-monitoring tasks into the online database for 6 weeks.

IX. Subject's Permission

I have read and understand this form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

Student name (print)	School	Course level (Japanese I, II, III)

Student signature _____ Date _____

Should I have any pertinent questions about this research or its conduct, and research subjects' rights, and whom to contact in the event of a research-related injury to the subject, I may contact:

Michiko Kobayashi Investigator(s)	(xxx) xxx-xxxx xxxxxxxxxxxx Telephone/e-mail
Barbara Lockee, Ph. D. Faculty Advisor/Project Reviewer	(xxx) xxx-xxxx xxxxxxxxxxxx Telephone/e-mail
David M. Moore Chair, Virginia Tech Institutional Review Board for the Protection of Human Subjects	(xxx) xxx-xxxx xxxxxxxxxxxx Telephone/e-mail

Appendix H

Demographic Information Sheet for Participants

If you wish to participate in the study, please fill out this form and return it to your facilitator along with your signed consent form.

Demographic Information Sheet

Name _____ School _____

Age_____ Gender (male female) Grade level _____

Email address_____

Course level (Japanese 1 Japanese 2 Japanese 3)

Have you taken distance learning courses before? (Yes No)

If yes, what courses? _____

Can you access the Internet at school? (Yes No)

Can you access the Internet at home? (Yes No)

Do you work part time outside of school? (Yes No)

How many extra curricular activities are you involved? (e.g. student organizations and athletics) (1 2 3 4 5 6 7)

Do you view the Japanese class on tape delay? (Yes No)

Why do you take the Japanese courses? Please circle yes or no for each item.

- I am interested in Japanese cultures and languages. (Yes No)
- I want to improve my Japanese. (Yes No)
- I need to take this class because it is required. (Yes No)
- I want to use Japanese in my future career. (Yes No)
- My parents (or friends) recommended me to take Japanese. (Yes No)

Appendix I

Letter to Parents Attached to Parental Permission Forms

September 8, 2005

Dear Parents of Japanese I, II, and III students:

I am Michiko Kobayashi, a doctoral student at Virginia Polytechnic Institute and State University. For my dissertation, I am planning to collect data from the Japanese classes in which your children are enrolled. The study has been approved by Henrico County. I have discussed the procedures for the data collection with the Japanese instructors and they have agreed to cooperate with my study.

Participation in the study is voluntary. Your children also have received a letter for an explanation of the study and a consent form. Please read the attached consent form for parents. After you read it, if you wish to give permission for your children's participation in this study, please sign the form and give it to your children by **September 26**. Your children will take the signed forms to their facilitators.

If you have questions regarding the study, please feel free to contact me via email. Thank you.

Michiko Kobayashi
The Center for Instructional Technology
220 War Memorial Hall
Virginia Tech
Blacksburg, VA 24061
mkobayas@vt.edu

Appendix J

Parental Permission Form

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Parental Permission in Research Projects Involving Human Subjects

Title of Project

Facilitating academic achievement in high school interactive television programs by promoting self-regulated learning.

Investigator(s) Barbara Lockee, Ph.D, Michiko Kobayashi

I. Purpose of this Research/Project

The purpose of the study is to examine the effects of self-monitoring on students' self-regulation and academic achievement in high school interactive television programs. The participants of the study will be high school students taking Japanese I, II, and III courses produced by Henrico County in Richmond, Virginia. The researcher will recruit participants from selected schools based on the number of enrollment in each course level. All students who agree to participate in the study and obtain parents' consent will be included as participants. The expected number of participants is 40 to 80.

II. Procedures

In this study, students will be asked to complete online questionnaires to assess their self-regulation twice and engage in self-monitoring tasks for 6 weeks.

1. In the third or fourth week of October, the online questionnaire, which requires 25 to 30 minutes to complete, will be administered.

2. After completing the questionnaire, students will begin self-monitoring. The self-monitoring involves tasks that help you monitor your learning process. In each week, they will enter the information related to your Japanese classes in the online database. The expected time required for these tasks is 15 to 20 minutes every week, but it can vary depending on the individual student.

3. After the 6 week of self-monitoring, students will be asked to respond to the same online questionnaire again.

4. The total hours required for all the tasks, including two online questionnaires

and 6 weeks of self-monitoring, will be approximately 3 hours.

Students may complete the online questionnaires and enter the information for your self-monitoring into the database either at school or out side of the school. However, they will not be allowed to use their class time to do these tasks. The study will end in the third week of December.

III. Risks

Participants will not encounter any risks other than those associated with regular school or class activities in this study.

IV. Benefits

Many studies show that self-monitoring enhances student academic achievement. While there is no guarantee that the tasks assigned to students in this study bring significant effects, we believe that the study provides them with an opportunity to learn self-monitoring strategies, and is more likely to have positive impact on their self-regulation and academic achievement.

V. Anonymity/Confidentiality

In this study, students are identified by their names, but their names will not be disclosed. To log in to the online database for the questionnaire and self-monitoring, a specific password will be required. Thus, access to the data will be restricted. Also, students' demographic information and test and quiz grades obtained from the instructors will be accessible only by the investigators for the purpose of analysis. The information will be stored in the investigator's laptop that is secured with the password. When the study ends, the data entered in the database and all forms that contain the names of students will be destroyed

VI. Compensation

The names of all participants who complete all the tasks assigned for the study will be entered into a drawing for Super Certificates. The researcher will draw the winning names. These certificates can be exchanged for a gift certificate at the store of their choice. Two students will receive $100. Six students will receive $50. Twelve students will receive $25. For the rest of participants who complete all the tasks, the researcher will provide a small gift from Japan.

VII. Freedom to Withdraw

Students are free to withdraw from a study at any time without penalty. The study is not affiliated with Henrico County and the Virginia Satellite Educational Network. If students choose to withdraw, they will not be penalized by reduction in points or grade in the Japanese courses.

VIII. Subject's Responsibilities

The students who voluntarily agree to participate in this study will have the following responsibilities:

- Complete online questionnaire at the beginning and the end of the study.
- Enter information for self-monitoring tasks into the online database for 6 weeks.

IX. Parent's Permission

I have read and understand this form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my consent

Parent signature Date

Your child's name School Course level (Japanese I, II, III)

Should I have any pertinent questions about this research or its conduct, and research subjects' rights, and whom to contact in the event of a research-related injury to the subject, I may contact:

Michiko Kobayashi Investigator(s)	(xxx) xxx-xxxx xxxxxxxxxxxxx Telephone/e-mail
Barbara Lockee, Ph. D. Faculty Advisor/Project Reviewer	(xxx) xxx-xxxx xxxxxxxxxxxxx Telephone/e-mail
David M. Moore Chair, Virginia Tech Institutional Review Board for the Protection of Human Subjects	(xxx) xxx-xxxx xxxxxxxxxxxxx Telephone/e-mail

Appendix K

The Login Screen for the Self-Monitoring Database

Note. Both the control and experimental groups login the database from this page.

Appendix L

The Goal Setting Menu Page for the Control Group.

Appendix M

The Goal Setting Page for the Control Group

Goal Setting

Week of 10/31 ~11/6

Please enter your weekly academic goals related to your Japanese class.
Your goals should be **specific** and **achievable**.

Examples

- I will write the new Japanese vocabulary words that I learned from last week five times for each.
- I will review my class notes for te-form of verbs.
- I will watch the class tape from October 28 to make up the lesson I missed.

*** You must enter at least two goals.**

Goal 1
Goal 2
Goal 3

Submit

Appendix N

The Goal Setting Exit Screen for the Control Group.

Thank you!

Questions?
Contact Michiko Kobayashi mkobayas@vt.edu

Appendix O

The Self-Monitoring Menu Page for the Experimental Group

Note. The pull down menu for tasks includes goal setting & study schedules, self-recording, and self-evaluation.

Appendix P

The Goal Setting and Study Schedules Page for the Experimental Group

Goal Setting / Study Schedules

Week of 10/31 ~11/6

1) Goal setting

Please enter your weekly academic goals related to your Japanese class.
Your goals should be **specific** and **achievable**.

Examples

- I will write the new Japanese vocabulary words that I learned from last week five times for each.
- I will review my class notes for te-form of verbs.
- I will watch the class tape from October 28 to make up the lesson I missed.

*** You must enter at least two goals.**
Click here to view your make up info.

Goal 1
Goal 2
Goal 3

2) Study Schedules

Please enter your weekly study schedule related to your Japanese class.

Example

	Time Begins	Time Ends	Place	Content
Mon	4:00pm	5:00pm	Home	Review classnotes for verb te-forms

	Time Begins	Time Ends	Place	Content
Mon	12:00 pm	12:00 pm		
Tue	12:00 pm	12:00 pm		
Wed	12:00 pm	12:00 pm		
Thu	12:00 pm	12:00 pm		
Fri	12:00 pm	12:00 pm		
Sat	12:00 pm	12:00 pm		
Sun	12:00 pm	12:00 pm		

Submit

Appendix Q

The Exit Screen for the Goal Setting and Study Schedule for the Experimental Group

Thank you!

Please remember to do self-recording and self-evaluation activities later in the week.

Questions?
Contact Michiko Kobayashi mkobayas@vt.edu

Appendix R

The Self-Recording Page for the Experimental Group

Self-Recording

Week of October 31 - November 6

1. Please enter your **actual accomlishments** related to **your Japanese class** (for example, content studied, assignments completed, etc.)

	Time Begins	Time Ends	Place	Content
Mon	12:00 pm	12:00 pm		
Tue	12:00 pm	12:00 pm		
Wed	12:00 pm	12:00 pm		
Thu	12:00 pm	12:00 pm		
Fri	12:00 pm	12:00 pm		
Sat	12:00 pm	12:00 pm		
Sun	12:00 pm	12:00 pm		

Click here to view past records.

2. Please select **the date(s)** from pull down menus to indicate **which class tape(s)** you viewed **during class time**.
If you are on block schedule and view two tapes in each lesson, please select the dates for Tape 1 and Tape 2. If you did not view a tape and took a test or a quiz during class time, select "**No tape viewed**". **This section is required for students on block schedule and students who view class tapes on one day delay.**

	Tape 1	Tape 2
Monday	No tape viewed	No tape viewed
Tuesday	No tape viewed	No tape viewed
Wednesday	No tape viewed	No tape viewed
Thursday	No tape viewed	No tape viewed
Friday	No tape viewed	No tape viewed

Click here to view past records.

3. If you missed class this week, please list make-up work that you need to complete (for example, view tape of 10/24 class, work sheet #14, etc). **If you have no make up work, please enter "None".**

If you are **NOT** ready for self-evaluation, click"**Exit**".
If you are ready for self-evaluation, click "**Self Evaluation**".

Exit Self-Evaluation

Appendix S

The Self-Recording Exit Screen

Thank you!

Please return to complete your self-recording soon.

Questions?
Contact Michiko Kobayashi mkobayas@vt.edu

Appendix T

The Self-Evaluation Page for the Experimental Group

Self-Evaluation

October 31 - November 6

1. Here are your weekly goals, study schedules, and accomplishments related to the Japanese class. Please answer the questions (a~d).

Goals & Study Schedules

I will find time to avoid "cramming" or doing homework at the last minute.
I will list, memorize, and integrate all new vocabulary along with what I already know.
I will review all hiragana and new kanji daily.

Monday	4:45 pm	5:00 pm	Home	Quick daily vocabulary drills
Tuesday	4:00 pm	4:15 pm	Home	Quick daily vocabulary drills
Wednesday	4:00 pm	4:15 pm	Home	Quick daily vocabulary drills
Thursday	10:00 pm	10:30 am	Home	Review notes for conversation & writing tests
Friday	11:00 am	11:15 am	School	Pre-test review drills
Saturday	9:30 pm	10:00 pm	Home	Practice reading skills by reading untranslated manga
Sunday	10:00 pm	10:15 pm	Home	Review schedule and goals for next week

Actual Accomplishments

Monday	11:15 am	12:00 pm	School	Watched lesson on ghosts, learned kanji for numbers 1-10
Tuesday	11:15 am	12:00 pm	School	Learned vocab for months of the year, completed kanji worksheet
Wednesday	11:15 am	12:00 pm	School	Learned terms for nations/nationalities, completed writing assignments
Thursday	11:15 am	12:00 pm	School	Reviewed all material learned during the week
Friday	11:15 am	12:00 pm	School	Completed conversation call & written test
Saturday	6:30 pm	7:00 pm	Home	Reviewed vocabulary online with a classmate
Sunday	7:00 pm	10:00 pm	Home	Reviewed reading & listening skills by reading manga/watching anime in Japanese

a) Did you achieve your weekly goals? ○ Yes ○ No
b) Did you use your study time effectively? ○ Yes ○ No
c) Did you study in a place with no distraction? ○ Yes ○ No
d) Are you satisfied with your overall accomplishments of this week? ○ Yes ○ No

2. Please rate your self-efficacy **AFTER** you view the classes **from October 31 to November 6**

a) How confident are you in correctly performing the tasks described below? Please rate **the level of your confidence** from 1 to 5.1 indictes the lowest level of confidence and 5 indicates the highest.

1) Say months (Jan. to Dec.) in Japanese. 1

2) Say all 11 countries that you learned this week in Japanese. 1

3) Introduce someone to someone else in Japanese. 1

b) What score do you expect that you will receive on a test about the above contents? Please **enter the number between 1 to 100**.

To enter new weekly goals and study schedule, return to the menu page.
To submit this information this page, click Submit.

Menu Submit

Appendix U

The Self-Evaluation Exit Screen

Note. This screen appears when students click the "submit" button in the self-evaluation page (see Appendix T).

Appendix V

Written Instructions for the Study Mailed to the Control Group

The Self-Monitoring Study

Thank you for signing up for the self-monitoring study. Here is the schedule for your self-monitoring activities. For details, please read the instructions in the following pages. At the end of the study, the names of participants who complete **all the tasks** assigned for the study will be entered into a drawing for gift certificates. Two students will receive $100. Six students will receive $50. Twelve students will receive $25. The rest of the participants who complete **all the tasks** will receive a small gift from Japan.

Oct. 23 ~ Oct. 30	Motivated Strategies for Learning Questionnaire (1) (Complete by Oct. 30)
Oct. 31 ~ Dec. 11	Self-monitoring activities (6 weeks)
Dec. 11 ~ Dec. 16	Motivated Strategies for Learning Questionnaire (2) (Complete by Dec.16)

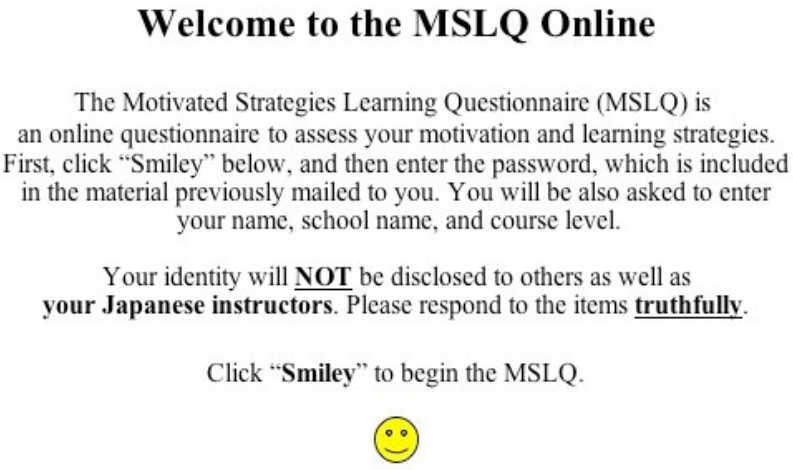
The study is not affiliated with Henrico County. You are free to withdraw from the study at any time without penalty. If you choose to withdraw, you will not be penalized by reduction in points or grade in your Japanese course.

Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

Motivated Strategies for Learning Questionnaire (MSLQ)
[Complete by October 30]

Before you begin self-monitoring activities, please complete the MSLQ, which is an online questionnaire to assess your motivation and learning strategy. It will take approximately 25 minutes to complete this questionnaire. You may complete the MSLQ **anytime between October 23 and October 30**.

Step 1 Go to the MSLQ Online website http://filebox.vt.edu/users/mkobayas/MSLQ.html and click "**Smiley.**"



Step 2 Enter password "**Japanese,**" and click "**Login.**"

Step 3 Enter your name, school, course level, and email address (if you have one).

Step 4 Read instructions carefully and then respond to the questionnaire items.

Step 5 Click "**Submit**" after you complete the questionnaire.

*** You will be asked to complete the same questionnaire again after the self-monitoring activities in December. The instruction will be mailed to your facilitator at the end of November.**

Self-Monitoring
[From October 31 to December 11]

*** The database for self-monitoring will be available <u>from Friday, October 28.</u>**

You will set weekly academic goals related to your Japanese class. Goals must be entered into the online database at **<u>the beginning of the week (Sunday or Monday)</u>**. For example, your goals for the first week of self-monitoring should be entered by **<u>Monday, October 31</u>.**

<u>Login</u>

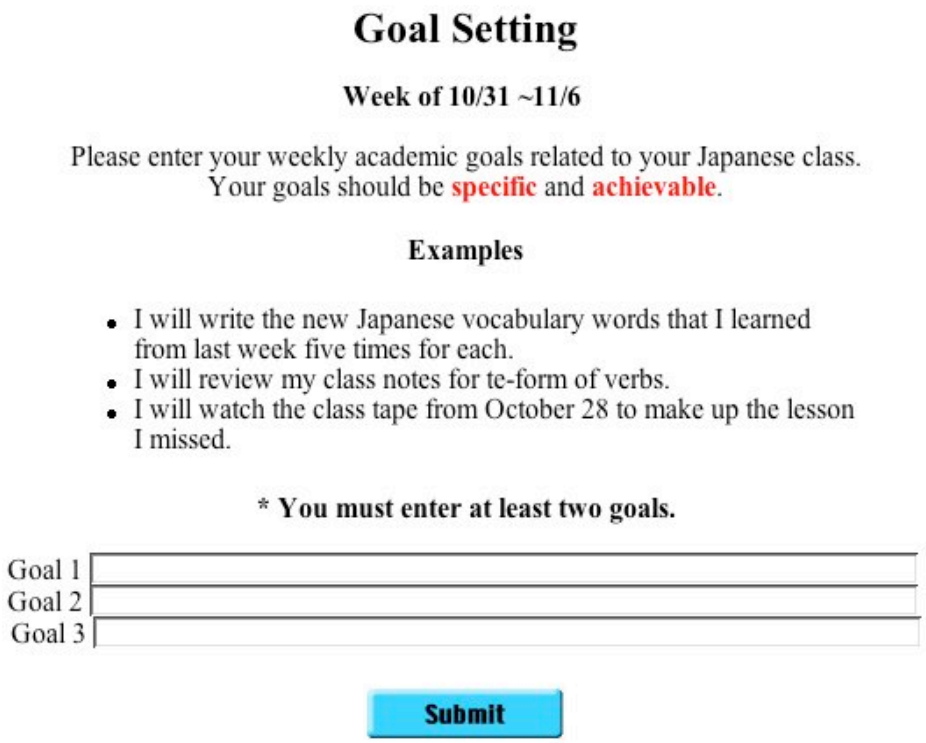
Go to the self-monitoring website, http://www.citsie.net/michiko/login.cfm
Enter your name and password, and then click "**Submit**". Your password will be mailed to your facilitator later.

<u>Select Week</u>

Select the week for which you will enter information. For example, if you set goals for the week of Oct. 31, you should select "Oct. 31 ~ Nov. 6" from the pull down menu, then click "**Submit.**"

Goal setting

Read instructions and examples in the goal setting page, and enter your weekly goals in the text boxes. After you set your goals, click "**Submit.**"



Goal Setting

Week of 10/31 ~11/6

Please enter your weekly academic goals related to your Japanese class.
Your goals should be specific and achievable.

Examples

- I will write the new Japanese vocabulary words that I learned from last week five times for each.
- I will review my class notes for te-form of verbs.
- I will watch the class tape from October 28 to make up the lesson I missed.

* You must enter at least two goals.

Goal 1
Goal 2
Goal 3

Submit

Each time you visit the self-monitoring web site, you need to login first and then enter your weekly goals.

If you have questions please contact me via email (mkobayas@vt.edu).

Appendix W

Written Instructions for the Study Mailed to the Experimental Group

The Self-Monitoring Study

Thank you for signing up for the self-monitoring study. Here is the schedule for your self-monitoring activities. For details, please read the instructions in the following pages. At the end of the study, the names of participants who complete **all the tasks** assigned for the study will be entered into a drawing for gift certificates. Two students will receive $100. Six students will receive $50. Twelve students will receive $25. The rest of the participants who complete **all the tasks** will receive a small gift from Japan.

Oct. 23 ~ Oct. 30	Motivated Strategies for Learning Questionnaire (1) (Complete by Oct.30)
Oct. 31 ~ Dec. 11	Self-monitoring activities (6 weeks)
Dec. 11 ~ Dec. 16	Motivated Strategies for Learning Questionnaire (2) (Complete by Dec.16)

The study is not affiliated with Henrico County. You are free to withdraw from the study at any time without penalty. If you choose to withdraw, you will not be penalized by reduction in points or grade in your Japanese course.

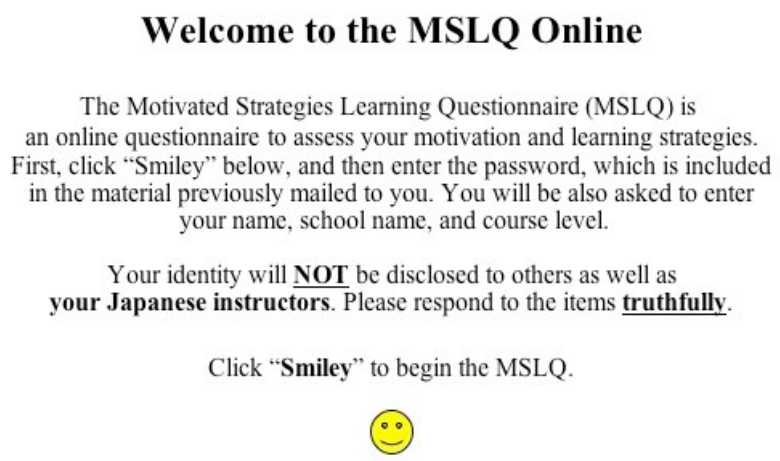
Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

Motivated Strategies for Learning Questionnaire (MSLQ)
[Complete by October 30]

Before you begin self-monitoring activities, please complete the MSLQ, which is an online questionnaire to assess your motivation and learning strategy. It will take approximately 25 minutes to complete this questionnaire. You may complete the MSLQ **anytime between October 23 and October 30**.

Here are the instructions for the MSLQ Online.

Step 1 Go to the MSLQ Online website http://filebox.vt.edu/users/mkobayas/MSLQ.html and click "**Smiley.**"



Step 2 Enter password "**Japanese**", and click "**Login.**"

Step 3 Enter your name, school, and course level.

Step 4 Read instructions carefully and then respond to the questionnaire items **truthfully**.

Step 5 Click "**Submit**" after you complete the questionnaire.

*** You will be asked to complete the same questionnaire again after the self-monitoring activities in December. The instruction will be mailed to your facilitator at the end of November.**

Self-Monitoring
[From October 31 to December 11]

*** The database for self-monitoring will be available from Friday, October 28.**

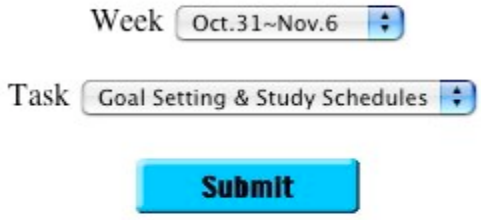
Your self-monitoring activities involve **goal setting**, **study schedules**, **self-recording**, and **self-evaluation**. You will enter information related to the Japanese class into the on-line database each week. You can access the database as many times as you want.
Each time you visit the self-monitoring web site, you need to login first and then enter information.

Login

Go to the self-monitoring website, http://www.citsie.net/michiko/login.cfm
Enter your name and password, and then click " **Submit.**" Your password will be mailed to your facilitator later.

Select Week and Task

Select the week and task from the pull down menus, and then click "**Submit.**" For example, if you want to set goals and create study schedules for the week of Oct. 31, you should select "Oct. 31 ~ Nov. 6" and "Goal setting and Study Schedules."



Goal Setting / Study Schedules

You will set weekly academic goals and create study schedules related to your Japanese class. Goals and study schedules must be entered into the online database at **the beginning of the week (Sunday or Monday)**. For example, your goals and study schedules for the first week of self-monitoring should be entered by **Monday, October 31.**

1. Read instructions and examples for goal setting, and enter your weekly goals related to your Japanese class in the text boxes.

Goal Setting / Study Schedules

Week of 10/31 ~11/6

1) Goal setting

Please enter your weekly academic goals related to your Japanese class.
Your goals should be specific and achievable.

Examples

- I will write the new Japanese vocabulary words that I learned from last week five times for each.
- I will review my class notes for te-form of verbs.
- I will watch the class tape from October 28 to make up the lesson I missed.

*** You must enter at least two goals.**

Click here to view your make up info.

Goal 1
Goal 2
Goal 3

2. In the table for study schedules, you will enter the time, place, and contents you plan to study "**outside of the class."** For example, if you plan to study class materials on Tuesday, Thursday, and Sunday, you will enter the information in the rows for Tuesday, Thursday, and Sunday and leave the rest of the rows blank. After you enter the information, please click "**Submit.**"

2) Study Schedules

Please enter your weekly study schedule related to your Japanese class.

Example

	Time Begins	Time Ends	Place	Content
Mon	4:00pm	5:00pm	Home	Review classnotes for verb te-forms

	Time Begins	Time Ends	Place	Content
Mon	------	------		
Tue	------	------		
Wed	------	------		
Thu	------	------		
Fri	------	------		
Sat	------	------		
Sun	------	------		

Submit

Self-Recording

1. Actual accomplishments

You will record your actual accomplishments related to your Japanese class. The format of the table is the same as the one for study schedules. In this table, you should include what you accomplished **"outside of the class."** You can enter information each time you study class materials or enter information for the entire week at a time at the end of the week. If you enter information for the entire week at a time, you may keep records of what you accomplished each day in your notebook or calendar.

1. Please enter your **actual accomlishments** related to **your Japanese class** (for example, content studied, assignments completed, etc.)

	Time Begins	Time Ends	Place	Content
Mon	------	------		
Tue	------	------		
Wed	------	------		
Thu	------	------		
Fri	------	------		
Sat	------	------		
Sun	------	------		

Click here to view past records.

2. Tape(s) viewed during class time

This section is required only for tape-delayed students (students who view the lesson after its original broadcast). From the pull down menus, select the date to indicate which class tape(s) you viewed **during your class time**. If you are on block schedule and view two tapes in each lesson, you may select the dates for Tape 1 and Tape 2. If you didn't view class tapes and took a test or a quiz, select "No tape viewed."

	Tape 1	Tape 2
Mon	No tape viewed	No tape viewed
Tue	No tape viewed	No tape viewed
Wed	No tape viewed	No tape viewed
Thu	No tape viewed	No tape viewed
Fri	No tape viewed	No tape viewed

Cleck here to view past records.

3. Make up information

This section is required for all students. You will enter your make-up information in the text box.

3. If you missed class this week, please list make-up work that you need to complete (for example, view tape of 10/24 class, work sheet #14, etc). **If you have no make up work, please enter "None".**

After you enter all information for the week, you can proceed to Self-Evaluation by clicking the button "Self-Evaluation." If not, click "Exit" and come back later to enter additional information.

Self-Evaluation

1. Your weekly goals and accomplishments will be displayed in the top of the self-evaluation page. Reviewing your goals and accomplishments, answer the questions (a ~d) by selecting radio buttons.

a) Did you achieve your weekly goals? ○ Yes ○ No
b) Did you use your study time effectively? ○ Yes ○ No
c) Did you study in a place with no distraction? ○ Yes ○ No
d) Are you satisfied with your overall accomplishments of this week? ○ Yes ○ No

2. How well do you think you understand class materials presented this week? Rate your confidence level for performing a task related to learned materials and enter your anticipated test score. Tasks will be updated each week. You must rate your confidence level **AFTER** viewing **all lessons from Monday to Thursday each week**.

a) How confident are you in correctly performing the tasks described below?
Please rate **the level of your confidence** from 1 to 5.1 indictes the lowest level of confidence and 5 indicates the highest.

1) Write 5 new Hiragana (a, i, u, e, o) that you learned this week. 1

2) Identify and locate two major cities in Japan. 1

b) What score do you expect that you will receive on a test about the above contents?
Please **enter the number between 1 to 100**.

When you complete self-evaluation for the week, click "Menu" and go to the goal setting and study schedules page to enter new goals and study schedules. If you wish to set goals and create study schedules later, click "Exit." Please remember that self-recording and self-evaluation must be completed before you enter new goals and study schedules.

If you have questions please contact me via email (mkobayas@vt.edu).

Appendix X

The MSLQ Online Welcome Page

Welcome to the MSLQ Online

The Motivated Strategies Learning Questionnaire (MSLQ) is an online questionnaire to assess your motivation and learning strategies. First, click "Smiley" below, and then enter the password, which is included in the material previously mailed to you. After you login, you will be also asked to enter your name, school name, and course level.

Your identity will **NOT** be disclosed to others as well as **your Japanese instructors**. Please respond to the items **truthfully**.

Click "**Smiley**" to begin the MSLQ.

Questions?
Contact Michiko Kobayashi
mkobayas@vt.edu

Appendix Y

The Login Screen for the MSLQ Online

Appendix Z

The MSLQ Online

Motivated Strategies for Learning Questionnaire

This questionnaire consists of two sections: Part A. Motivation and Part B. Learning Strategies. It will take approximately **25 minutes** to complete both sections. Before you begin, please enter your full name and school name, and select your course level.

Name

School

Course level
◯Japanese 1 ◯Japanese 2 ◯Japanese 3

E-mail (if you have one)

Part A. Motivation

The following questions ask about your motivation for and attitudes towards your Japanese class. **Remember there is no right or wrong answer, just answer as accurately as possible.** Use the scale below to answer the questions. If you think the statement is very true of you, select 7; if a statement is not at all true of you, select 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you. You are free not to answer any questions you do not want to.

1	2	3	4	5	6	7
Not at all true of me						Very true of me

1. In the Japanese class, I prefer the material that really challenges me so I can learn new things.

◯1 ◯2 ◯3 ◯4 ◯5 ◯6 ◯7

2. If I study in appropriate ways, then I will be able to learn the material in the Japanese class.

◯1 ◯2 ◯3 ◯4 ◯5 ◯6 ◯7

3. When I take a test I think about how poorly I am doing compared with other students.

◯1 ◯2 ◯3 ◯4 ◯5 ◯6 ◯7

4. I think I will be able to use what I learn in the Japanese class in other classes.

◯1 ◯2 ◯3 ◯4 ◯5 ◯6 ◯7

5. I believe I will receive an excellent grade in the Japanese class.

◯1 ◯2 ◯3 ◯4 ◯5 ◯6 ◯7

6. I am certain I can understand the most difficult assignments for the Japanese class.

◯1 ◯2 ◯3 ◯4 ◯5 ◯6 ◯7

7. Getting a good grade in the Japanese class is the most satisfying thing for me right now.

◯1 ◯2 ◯3 ◯4 ◯5 ◯6 ◯7

8. When I take a test I think about items on other parts of the test I can't answer.

◯1 ◯2 ◯3 ◯4 ◯5 ◯6 ◯7

9. It is my own fault if I don't learn the material in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

10. It is important for me to learn the course material in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

11. The most important things for me right now is improving my overall grade point average, so my main concern in this Japanese class is getting a good grade.

○1 ○2 ○3 ○4 ○5 ○6 ○7

12. I am confident I can learn the basics concepts taught in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

13. If I can, I want to get better grades in the Japanese class than most of the other students.

○1 ○2 ○3 ○4 ○5 ○6 ○7

14. When I take tests I think of the consequences of failing.

○1 ○2 ○3 ○4 ○5 ○6 ○7

15. I am confident I can understand the most complex material presented by the teacher in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

16. I prefer course material that interests me, even if it is difficult to learn.

○1 ○2 ○3 ○4 ○5 ○6 ○7

17. I am very interested in what I am learning in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

18. If I try hard enough, then I will understand the class material.

○1 ○2 ○3 ○4 ○5 ○6 ○7

19. I have an uneasy, upset feeling when I take a test.

○1 ○2 ○3 ○4 ○5 ○6 ○7

20. I am confident I can do an execellent job on the assignments and tests in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

21. I expect to do well in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

22. The most satisfying thing for me in the Japanese class is trying to understand the concept as thoroughly as possible.

○1 ○2 ○3 ○4 ○5 ○6 ○7

23. I think the course material in the Japanese class is useful for me to learn.

○1 ○2 ○3 ○4 ○5 ○6 ○7

24. When I have the opportunity in this Japanese class, I choose class assignments that I can learn from even if they don't guarantee a good grade.

○1 ○2 ○3 ○4 ○5 ○6 ○7

25. If I don't understand the class material, it is because I didn't try hard enough.

○1 ○2 ○3 ○4 ○5 ○6 ○7

26. I like the subject matter of this class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

27. Understanding the subject matter of this class is very important to me.

○1 ○2 ○3 ○4 ○5 ○6 ○7

28. I feel my heart beating fast when I take a test.

○1 ○2 ○3 ○4 ○5 ○6 ○7

29. I am certain I can master the skills being taught in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

30. I want to do well in the Japanese class because it is important to show my ability to my family, friends, or others.

○1 ○2 ○3 ○4 ○5 ○6 ○7

31. Considering the difficulty of this class, the teacher, and my skills, I think I will do well in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

Part B. Learning Strategies

The following questions ask about your learning strategies and study skills for your Japanese class. **Again, there is no right or wrong answer. Answer the questions about how you study in the Japanese class as accurately as possible.** Use the scale below to answer the questions. If you think the statement is very true of you, select 7; if a statement is not at all true of you, select 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you. You are free not to answer any questions you do not want to.

1	2	3	4	5	6	7
Not at all true of me						Very true of me

32. When I study the class materials in the Japanese class, I outline the material to help me organize my thoughts.

○1 ○2 ○3 ○4 ○5 ○6 ○7

33. During class time I often miss important points because I'm thinking of other things.

○1 ○2 ○3 ○4 ○5 ○6 ○7

34. I usually study in a place where I can concentrate on my class work.

○1 ○2 ○3 ○4 ○5 ○6 ○7

35. When studying for the Japanese class, I make up questions to help focus on my assignment.

○1 ○2 ○3 ○4 ○5 ○6 ○7

36. I often feel so lazy or bored when I study for the Japanese class that I quit before I finish what I planned to do.

○1 ○2 ○3 ○4 ○5 ○6 ○7

37. When I study for the Japanese class, I practice saying the material to myself over and over.

○1 ○2 ○3 ○4 ○5 ○6 ○7

38. Even if I have trouble learning the material in the Japanese class, I try to do the work on my own, without help from anyone.

○1 ○2 ○3 ○4 ○5 ○6 ○7

39. When I become confused about something I am reading for the Japanese class, I go back and try to figure it out.

○1 ○2 ○3 ○4 ○5 ○6 ○7

40. When I study for the Japanese class, I go through the textbook and my class notes and try to find the most important ideas.

○1 ○2 ○3 ○4 ○5 ○6 ○7

41. I make good use of my study time for the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

42. If class materials are difficult to understand, I change the way I study the material.

○1 ○2 ○3 ○4 ○5 ○6 ○7

43. When studying for the Japanese class, I read my class notes and the textbook over and over again.

○1 ○2 ○3 ○4 ○5 ○6 ○7

44. I work hard to do well in the Japanese class even if I don't like what we are doing.

○1 ○2 ○3 ○4 ○5 ○6 ○7

45. I make simple charts, diagrams, or tables to help me organize course materials.

○1 ○2 ○3 ○4 ○5 ○6 ○7

46. I find it hard to stick to a study schedule.

○1 ○2 ○3 ○4 ○5 ○6 ○7

47. When I study for the Japanese class, I pull together information from class and the textbook.

○1 ○2 ○3 ○4 ○5 ○6 ○7

48. Before I study a new class material thoroughly, I often skim it to see how it is organized.

○1 ○2 ○3 ○4 ○5 ○6 ○7

49. I ask myself questions to make sure I understand the material I have been studying in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

50. I try to change the way I study in order to fit the course requirements and the teacher's teaching style.

○1 ○2 ○3 ○4 ○5 ○6 ○7

51. I often find that I have been studying for the Japanese class but don't know what it was all about.

○1 ○2 ○3 ○4 ○5 ○6 ○7

52. I ask the teacher to clarify concepts I don't understand well.

○1 ○2 ○3 ○4 ○5 ○6 ○7

53. I memorize key words to remind me of important concepts in the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

54. When class work is difficult, I either give up or only study the easy parts.

○1 ○2 ○3 ○4 ○5 ○6 ○7

55. I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

56. I try to relate ideas that I learn in the Japanese class to those in other classes whenever possible.

○1 ○2 ○3 ○4 ○5 ○6 ○7

57. When I study for the Japanese class, I go over my class notes and make an outline of important concepts.

○1 ○2 ○3 ○4 ○5 ○6 ○7

58. When studying for the Japanese class, I try to relate the material to what I already know.

○1 ○2 ○3 ○4 ○5 ○6 ○7

59. I have a regular place set aside for studying.

○1 ○2 ○3 ○4 ○5 ○6 ○7

60. When I study for the Japanese class, I write brief summaries of the main ideas from the textbook and my class notes.

○1 ○2 ○3 ○4 ○5 ○6 ○7

61. I try to understand the material in the Japanese class by making connections between information from the textbook and the lessons.

○1 ○2 ○3 ○4 ○5 ○6 ○7

62. I make sure that I keep up with the assignments for the Japanese class.

○1 ○2 ○3 ○4 ○5 ○6 ○7

63. I make lists of important items for the Japanese class and memorize lists.

○1 ○2 ○3 ○4 ○5 ○6 ○7

64. Even when course materials are dull and uninteresting, I manage to keep working until I finish.

○1 ○2 ○3 ○4 ○5 ○6 ○7

65. When studying for the Japanese class, I try to determine which concepts I don't understand well.

○1 ○2 ○3 ○4 ○5 ○6 ○7

66. I often find that I don't spend very much time on the Japanese class because of other activities.

○1 ○2 ○3 ○4 ○5 ○6 ○7

67. When I study for the Japanese class, I set goals for myself in order to direct my activities in each study period.

○1 ○2 ○3 ○4 ○5 ○6 ○7

68. If I get confused taking notes in class, I make sure I sort it out afterwards.

○1 ○2 ○3 ○4 ○5 ○6 ○7

69. I rarely find time to review my notes or the textbook before a test.

○1 ○2 ○3 ○4 ○5 ○6 ○7

Pintrich, P. R., Smith, D. A. F., & McKeachie, W. J. (1991).
A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ).
Ann Arbor, MI: The University of Michigan, School of Education.

After you complete the questionnaire, please click the "submit" button below.

Submit

Appendix AA

Reminder Note Faxed to Japanese Facilitators

September 26, 2005

Dear [Facilitator's full name], Japanese facilitator

I am Michiko Kobayashi, a doctoral student at Virginia Tech. I mailed you a packet that contained consent forms for my study two weeks ago. As I described in my previous letter, I asked your students to bring you signed consent forms by **September 28** if they wish to participate in the study. I would appreciate if you remind your students of my study and the deadline for signed consent forms. If your students bring you signed consent forms, please mail them to me using a brown envelope that I included in the packet.

Again, thank you very much for your cooperation. Please feel free to email me if you have questions.

Sincerely,

Michiko Kobayashi
Instructional Design and Technology
220 War Memorial Hall
Virginia Tech
Blacksburg, VA 24061
mkobayas@vt.edu

Appendix BB

Letter to Facilitators Attached to the Written Instructions for the Study

October 17, 2005

Dear Japanese facilitators

The self-monitoring study will start from October 23. Please give enclosed materials to each student who signed up for the study. A confirmation sheet that includes the list of participants is also attached to this letter. Please return the sheet after you distribute the materials to the students. If you have questions regarding the study, please feel free to contact me via email.

I appreciate your help.

Michiko Kobayashi
mkobayas@vt.edu
220 War Memorial Hall
Virginia Tech
Blacksburg, VA 24061

Appendix CC

Confirmation Sheet Attached to the Written Instructions for the Study

Confirmation Sheet

Dear Japanese facilitators:

Please sign and return this confirmation sheet using an enclosed white envelope as soon as you receive the packet and distribute materials to participants listed below. Thank you.

Participant's name	Check this column if participants have received the materials
[Participant's full name]	

School Facilitator's signature Date

Appendix DD

Cover Letter Faxed to Facilitators to Inform Participants of Their Passwords

October 27, 2005

To : [facilitator's first name], Japanese Facilitator
From: Michiko Kobayashi, Ph.D. student at Virginia Tech
Re: The self-monitoring study

Dear Japanese facilitator:

Please give the following sheets to the participants of my study.
I appreciate your help.

Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

_____ Pages to follow

Appendix EE

Letter Informing the Experimental Group Students of Their Passwords

Dear [the experimental group student's first name]

The self-monitoring will begin next week. Here is your password for the self-monitoring database. Each student has a different password. Please do not show your password to other students.

Your password: xxxxxx

Your goals and study schedules for the first week must be entered **by Monday, October 31.** Before you enter information in the database, please be sure to read the instructions that I previously sent to you.

There are a few things that I would like to add to the instructions.

1) In the goal setting and study schedule page, you will find the link, " Click here to view make up info." When you click it, make up information that you entered in the previous week will appear in a different window. This should help you see what kind of make-up work you need to complete.

2) In the self-recording page, you will find two links: "Click here to view past records". One is located below the table for "actual accomplishments." Another one is located below the table for "tapes viewed". When you click these links, information you entered in the past will appear in a different window.

* If you have not completed the MSLQ yet, please do so **by Sunday, October 30**.
The password for the MSLQ is different from the password for the self-monitoring database (see the material that I sent to you).

Please feel free to email me if you have questions.
Thank you.

Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

Appendix FF

Letter Informing the Control Group Students of Their Passwords

Dear [the control group student's first name]

The self-monitoring will begin next week. Here is your password for the self-monitoring database. Each student has a different password. Please do not show your password to other students.

Your password: xxxxxx

Your goals for the first week must be entered **by Monday, October 31.** Before you enter goals in the database, please be sure to read the instructions that I previously sent to you.

* If you have not completed the MSLQ yet, please do so **by Sunday, October 30**.
The password for the MSLQ is different from the one for the self-monitoring database (see the material that I sent to you).

Please feel free to email me if you have questions.
Thank you.

Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

Appendix GG

Goal Setting Reminder Fax for the Control Group

To: [facilitator's full name], Japanese class facilitator
From: Michiko Kobayashi, Ph.D. student at Virginia Tech
Re: Self-monitoring study

Could you please give this information to the participant of the self-monitoring study? Thank you very much for your help.

Dear [student's first name],

Please enter your goals for **Week 6** into the database **by Monday, December 5.**

http://www.citsie.net/michiko/login.cfm

Your password is xxxxxx

Please note that to be eligible to receive compensation, you must **complete ALL TASKS and submit information "ON TIME."** I am tracking the time of each data entry. This is important because the information entered into the database after the deadline is invalid and I am unable to use it for analysis.

Thank you very much for your cooperation with my study.
If you have questions, please feel free to email me.

Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

Appendix HH

Goal Setting Reminder Email for the Control Group

Dear [student's first name],

Please enter your goals for **Week 6** into the database **by Monday, December 5.**

http://www.citsie.net/michiko/login.cfm

Your password is xxxxxx

Thank you very much for your cooperation with my study.
If you have questions, please feel free to email me.

Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

Appendix II

Self-Monitoring Reminder Fax for the Experimental Group

To: [facilitator's full name], Japanese class facilitator
From: Michiko Kobayashi, Ph.D. student at Virginia Tech
Re: Self-monitoring study

Could you please give this information to the participant of the self-monitoring study? Thank you very much for your help.

Dear [student's first name],

Please complete your self-recording and self-evaluation for **Week 5** and enter your goals and study schedules for **Week 6** into the database **by Monday, December 5.**

http://www.citsie.net/michiko/login.cfm

Your password is xxxxxx

Please note that to be eligible to receive compensation, you must **complete ALL TASKS and submit information "ON TIME."** I am tracking the time of each data entry. This is important because the information entered into the database after the deadline is invalid and I am unable to use it for analysis.

Thank you very much for your cooperation with my study.
If you have questions, please feel free to email me.

Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

Appendix JJ

Self-Monitoring Reminder Email for the Experimental Group

Dear [student's first name],

Please complete your self-recording and self-evaluation for **Week 5** and enter your goals and study schedules for **Week 6** into the database **by Monday, December 5.**

http://www.citsie.net/michiko/login.cfm

Your password is xxxxxx

Thank you very much for your cooperation with my study.
If you have questions, please feel free to email me.

Michiko Kobayashi
mkobayas@vt.edu
Instructional Design and Technology
Virginia Tech

Appendix KK

Reminder Fax for the MSLQ Post-Test

To: [facilitator's full name], Japanese class facilitator
From: Michiko Kobayashi Ph.D. students at Virginia Tech
Re: MSLQ reminder

Please give this information to the participants of my study.
Thank you very much for your help.

Dear [student's first name],

Please complete the MSLQ by Friday, December 16.

http://filebox.vt.edu/users/mkobayas/MSLQ2.html

Password is Tokyo.

Completing the MSLQ is one of the tasks assigned for the study and it is important because if you do not complete it, I will not be able to use your data (6 weeks of self-monitoring) for my analysis.

I appreciate your cooperation.

Michiko Kobayashi
Virginia Tech
mkobayas@vt.edu

Appendix LL

Reminder Email for the MSLQ Post-Test

Dear [student's first name],

Please complete the MSLQ by Friday, December 16.

http://filebox.vt.edu/users/mkobayas/MSLQ2.html

Password is Tokyo.

Completing the MSLQ is one of the tasks assigned for the study and it is important because if you do not complete it, I will not be able to use your data (6 weeks of self-monitoring) for my analysis.

I appreciate your cooperation.

Michiko Kobayashi
Virginia Tech
mkobayas@vt.edu