Evaluation and Developmental Plans for Interactive Videoconferencing System in Distance Education

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In the fall of 1995, Korea National Open University launched a project to research use of the information super-highway with funds from the Ministry of Information and Communication. As a result, an interactive videoconference network was introduced for educational programs in the geographically scattered regional and local study centers. Using this network, the project connected 14 centers, introduced interactive tutorial sessions, held various meetings among university members in different places, encouraged open discussions among students, faculty members, and general citizens, and created non-degree programs using the system. Detailed evaluation has revealed that the majority of the instructors and participants have had a favorable impression of this system. Despite its shortcomings, the investigaors have found that VCS is here to stay.

KEY WORDS : distance education, videoconferencing system(VCS), evaluation of VCS, developmental plan of VCS

I. Introduction

Most distance learning programs have been delivered in a one-way communication format. Printed materials, audio, video, radio, and TV have been heavily used for delivering the programs. In addition to these media, distance teaching institutes have offered face-to-face tutoring or counselling, e-mail and fax communication services. In recent years, new information technologies (NIT) have exploded and many distance educational institutes have been seeking various ways of incorporating these advanced technologies into their system to improve two-way interactivity and thus to ensure the quality of distance education. This report is based on an evaluation study funded by the Korean Government.

In the fall of 1995, Korea National Open University (KNOU)

launched a project to research use of the information super-highway with funds from the Ministry of Information and Communication. As a result, an interactive videoconference network was introduced for educational programs in the geographically scattered regional and local study centers. Using this network, the project connected 14 centers, introduced interactive tutorial sessions, held various meetings among university members in different places, encouraged open discussions among students, faculty members, and general citizens, and created non-degree programs using the system. Since KNOU serves above 300,000 students and has 640 faculty members and administrative staff all over the nation, meetings and training sessions among its members were frequently held.

The Korea National Open University (KNOU), one of the world's largest distance learning institutes, was founded in 1972. As the only distance teaching university in Korea, KNOU has continued to serve the advanced educational needs of adults as well as awarding degrees at the bachelor's level to qualified people. As any other distance education institutes, KNOU has adopted printed materials as its main instructional delivery medium and broadcast lectures through TV and Radio as its supportive teaching method. However, most courses require students to attend a one-week schooling session held at the 12 regional centers all over the nation. The purpose of these schooling sessions is to deliver concentrated lectures.

As for the schooling sessions, each regional study center organized the schooling sessions independently from the other centers and thereby provided different content under the same course titles. Actually, individual learning centers hired part-time instructors locally. Most of the time the students in the Seoul area in which the headquarters of KNOU is located received lectures from the KNOU professors who had themselves developed the textbook materials and examination goals for the achievement tests.

In addition to the 12 regional study centers located in the provinces, 29 local study centers have been established for the students who live in more remote areas. However, to receive schooling sessions, the students who live in remote areas have to come to the nearest regional study center. As a result, there is only limited interaction between students and professors in the

regional centers.

Thus the major research questions were as follows:

1. Finding the factors that influence the effectiveness of a videoconferencing system (VCS): What are the instructional tendencies of the professors and interaction patterns during the distance lecturing? What are the satisfaction levels of the distance lecturing and why?

2. Management and hardware concerns: What are the technical problems to manage a VCS and how can it be improved? What kind of future vision do we need to improve VCS hardware equipment?

3. Social and cultural impact: What is the social and cultural impact of the utilization of a videoconferencing system?

II. Interactive Design of the Videoconferencing System (VCS)

From the VCS headquarters, located in Seoul, the VCS is arranged in a fashion that connects 12 regional study centers and 1 local study center. For transmission, a commercial T1 (transmission speed: 1.544Mbps) communication line which is provided by the Korea Telecommunication Corporation is used.

The headquarters of KNOU established a studio equipped mainly to broadcast and lecture through VCS. Also, 7 of the regional centers have the capacity to give as well as receive the lectures using VCS. However, the remaining 5 regional centers and 1 local center can only receive lectures since they do not have the ability to broadcast.

A. *Hardware component*

The basic hardware components can be divided into five major areas: transmission, video, audio, remote control, and support systems. For transmission a T1 class CODEC (Coder/Decoder), and MCU (Multi Channel Unit) are used. Each classroom is equipped with three color closed circuit cameras, 43″ or 52″ color monitors, beam projectors, VHS, VTR, and TBC that process the video signals. The audio setup includes a wireless mic system and other audio processing equipment; amplifiers, equalizers and speakers. In addition, a pentium processor PC with all the necessary software is used as the main control

station; it is linked to the VTR control and Audio/Video (AV) matrix switcher. As an addional support system, a briefing system and data viewer are designed to create and support supplementary educational materials.

B. Finance

In 1995, KNOU was designated to be a "Distance Education Trial Institution" by the Ministry of Information and Communication. KNOU with the help of participating industries is in the processsing of implementing and conducting a field study on distance education in Korea, which will be completed in 1997. A total amount of $4.325 million was invested.

C. Educational Scenarios

1. Support of Degree Programs
The purpose of the VCS used in degree programs is to increase interaction between instructors and students, to expand face-to-face leaning opportunities and thus ensure the quality of distance education. For example, this system can be applied in regular lectures (schooling sessions), special programs such as a summer/winter session, or night school, as well as orientation sessions.

2. Support of Non-degree Programs
VCS can also be used to support various faculty, student, and general citizen activities as well as intra- and inter- school student symposiums, faculty meetings, and general information on education. In addition, the facilities can be leased out to other interested organizations.

III. Evaluation of the VCS

The evaluation of the VCS started in March of 1996 and were completed in December of 1996; it is divided into three stages. The first stage, from March to June of '96, involved gathering information on similar cases, preliminary site visitations, the development of questionnaires, and data collection. In the second stage, from July to September of '96, site visitations were conducted, questionnaires were distributed, and interviews were performed. In the final stage of evaluation, from October to

December of '96, a detailed data analysis was done. The demographics of the people in this study consist of the undergraduate students of KNOU, instructors, operators, and managers involved with VCS. In the course of the study, the following three different research methods were adopted.

Basic Research: The review of related literature and case studies which focused on two aspects: 1. The effectiveness of VCS related programs. 2. The educational satisfaction and limitations cited concerning VCS like programs.

Field Research: Interviews were conducted and surveys were passed out to the teachers, students, and operators involved in the VCS. Through video analysis and on-site visitations, the actual teaching-learning process were observed and analyzed.

Policy Research: Forums consisting of experts in distance education were open. Through this forum, future plans for improving system stability and availability, teaching strategies, and detailed plans for increased implementation were developed.

In order to evaluate the effectiveness of the videoconferencing system, the following areas were investigated.
1. Analysis of teaching-learning activities
   a. Instruction tendencies
   b. Interaction between instructors and students
   c. Student activities.
2. Analysis of satisfaction levels and opinions of instructors and students on VCS
3. Analysis of VCS management-operation
   a. Human element
   b. Material element
   c. Financial element
4. Analysis of hardware and communication environment of VCS
5. Analysis of VCS's social and cultural impact
   a. Changes in the instructor/student relationship
   b. Changes in social perception of distance education

IV. Process of Evaluation

Questionaires, interviews, observations and video tape analysis were the major research tools of this study.

The questionnaires, both for instructors and students, were

used for the evaluation of academic issues, the instructor's use and management of the distance education technology, changes or adaptations in instructional strategy and management, satisfaction levels on participant feedback and supplementary material provided, and most importantly the instructor's opinion on VCS. Some other issues addressed in the questionnaires pertained to the educational environment provided by VCS: Was the atmosphere comfortable? Was the environment user-friendly? What are some of the things that can be improved on 1,218 students and 10 instructors responded to the questionaire.

Interviews were conducted not only with instructors and students but also with people involved in the University administration, management, and operational technology. During the interviews, the interviewers asked specific questions concerning interdepartmental cooperation, managing and operational problems, and solicited personal opinions on VCS's strengths and shortcomings as well as possible solutions.

All VCS sessions were videotaped and some of the sessions were observed. Among the video taped sessions, 50 sessions were randomly chosen for the analysis.

V. Results

A. Results of Field Research

1. Analysis of VCS's technical aspect revealed the following points. Compared to other distance education media such as audio conferencing, VCS showed great promise and potential as the dominant distance education media. This was largely due to the fact that KNOU's VCS seemed to adequately support a true two-way interactive environment. However, in order to increase the effectiveness of VCS, more technological improvements were shown to be needed. Many technical difficulties from the source and receiving ends were cited to disrupt the VCS session. These difficulties also revealed the need for an adequate back-up transmission system other than the T1 line used for transmission. Some of the technical difficulties influenced the student's and teacher's attitude towards VCS. The unfamiliar environment coupled with these difficulties brought out some

people's rejection against technology.

2. In some cases, the support tools used for the production of classroom materials burdened the teacher and was found to be a reason for an unfavorable view on VCS. Therefore, in order to increase the effectiveness of VCS, not only the direct technology involved in VCS must be improved, but also the technology that supports the classroom instructors and students should be developed.

3. Analysis of satisfaction levels and opinions of teachers and students on VCS revealed the following. Although teachers showed great satisfaction in their own teaching strategies concerning VCS, many of them commented on a desire for more interaction in the classroom. There were possible reasons for this lack of interaction. However, the major reason was thought to be based on the style of lecturing. In other words, the teachers were used to presenting the material in a "one-way" fashion, therefore eliminating from the start any possible interaction from the students. Interviews with the teachers revealed a high level of stress concerning the preparation of the actual lecture and material for VCS. This was viewed to be due to the unfamiliarity of environment.

4. The students generally gave a positive response to VCS. However some responded that the VCS lectures were not able to bring much intellectual stimulation and reflect educational diversity. Further analysis of student feedback showed that there was much room for improvement in the operational and management practice of VCS.

5. Further analysis of the social and cultural impact of VCS revealed a favorable response from both students and teachers. This was largely due to the new opportunities in which VCS offered. The increased availability of experts and different education media seemed to play an important role in this favorable response. Also, the time factor, in which the students did not have to travel hours for a lecture, was an extremely attractive trait. This was especially true for the students who were not located near the KNOU's main campus area.

6. Two main factors need immediate improvement when lecturing through VCS: instructor training and operator training. Instructors who did not have enough training in the VCS were observed to be uncomfortable during their whole lecture. They

did not seem to form a close tie with remote students. So, training, not only for the technical use of VCS, but also for remote teaching strategies need be established. Also, many system operators who did not understand the teaching learning patterns did not cooperate effectively with the instructors in delivering the content and did not show appropriate appreciation for the remote participants.

7. In general, students and instructors wanted more lectures through VCS. Students in the regional and local centers were satisfied because they had opportunities to access live lectures by Seoul Campus professors and hoped that this system would enable them to participate in lectures given by famous experts in various fields. Futhermore, the general public wanted VCS to expand into other general fields like adult education, and extracurricular activities.

8. Social perceptions on VCS were split, however. Where on one side, people hailed it as the next educational medium, others replied that it might be too early to make that judgement. Among these less enthusiastic supporters of VCS, many people commented that VCS was "like watching TV", "boring", and, due to the lack of actual presence of the instructor, that "they felt like they were not in the classroom." Others pointed out their frustration that their so called "classmates" in other regional sites did not "feel like their classmates" for there were few opportunities to interact with them. One of the interesting trends found in the investigation was the participants comfort with VCS largely depended on their view and understanding of the technology. If they were comfortable with and had better understanding of the technological aspect of VCS, they were more likely to adapt to VCS. However, it was interesting to note that, regardless of whether they had favorable impression of VCS or not, many people commented that VCS is appropriate for all educational subjects.

B. Developmental plan for VCS

The following is the list of developmental plans for VCS drawn from this study.

1. The Stabilization and Expansion of VCS
    1.1 Currently, VCS is fully implemented in 12 regional sites and in one local site. In order to increase the efficiency of

VCS, it must expand to the local center level.

1.2 In order to bring increased stability to the system, the following three thing should be done: implementation of UPS, backup systems, emergency protocol, and training programs for system operators.

1.3 VCS is based on real time. Other supplimentary systems such as VOD or PSTN must also be developed.

1.4 A multimedia network consisting of computer learning tools and satellite broadcast sessions must also be added to VCS.

1.5 Consistent funding must be appropriated in order to support the development and operations aspect of VCS.

2. VCS policy

2.1 The training and orientations programs for students, teachers, and operators concerning VCS, must be further sought for and developed.

2.2 Proper personnel allocations are needed for VCS. Professionals or people who have much knowledge of VCS should be involved in VCS rather than temporary or amateur personnel.

2.3 Consistent outside funding is needed for the various programs and operations of VCS.

2.4 A policy must be developed to make VCS public

3. Operations and Systems management

3.1 The Minimization of operational errors or "down time".

3.2 Regular meetings between system operators and communication service providers.

3.3 A detailed contract between communication service providers and VCS system operators concerning operational matters is also needed.

4. Development of Teacher - Student relationships.

4.1 Planning

Proper planning of what subjects will be offered, the classroom size, and the number of local sites involved, should be elucidated.

4.2 Training

Once, the subjects are determined for VCS, the involved teachers and personnel should be trained to be familiar with the various aspects of VCS.

Some of the aspects covered for the teaching aspect will be

Selection of learning objectives and content; strategy for teacher-student interaction; development and usage of support learning material; sending of hand-outs; rehearsal for proper media usage; trouble shooting; system management; and student orientation.

The following are some suggestions to make VCS fulfill its true potential as a distance education medium.

1. VCS should not only be used in the education of university student but also be used for various educational programs for the public. This will not only increase the usage of VCS during the times when it is not needed for university related matters but also help the development and advancement of the local community.
2. VCS should made open for the usage of students and various student organizations
3. VCS should be made available to host various outside events: symposiums, seminars, etc.
4. VCS's role as the central medium of educational and cultural innovation for the information society should be clarified.

VI. Discussion and Conclusion

Due to the exponential growth in telecommunications technology, many new forms of educational media have been made available over the years. One of the most attractive traits of these new distance education media is that they eliminate the spatial limitations of education. In other words, one's need to be actually present at the instructional site is eliminated. Another attractive trait is its affordability. Due to new materials and technology, using these telecommunication alternatives make education more and more affordable. Furthermore, in a world where time has become the most expensive commodity, distance education has also proved to be invaluable. No longer do people have to spend a great length of time traveling to physical locations, saving money as well.

Following the trend to establish more effective distance education media, KNOU, with the help of various corporations and the government, developed its own Videoconferencing System. Detailed evaluation has revealed that the majority of the

instructors and participants have had a favorable impression of this system. However, research also revealed that there were several obstacles with respect that VCS must overcome. These obstacles can be grouped into two areas: the technological and the human aspect.

Although VCS proved to be successful, the two way communication between instructors and participants must be further improved. Technologically, many students wished that VCS be more user-friendly and less intimidating. Sometimes even when a query was made by a participant, the query was lost or delayed. Due to mechanical or technical difficulties, both instructors and participants commented that "they weren't getting the full view" of the classroom indicating that more coordinated camera movement or monitor arrangement needs to be worked out.

This study has also revealed that if VCS is to become even more successful, proper education of VCS technology must be given not only on the participants but to the instructors as well. It has been noted that many people "sensed" that some instructors were also uncomfortable with the environment, thus, bringing down the credibility of VCS. Although technology can never replace the personal aspect of education, we believe a more personal atmosphere can be created through proper orientation and curriculum development.

VCS has shown its strengths and potential to become one of the most powerful education tools in the near future. Through this study the investigators have found that VCS is here to stay, despite its shortcomings.

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