Session II

Application of New Media and its Relationship to Guidance in Schooling

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Chairman: Good morning, Ladies and Gentlemen. We would like to start the second day of this International Symposium on Distance Education. My name is Sakamoto, from the Tokyo Institute of Technology. I shall be serving as your moderator. We will have presentations by five specialists this morning.

The topic of this Session II is the "Application of New Media and its Relationship to Guidance in Schooling." It says guidance, but I would add Guidance and Teaching in Schooling. Recently, with the rapid development of the means of communication, it has become possible to transmit a large volume of information at low cost. Using the visionary image, the interactive communication on transmission has also become possible using satellite and other means. Therefore, there has been remarkable progress in terms of media of communication as well.

The interactive exchange of information over great distances has become possible. In the past, using telephone, postal services or broadcasting we tried to establish distance education in either "one way" or "interactive way," but new developments in technology and media have exerted a major impact on distance education. We can clearly say that new media is changing distance education. So here we shall be learning the actual examples of application of such new media to distant education and looking to future directions.

The first presentation is by Dr. Kobayashi, who served as the Vice President of the University of Air until quite recently. Professor Kobayashi graduated from the Tokyo University of Commerce and is a Doctor of Business Administration. He also taught in the Tokyo Institute of Technology and worked as a Dean of Education Administration or the Dean of Department of Engineering, the major pillar in the university. He has been carrying out various experimental works to actually use new media.

Dr. Kobayashi, please.

Y. Kobayashi: Thank you very much, Mr. Chairman, for your introduction. Good morning, Ladies and Gentlemen.

This morning, I would like to talk about our experiences when I acted as Vice President of University of the Air for a period of six years during which time we made a lot of new attempts and new ventures. Mr. Sakamoto has referred to the theme of the discussion.

President Koda said yesterday something about our university, how it functions and the constantly various problems that have to be tackled.

First of all, I would like to tell you that the written text of my presentation is an outline of what I am going to tell you and I would be very glad if you would refer to that text at a later stage. Because of lack of time, I will not necessarily touch upon this text but will speak freely.

Since the start of our University of the Air, one major problem that has been faced concerns is actual attendance by students at various classrooms. They have to physically attend classes. There is a law which was introduced by the Ministry of Education governing university education by correspondence. The University Correspondence Course Standards is the regulation which says that by the time a student graduates from a university by correspondence, at least 30 units or credits have to be obtained by the students through their actual classroom attendance. The total number of credits required is more than 124 credits for ordinary university students and out of those, 30 have to be obtained through schooling.

In our University, all the courses are given through TV programs or radio programs on the air. Everything is instructed on the air, so we wish we could be given a more lenient regulation. What is required for the students is to obtain 20 credits, given the fact that all the programs are offered through TV and radios. We wish the number of credits could be even less.

We have eight study centers and at these centers professors do actually give classes. We have approximately seventy subjects. The number of subjects offered differs from one center to another, and Monday is a holiday. So except for Mondays, the centers are open every day until 8:30 in the evening. One course has 1.5 hours multiplied by 5 times and students who attend that specific course are given one credit.

When we welcome non-Japanese guests to our university and try to explain how we function, very often they seem somewhat surprised to learn that although the students are enrolled in the University of the Air, they actually have to attend classroom classes. Their surprise is well founded. (I can well imagine their surprise.) Housewives and business people who work during the day are students of our university. They want to learn in addition to their respective work as housewives or company employees. To ask them to come to study centers to attend classes is demanding too much from them.

However, this situation may have something to do with the Japanese specific

situation which in turn deals with the University Correspondence Course Standards. Another aspect that is specific to the Japanese students is the fact that among our students, there are some who are attending or taking courses at a higher education level for the first time after having reached a certain age. Certainly they can read printed materials themselves and they can also listen to radio programs or watch TV programs. However, depending on the type of course, or on the way in which a professor gives his lesson or speaks to the students, the reaction on the part of the students may differ. Still the attendance for any program or course is somewhat unidirectional instead of conversational. That is why, in a way, it is a good idea for the students to attend classes, because they can have more stimulus. They can ask questions personally to the professor and can receive guidance and personalized teaching at classrooms.

The students do appreciate that aspect. Tutoring systems have been introduced in various open universities like the Open University in the U.K. I do know that in the U.K., they have a lot of tutors who give guidance and teaching personalized to respective students. Of course, it would be very nice if the Japanese system could integrate that system into the open university. However, somehow the Japanese system does not seem to be very compatible with that tutoring system. Even without this type of tutoring system, by students attending classroom classes, they do receive similar guidance. Sixty to seventy subjects are taught at 8 study centers. Study centers are located only in the Tokyo Metropolitan area and its vicinity and this area was considered as the Phase 1 project. Before expanding the subject area to the whole of the nation, it will be necessary for the university authorities to have a sufficient number of professors, 400 to 500 in number, who can support us.

In addition to full-time professors we do ask for the help of 400 to 500 outside professors. Since the conversational method of teaching is of great importance, that reminded us of the possibility to use new media. Today, with 80% of the budget allocated for the University of the Air coming from the public fund, from government funding is very limited. So approximately 80% of the money comes from the government and full-fledged conference in television conference systems, which is experienced at the Tokyo Institute of Technology connecting two campuses, is very hopeful, but not so easy to introduce.

I think the Californian example will be referred to at a later stage by one of our guests as well as NEC's inhouse education using new media television conference which is another example of how such new media has assisted education. In our case, the University of the Air has certain budgetary constraints so that we have to make the best with what is available as far as resources are concerned. Several years ago, we embarked on a pilot television conference project, the ultimate goal of which was to

incorporate television conferences into our education in the future. I would like to share with you what we have been doing in the area of classroom instruction or schooling at the University of the Air. A major part of classroom instruction is schooling. We have the National Institute of Multimedia Education, (N.I.M.E.), which has a lot of projects and our university has cooperated with this institute. Sometimes initiatives come from our university, sometimes the initiatives are introduced by N.I.M.E. We respond to that initiative and both of us cooperate with each other for the introduction of new systems of instruction.

Computer-aided instruction was one idea which was introduced several years ago by N.I.M.E. This institute tested the instruction system with the help of a company, Epson (former Seiko) computers were borrowed and using these computer on lease from that company, education was conducted. There was certain concern or doubt in regard to the effectiveness of having such a project in a big Metropolitan area, but at any rate, such a project was made.

Secondly, prior to full-fledged studies and experiments, we did have several preliminary experiments. The first experimental project was conducted with the cooperation of the Prefecture of Kumamoto in the southern-north island of Kyushu. A telephone conference technique was introduced in this project.

I will just briefly explain this system. This (picture) is the system used towards the end of the project. Here (Map of Japan) you have this University of the Air...sorry, N.I.M.E., and this is Kumamoto City, Hitoyoshi City and Hondo City and another city, four places were linked with N.I.M.E. This (picture) is the teleconference. However, we did also look at the other side, visually still picture, and certainly telephone cable, facsimile and electronic blackboard was used.

You will find that picture on the other side of the rostrum. I myself acted as a professor giving lecture. It was a lecture on "Business Management" given to students in Kumamoto. This was the first class offered by me using this system. In the next picture, the man who is standing is an associate professor and English native speaker, an American person and the lady who is seated is the associate professor of the University of the Air. This is the English class, so we did use this system for English courses.

Another picture. This shows the classroom at the receiving side. I do not know in what city, probably in Kumamoto city. These are the persons who are receiving instruction, trying to respond to questions asked by the professor. This happens very often in the case of English class. However, when it comes to classes like English, teachers have to correct pronunciation, English pronunciation, etc., so this type of system, teleconference, is not very practical. Maybe as a question of habit, however, it has to be improved.

In 1987, N.I.M.E. started using a system, INVITE 64 system developing by KDD

(International Telephone Communication Company).(tab)I am afraid this (OHP) is written in Japanese but this shows the system. The main characteristics of this system is the following. A digital network system which started to be available for commercial use was used and 64 kilo bit per second and still pictures as well as moving pictures could be obtained. The capacity was 64 kbps, which is not large, which means that the moving picture had a very slow speed. In addition we certainly could use still pictures, facsimile and the electronic blackboard, etc. This picture shows only two places, but several different locations can be connected through this system. INVITE 64 system was used several times within N.I.M.E. and at the same time, we conducted a series of studies at the Chiba Study Center. Because of lack of time I will proceed to the third example.

The third example started in December 1988 linking Saitama Study Center and Tokyo Study Center II, both of which are located 25 kilometers away from each other, the students and professors who participated in this project were monitored. This (OHP) is the result of this experiment. Here you have the picture on your lefthand side. This is the host side, Saitama Study Center. The Tokyo Study Center II is the receiving side. This (OHP) is the result.

Let's first look at the reaction on the part of the students in response to this experiment. Subjects involved were "Japanese Literature", and an associate professor of our university participated in this project. This course is basically a course in which the professor gives lectures to students. However, printed materials are used and professors do ask questions to students.

Another subject is "Earth Science". Professor Nasu who spoke yesterday has involved. In this subject a lot of visual support was given and the reaction was given from students and professors. Three is average or normal, if 5 is given it's relatively good. One is bad. For example, image is normal, sound is good, recognition is easy. Sometimes students said that the movement was too slow and there was fatigue to a certain extent because of that system. Otherwise, they feel familiar with the system; they feel normal: they did not feel isolated. So the reaction from the students was relatively good for both subjects.

All of our students are used to receiving instruction and education through TV programs and media programs, so they were somewhat disturbed by the slow speed of a movie. And the video image to them was too slow. The size of classroom was a problem because of the hardware and equipment, not the whole of the class could be pictured, so only a portion of the classroom was viewed by the students by the other side. What about the cost? For this specific project, we had to pay money for using the equipment on lease from the manufacturers. For the previous project, we did not have to pay anything, because we had a contract. Since the contract expired, however, we

had to pay some money for the system's usage, approximately 3 million yen was paid.

This project lasted only one week, and if we were to use this system for a longer period of time, the cost would be lower. Two or three study centers can be connected and one single lecture can be transmitted to 2 or 3 different study centers that is one big merit. In the future, a television conference system, if we could afford it would be the ultimate goal as far as our university is concerned.

In regard to future prospects I would like to share with you something. Broadcast satellite communication is another system that we would like to incorporate, but it will incur a lot of money. So to start with, we would like to expand our Study Centers throughout the nation and thanks to support from various organizations. Already we have a tentative project in Hiroshima. However, there is still pending issues of schooling and necessity to bring about conversational two-way instruction. Television conferences can complement this. As far as guidance is concerned, professors, especially the full-time professors who give guidance to students, once they get used to this kind of new media and equipment, it will help them a great deal to be able to communicate with the students.

I think the time has come for me to conclude. Thank you very much for your attention.

Chairman: Thank you very much, Professor Kobayashi. Three projects have been introduced to us. You may have questions regarding his presentation but we will entertain them at the later date. So we will proceed to our second speaker, Prof. E. Marie Oberle. Professor Oberle is the Director of National University Teleconference Network of the United States. Professor Oberle will be explaining to us the NUTN, Professor Oberle received a Doctor's degree in Oklahoma State University in pedagogy, nursing and life-long education, and is very active in various associations. Professor Oberle, please.

E.M. Oberle: Thank you, Mr. Chairman. Good morning. I would like first to express my appreciation to the University of the Air and the Institute for Multimedia Education for the privilege of being the part of this distinguished group discussing a subject that is very dear to my heart. In the time that I have with you today, I will highlight and explain on my paper, the National University Teleconference Network, a new force in higher education. Actually, the communication satellite is the new force and the consortium of universities is pioneering the applications of that new technology.

Through the use of transparencies and a short video tape, I will briefly touch on the nature of the consortium, why there was a need for such an organization, present

some applications and speak briefly to the prospects of the future. My challenge, of course, in a short time is to give you enough details so that you will not only understand what we are doing, but be able to still convey the broad picture that I feel there is a great potential for this satellite medium.

But first, I'd like to help you get a sense of where this coordination is taking place. This is a map, of the coast of the United States, and the shaded area is Oklahoma, many of you may know us best by the western movies with the cowboys and Indians. This is a small community in a university town of approximately 45,000 and half of those are university students. Oklahoma State University in Stillwater, Oklahoma where you see the dot is the host institution for the National University Teleconference Network. I will be referring to the term Teleconference to mean a conference at a distance using the electronic media. This conveys satellite teleconferencing, audio-conferencing and computer conferencing. And I will identify these in the text of my presentation. In addition I will be using the terms consortium and network simultaneously and refer to the National University Teleconference Network by its acronym. I don't know if you are accustomed to use acronyms to shorten these long names but its NUTN and we call it Nutn.

I will be speaking more specifically about the consortium that I represent but I will mention other activities to provide a sense of the use of communications satellite in the U.S.A.

What is NUTN? I apologize that I don't have these also in Japanese. It is a consortium. Of institutions of higher education and the mission is to provide effective electronic means of exchanging information, primarily through the use of the satellite. This organization is in its 8th year and is pioneering the use of satellites in higher education in the U.S.A. This is an extremely diverse membership including research universities, land-grant colleges, 2-year technical colleges both private and public. These are located throughout the United States, Canada and Mexico. All of these areas can be covered by a single satellite; the footprint covers that much area. We have approximately 3200 institutions of this kind, accredited institutions of higher in the U.S.A. Dr. Meuter will soon be speaking about Chico State University and they are member of this consortium. Nest transparency, please.

Why was this organization needed? We perceived that it was needed. First, the educational community was strained for resources, financial and human. Grants were very difficult to come by. We have a shortage of qualified professors in specialized areas. And second, the traditional enrollments were declining. The last of the baby-boomers were nearly educated. I understand this is occurring in Japan as well. Third, the information explosion was upon us. Dr. Morrison reminded us yesterday that information was and still is multiplying at such an amazing pace. We are all struggling

to keep up with it.

Retraining and professional continuing education is a must to keep current. So that the non-tranditional student was eyed with great interest by our institutions. The average adult in the United States makes five career changes in a life time so there is really a challenge to us to try to keep these professionals updated.

And fourth, there was a profound change in the way we communicate as a society. The communication satellite was a technology that needed an application and we believed the satellite provided us with the opportunity to reduce our geographic barriers. There are many of our states that do not have a capability of receiving television. However, they can utilize a satellite receiving dish and be in touch that way. This way we could reach thousands of people with what we think are the latest thoughts from the greatest minds from all of our wonderful universities. So given this environment, a group of visionary educators were looking to alternative ways to serve their constituency and this is how this organization came into being.

The organization took the nature of a consortium that would function both as a professional association of higher education teleconferences and a satellite delivery system for programs. The membership would bind the group and the members would be represented by the advisory board. This arrangement would allow member institutions to utilize audio, satellite and video to reach national and international audiences with programs that they originate.

So how does this work? First, a member institution must come up with an idea for a program that is really compelling. It must be timely and it must convey the most current information. It cannot be local in nature. For it will not have a wide appeal. Second, it must develop a quality program, that means using the experts in identified subject areas. And third, its marketed to a target audience. Through colleges and universities. To be able to participate a receive side would need to have a satellite receive dish and a capability of pulling that signal from the satellite. Because these programs are all offered live, interactive, satellite video. That's one-way video, two-way audio.

And then, fourth, the coordination is really the secret in giving a successful experience. We work with a key person at a college or university and these persons are generally in continuing education so that they are accustomed to doing conferences in institutes. The coordinating office which I represent is responsible for all of the training, all of the consulting and coordination that needs to take place as these national programs are put together.

Let me just speak briefly of a program example that might give you an idea of how this works. One institution came up with the idea that business industry is really in need of more information on the economic integration of Europe in 1992. So this

university worked with our U.S. Department of Commerce. They were able then to put together a quality program using the experts. It would be so expensive to bring all of these experts to one institution to receive this information. So, we sent a camera crew to the Economic European Community in Belgium and taped the ambassadors. Then the second level in command were actually the persons that participated live on the satellite video teleconference. The target audience was business and industry, although trade associations as well as colleges and universities received it for curriculum enrichment. Many of these are very timely societal issue kinds of programs used by our universities for curriculum enrichment. The coordination was then done by our network. We needed to find the site that could receive the program and the people that wanted to see the program and put them together. Of our 3200 colleges and universities, approximately 1500 have that capability to receive the satellite signal. We have about 50 business networks that had been established and using our technology. In addition, many high schools have the receive capability as well as government offices and libraries and other public buildings.

I would like now to show you a short video tape of a variety of programs that we do. May we have the tape, please.

(Showing of video film)

Our programs are from two to four hours in length and they are all live, interactive. Of course they have a number of tape segments to provide emphasis and variety in the programs. In an effort to put what we call "the high touch to the high-tech" we recommend a local component to every program. We call it "the local wraparound," where the receive sides bring in technical experts that speak to the national program in light of what it means for their own community. This way we feel that we have more active learning taking place than we would have just watching the television program. In addition, we have a variety of instructional designs for the programs so that we even design activities where there can be a small group discussion. We are being very creative in ways of doing this teleconference because we think there is more active learning taking place. This is what we are working toward.

Obviously, to make this delivery system cost-effective we need large numbers; we need to distribute large numbers. But then our challenge is how do we interact? So we are using a number of ways with the computer with the facts and, of course, we are always with the audio component.

The coordinating office works with other educational institutions, special groups, member institutions, the government, other networks, many, many networks are bring established in the U.S.A. Many of you heard of the National Technological Network. We work with them because once you have a networking place everyone wants to take advantage of additional programming and use that equipment. So we help to

coordinate all of the networks. The services that we provide are broad, the main one being training. We provide a training by plant, by audio conferencing, by computer conferencing, by satellite conferencing and face to face. I will be leaving here this afternoon for such a conference in California with the members. Our program can be diverse from continuing education for business and industry to a very wide variety of programs.

I will just say that in terms of what works you will be able to read in the paper more specifically what we have found that works and some of the things that did not work. We obviously made some mistakes. But the most important thing and I think you will appreciate this being in higher education is that we did allow for the local autonomy of each institution to be protected, and I think that we one of the key successes. As I said, you may read about these more in detail in the paper.

The environment in which we were operating had some very key factors that benefited us as we developed this network. Many of our institutions had a fear of being left behind if they did not participate because the colleges and universities know that they have to develop a strategy for the 21st century. We have a desire, I believe, for equality in our society and the educators are searching ways to reach minorities, disadvantaged students, and those living in remote and isolated communities. Telecommunications can be the great equalizer.

Then the third factor was that there is a conversion between the interest of higher education and the interest of business and industry. Increasingly, businesses are looking to colleges and universities to provide training and retraining that they need. And, of course, colleges and universities have the expertise that business and industry need.

There were obviously many obstacles to the development, and the most important one was that there was no precedent to follow. We faced skepticism on a daily basis still do. We were ahead of our time as we were pioneering this new application. We could not guarantee it would work and it was a threat to the traditional way of teaching. You may read more about this in the paper.

I would like to speak finally to the prospects for the future. It has been an accessible experiment in cooperation and clearly the University of the Air and the Institute of Multimedia Education know how powerful you can be if you cooperate. And this is what its all about, I believe, in this new communications industry. The communications technology is a new force in higher education. There isn't any question. NUTN is privileged to be a part of that force. We have educated a whole generation of teleconference users. And in all honesty, I must add that we have made some mistakes. However we are doing some things right if we've been able to stay together for eight years. Many believe that satellite teleconferencing is a fad and that it

will go away. I think they even hope that it will but it hasn't. Currently, I am sensing an acknowledgment by our institutions of higher education that teleconferencing is here to stay and they are saying "teach us, we want to learn." We know that we are going to have to get into using this technology so that our training for our institutions is really just beginning.

I'd like to share with you that we envision a global network. We are already integrating the technologies. We want to do that more so that our efforts will be more effective. We see many networks being established. Your research universities will have their network. There will be an international division; the junior college is developing a network. The four-year colleges have their network. All of these can serve their institutions individually and then we can all cooperate when we want to have very wide distribution of programs.

High schools, business and industry, government and so forth are served by the institutions of higher education in our design. Internationally, we will be doing our first international teleconference in August 1990. And it will be on applied biotechnology. It will be research oriented. And it will be uplinked from Cologne, Germany and from Washington State University.

There are global networks being established. NUTN is a secretariat of one called Foundation for International Tele-education. We have a number of persons here in Japan that are part of it. I send information to the President of the University of Tokyo and there is another person that I send information to regularly on this global network. So this is a start. It is a start of what I think will benefit all of us in our global society.

I appreciate very much the opportunity to be with you today and would welcome the opportunity to answer any questions. A number of your professors from the Institute of Multimedia Education have visited with us in Stillwater and I invite more of you to do the same.

Chairman: Thank you very much, Dr. Oberle. You have contributed to us a very valuable experience that you have undergone in the last 8 years of your program. Next is Professor Yasutaka Shimizu of the Tokyo Institute of Technology. His field of expertise is electricity. He is also very much an authority on educational Technology. He will be talking about the experimental teaching system utilizing optical fibers. He was instrumental in designing a national operation of this system for the university.

Y. Shimizu: Thank you very much. Shimizu is my name from the Tokyo Institute of Technology. You have just heard from our moderator about the optical fiber communication system that we have within the university. Today, we will be talking about the system that we started in 1981 and 1982. We have been using this system

continuously in our university education and I would like to briefly speak about how we evaluate this system. Also, we have been recently cooperating with the use of a more advanced system HDTV, that I'll be talking about. In January of this year, for only a short period of 1 month with the cooperation of NHK and NTT and other manufacturing companies, we have been able to use high definition television in our classrooms, we evaluated the result of our experiment and we made comparisons between HDTV and the traditional NTSC system. I would like to share with you the results of our study.

First of all, we have used the optical fiber connection in education; we also utilized radio waves and satellite communication and regular telephone lines as well. We use the optical fiber especially distance for our education purposes with the use of optical fiber in distance education, various things are possible. There are many modes or forms of distance education. It can be, for instance, an audio lecture which relies on the sound transmission. Many attempts have been made to do this. Trials have been made, but since students have to rely only on hearing, they have to concentrate very much on their hearing ability and thus get very tired easily.

Another alternative is the electronic blackboard system which can send handwritten letters or drawings on the blackboard, the information can be brought on the system.

Then we also have a stationary video picture system which was discussed earlier. We can have a semi-stationary video picture system, INVITE 64 that the other gentleman talked about. Then we have a moving picture system, with which we can send moving pictures. Another alternative is high definition telelecture which uses high definition television. We conducted experiments on this for one month this January.

So these are the possible alternatives what are the pieces of information that can be sent? Audio, electronic blackboard system, stationary, semi-stationary and moving video pictures are methods by which various pieces of information or be handwritten pictures and drawings can be sent. An OHP or slide can be sent on 4 out of these 6 alternatives.

You have heard already the examples of NUTN and the systems of Mr. Kobayashi. There are many ways of submitting these pieces of information. Broadcasting is one point to submit information to a multiple number of receiving ends, and unilateral is the case of broadcasting and in the case of telecommunications network, the bi-directional, two-directional communication can be achieved so that conversation or interectual communication can take place.

So there are one-way communication, and two-directional communication. Semi-two-directional communication is also possible, which means that it uses one-way video and two-way audio. So image picture can be sent one way but since there are two

channels for audio, students can send their questions to the teacher or instructor. In our case, what we have is fully bi-directional system two ways for video and two ways for the sound. This was done in order for the system to be able to approach a live classroom atmosphere and this map shows what our project add in terms of its coverage. We are across the Tokyo Bay in Chiba but the system connected our Ohokayama campus in Tokyo with our Yokohama campus, 27 km in distance. Luckily, between these two campuses there was a private railway line connected to the campuses. Therefore, we used their track to connect a single mode optical fiber between Ohokayama and Nagatsuda campuses and through this means we were thus able to create a live educational environment. The distance for the fiber was 26.4 km and we used 1.3 radio wave and 400 mega bits per second was the speed of information transmission. There were eight fibers used in the optical fiber so a large amount of information was able to be sent.

Today, we are using 32 mega bits per second to send one image. A very high definition, high quality picture is being sent and since we are using a high speed of 400 MBS, it can accommodate easily the HDTV pictures as we demonstrated in our experiment conducted in January.

As I said, we borrowed the track side of the railway company and these are the pictures showing how we are laying the tract for connecting the cables. This orange cable is our university line and this is on campus. It shows how the cable is laid within the campus and the number of channels for TV that can be very large using this system. Presently, we use a TV lecture system. Next to the blackboard we have the 70 inch video projector. This one you have right behind you is a very large monitor system but we have just as large a monitor screen, 70 inches, about 3 meters across. So the images of the teacher or the blackboard can be shown life-size. We will be showing some of the pictures. This is the case in which an OHP is used. This is the wall picture of the instructor using the OHP and through this, the distance education system when the image appears on the large screen. The bottom picture is how it appears.

We evaluated the results of our project and I have on many occasions in the past reported the results of our project. We have questioned our students to see how they evaluated our program. We conducted this survey at the beginning of the term and also half a year later, after about 15 lectures. The same questions were asked after an interval of about 6 months and when students are exposed to this system for the first time, they tended to give high evaluation. After the 6 months, however, when they were used to the system, they began to complain. For instance, the letters they said, were not very legible.

This is because when you see a real-size picture of a teacher and you see the blackboard, teachers are very eager to concentrate their mind to even read the very

small pictures they may or may not be able to see on the screen. Half a year later they became objective and began to sometimes complain. These factors of evaluation how easy it was to see the picture, how was the atmosphere conveyed and how was the quality of sound, how was the position of the screen, these were the factors on which questions were asked.

The first factor was the ways of viewing; the second was the live atmosphere, whether the live atmosphere was conveyed or not; the third factor was the quality of the sound; and the fourth factor was the position of the screen, No. 3 indicates a medium evaluation, No. 1 is a poor evaluation and 5 is the top rating. On the average you can see as in the green line when they are exposed to the system, in the beginning of the term they tended to give higher evaluation. But toward the end of the term, as shown by the blue line, the evaluation tended to get lower. And there was a significant difference by more than 1 percentage point. In terms of the atmosphere, sound and the screen the evaluation points were the same without any statistically significant difference. In terms of ease of viewing, whether the screen or images were easy to see or not, there was a distinct difference in terms of the students' evaluation between the first time they saw the image and 6 months later.

We have what is called the Hawthorn effect, when somebody is evaluating a new system, they are taken aback; they are surprised. Therefore, the evaluation tends to jump up. Gradually as they get used to the new system, the evaluation comes back to the original level, sometimes even below the original level of evaluation. If the blue line the final evaluation rating, is higher than the original level, obviously the system is to be welcomed. If the red line is high then the final evaluation is below the original level. Obviously this means that the system is not a welcomed system.

This is what is called a Hawthorn effect. This is a concept used in business engineering. The report is from Mr. Kobayashi. So with regard to the quality of picture, the red line was unfortunately the case but with regard to the other three factors, there were no significant differences. So the blue line was the case.

We came to the conclusion the only thing needed in terms of improvement was to make better the quality of the picture and the original system we used was two screens of 70 inches. With high vision, the HDTV is wider like a cinema pictures. Therefore, we were able to use only one screen so the overall size of the screen was smaller than the previous screens we had been using. We are showing a video not having any sound because I had to edit the video last night in a rush. It was taken by a student, an amateur cameraman and the picture that was taken by the amateur was edited by myself, also an amateur. So it is not going to be a good picture. Nevertheless I will show you the video. I will be putting in the narration.

(Showing of video film)

The equipment used is very heavy for HDTV but with the cooperation of the manufacturers we were able to bring the equipment onto the campus. The one you saw was a light one, but the overall system was very large, which required adjusting the system, using one classroom and controlling the system and the camera used for the HDTV. I understand it cost about ¥60 million. The cameraman dropped it during our experiments, and we had to make adjustments on the equipment. Since we were using optical fiber we had enough transmission capacity. This is the monitor and camera control unit. Many electric manufacturers cooperated with us in this project. This is the scene of the lecture. A very clear picture can be received through HDTV but since this video was taken by an ordinary video, you dont see the quality of the picture. But this lecturer is talking about electric circuits and since lighting was not perfect, you see the reflection. Actually, you got an impression that the lighting was not that bad in the classroom, because in this video the poor lighting did not come out very well.

This is the classroom students taking the class and Dr. Sakamoto who is our moderator also appeared in our lecture. The students, as you can see, are very serious when it comes Dr. Sakamoto's lecture. And there are some more we could show but for now we will conclude the video program.

So, this is how we used HDTV, as I said, many companies were involved in this project; we connected two campuses Ohokayama and Nagatsuda; and two methods of transmission were used because we were experimenting with them. From Nagatsuda to Ohokayama, from left to right, we are using analog system, FM multi-optical transmission technology developed by NHK. For the return direction, we used a digital system developed by NTT. Both these were used during the Seoul Olympic games and we were able to make sue of these very advanced system free of charge because of these supporters, NHK and NTT. And this is how the lectures or classroom activity was conducted and how people evaluated our experiment.

The Letters may be too small for you, but we asked the same questions of the respondents, the same questions we asked when we were carrying out the previous experiment without using HDTV. So that we could make a comparison between the NTSC system, a traditional TV and HDRV, clear differences were seen particularly with regard to the quality of picture. People evaluated HDTV much more highly, which was naturally to be expected. We conducted fact analysis as, and there were three factors for the HDRV experiment. When the NTSC system was used, the quality of the image was the biggest factor. With the HDTV, the most important factor turned out to be the atmosphere of picture because people evaluated the fact that a live sort of atmosphere was conveyed through the system. The second factor was the quality of image, the third, sound and screen.

I will show you another OHP in the case of NTSC, the sound of screen was two

different factors but with HDTV we combined them into one. In any case, the HDTV showed much higher evaluation results.

One natural conclusion was the more money you spend, the better system you end up with. The students were divided into undergraduated and graduate students so as to compare these two groups on three factors, atmosphere, quality and sound/screen. As you can see, graduate students tended to give higher evaluation compared to undergraduates. And taking the average of these three factors, since the average point would be 3, you can say that undergraduates also gave high marks but in comparison to graduates students, undergraduates evaluation was lower.

The rationale behind this is that maybe the graduate students are the select students who come up from the undergraduate level. They are more eager to give high marks to these systems because they are willing to study. We also invited representatives of the companies which took part in this project to actually experience the new system and we asked these businessmen the same set of questions. This is the result of the questionnaire. Since businessmen are not used to classroom atmosphere, they give very high marks. However, since they are also expert in this kind of system, when it comes to the quality of image, the businessmens evaluation was lower than the ordinary students. For sound and screen, the evaluation marks were about the same.

This is the result of our distant education using the high vision HDTV system. Originally, we have been doing this kind of experiment since 1981. This system was developed by a committee of which Mr. Kobayashi is the head and on a continual basis, we have been keeping evaluations. For the system like ours which is both video and sound in two directions, one point that has to be evaluated is the sound environment. There is a difficulty involved in terms of what is the most audio effect that can be created. The visual environment is easier because TV means that as long as you send a picture, the viewer can see the picture. Sound is different. Depending on the room, there are other audio effects and particularly because we are using two directional systems, the sound system turned out to be the most difficult to control.

System function and cost effectiveness are two of the factors that also have to be attended about. Also, what about the running effect? We looked at four factors. The sense of participation or sense of satisfaction was one factor how people evaluate it —the level of satisfaction they were able to feel when they were participating in this program. Since this was distance education, however, the content of the education or teaching substance was also important.

The second factor to grade the running effect was to what extent students actually obtained or learned knowledge or skill? This could be checked through both a pretest and post-test, before and after the test. since we are using this system only for the graduate level, we felt that there could be a difference depending to whom we were

targeting the program. Undergraduates level of eagerness to study will be different compared to graduate level, who is a more selected group of students.

The third, important point is how the student was able to apply what he had learned in terms of knowledge or skill, the second factor. In the case of a company, the fourth point would be what has the businessmen learned, which would be reflected in his actual business performance.

We so far have been looking at the first factor, the level of satisfaction. The other three factors, however, have to be also studied. The factors that affect the evaluation, affecting both teachers at the top and students at the bottom, because of actual presence of teacher students might be affected with his willingness to study. Our experiment at least resulted in students feeling the sense of unity or a sense of togetherness. Since we used four altogether channels for this system both TV and sound fully bi-directional system, we were able to create this sense of unity. In fact, a very large amount of information was being conveyed through the system and that might have been the reason why the students were able to feel that they were together.

So this is the example of the new technologies as applied to our distance education.

Thank you.

Chairman: Thank you very much, Professor Shimizu for giving us the result of your experiment of distance education using a new communications technology.

Next to speak to us is Dr. Ralph Meuter. He is the Dean for Regional and Continuing Education and Associate Vice President for Academic Affairs, California State University. I understand geology is his expertise, and he obtained a Doctorate from Oklahoma University in geography. He will be talking about the distance education program using the ITMC network.

R.F. Meuter: I, like my colleagues, am honored and privileged to be here with you during this Symposium. I have learned a lot. I hope to share some things with you about a single institution located in the rural environment and the rural part of northern California, a highly developed state. Yet we used telecommunication technologies to solve problems of overcoming distance and time to provide educational services to the citizens of northern California.

What I hope to accomplish this morning is to illustrate that a single campus of a relatively conventional nature — California State University in Chico is a conventional American university has taken the opportunity to develop the utilization of these unconventional delivery systems and thus the coupling of the innovative along with the traditional and conventional. Weve had an opportunity yesterday and today to hear of

unusual institutions developing with the special purpose to supply educational programs to clients throughout the nation or significant segment of a place. I want to emphasize that my descriptions deal with a conventional university that is going on doing some non-conventional things.

What I plan to do this morning is to first set the scene and describe to you this place of California State University at Chico, some developments and the evolution of our programs using electronic technologies to deliver distance education programs, and then, after that description, to identify what I call the basic underlying philosophies. I'll be examining what we have learned, what can be applied to all experiments of this nature and thus to the success of our students in the teaching and learning situation. So, first of all, I would like to cover the background and introduce California State University at Chico.

I hope that you don't mind my speaking from this distance. Is the sound okay? California State University, Chico is a medium sized university located in the north-eastern portion of the State of California. You can see on the map the illustration of the precise location. The university is a member of a 19 campus major university system in the State if California called the California State University system. Each of the 19 campuses are illustrated on this map.

Some statistical information regarding the California State University system is at the top of this slide. I did mention there were nineteen campuses in the entire system. On those campuses well over 300,000 students are being educated n the State of California. We have a faculty in those 19institutions approaching 20,000 individuals. It is a very large system of higher education and it is growing at this time as the State of California is growing and the higher education needs of that State are growing.

Just for your information, there are two additional segments of public higher education in the State of California, the University of California system with campuses at Berkeley, U.C.L.A. and 6 other locations is familiar to you. The third segment of public higher education in California are what we call the community colleges; two-year institutions of which there are well over 110 different locations in the State of California.

Lower on this slide is some information about the campus at Chico. Chico is the second oldest of the campuses in the California State University system. I emphasized earlier that it is a relatively conventional American university located in an isolated rural region. While middle sized, we have about 14,000 undergraduate students, 13,500 full-time equivalent, that is those students who they are taking a full load of 15-semester units. We are primarily an undergraduate institution with a small amount of graduate programs. I list the individual colleges at the university to indicate that this is a conventional educational and academic organization. There is nothing unconven-

tional about this institution other than our heavy use of telecommunication technologies. We have 8 colleges that are listed here with faculties and departments of a standard variety. We offer a little over 52 Bachelors degrees and about half that number of Masters degrees.

It is important to understand the location of Chico in the State of California to realize that this is a rural part of northern California. It tends to be isolated by geography; that is, there are very few people in this large area. Most of the economic support in the area is determined by agriculture, forestry and some mining. This illustration is known as the educational service area for California State University, Chico. It is in that area that the university is responsible to provide the higher educational programs to the residents in that part of California.

There are a relatively small number of residents in that area, because most of our students are derived from the Los Angeles basin and the San Francisco Bay area. However, we are responsible to supply educational programs to rural northern California. In the past, the way those programs were delivered was simply by putting faculty in automobiles and sending them out on the highway for 3 and 4 hour drives to go to small towns where they would visit with students and offer classes. It was very, very inefficient both economically and some would say instructionally. What we developed fifteen years ago and it now has been in operation for over 15 years is a program that we call instructional television for students. This is a land-based or terrestrial microwave system which shares the live and interactive classes originating on the university campus. There are regular students on the Chico campus sitting in the classroom, being taught by the regularly appointed faculty member to not only the students on campus, but also to the residents described on the map behind me.

These are programs that can be completed completely at the remote site. It is not necessary to travel into the university for any of the services that can be had at the main campus. It is our goal to provide the rich variety of services remotely to these students also using electronic means. This is a one-way video and two-way audio system with classes from throughout the curriculum. There is no particular specialization of the curricular offerings. A factor that I am convinced is true is that the course can be successful if the faculty member wants to make it successful using these technologies. The reverse of that rule also holds that if a faculty member does not want to make these programs viable over electronic technologies it will not be successful.

I leave this slide up in addition to illustrate one site. It is here to the south, that is a community known as Roseville, California. It is on the outskirts of our State capital at Sacramento. It is the beginning place for a developing second Silicon Valley in the State of California. Most of you are familiar with the current Silicon Valley centered on Palo Alto and San Jose in the South Bay. In the last 5 to 10 years, this Rosville corridor,

north of Sacramento is developing and appears to be more fully developing. I point that out because at that location 10 years ago, the Hewlett Pakcard Company opened a new manufacturing plant in Roseville. When they opened that plant, they were aware of Chico States Television Network and they requested that their manufacturing plant be designated a receive site for the land-based system that Chico had developed.

They also requested that we put regular university classes of one of our strongest academic programs, that is computer science, on this system. So some 10 years ago, we developed the strong relationship with Hewlett Packard Company and began offering classed leading to the Masters degree in computer science to that single site about 100 miles south of the campus. As time has passed, our faculty and the Hewlett Packard engineers as students have evaluated the program positively. We have moved in to the next level of delivery, using a different technology; 5 years ago almost to this date the same individuals from the Hewlett Packard Company at Roseville returned to the university at Chico and requested that we offer a Masters degree in computer science beyond the Roseville site. The Hewlett Packard Company at this time had a need to provide quality educational experiences to their electrical engineers, as their company intended to transist those electrical engineers from hardware dominated people to computer scientists. They asked the university to assist. At that time, we were investigating a much more extensive land-based or terrestrial microwave system but it became very obvious that their needs within the company were beyond what microwave connections could be developed and we proposed a satellite-delivered live, full motion video program that began slowly — that is, with just a few states 5 years ago and with 5 sites in the State of California, and a single site in Boise, Idaho for Hewlett Packard. That program worked very well based on the same concept as the previous program that I described. The instruction is live and interactive, with one-way video, two-way audio using telephone, standard telephone instruments to talk back into the classroom. It is realtime instruction and there is an important subtlety in the psychology of learning that we have discovered about realtime, live interactivity versus delayed video tape and other methods of delay. We are committed to this live and interactive delivery.

After the first semester of this experiment, I should note that the Hewlett Packard Company entirely funded this experiment for the first year inclusive. All satellite transponder time, all faculty costs, all administrative costs, the entire program was funded without question by Hewlett Packard. It was a wonderful experiment for educators to be involved in. It is not the type of experiment that we are normally accustomed to. This one was first class all the way and has remained that way.

As the program developed that first semester, it was evaluated very positively and we watched the second semester expand into 5 states. We launched into a 5 state

network, all Hewlett Packard, in Washington, Oregon, Colorado, Idaho and California. Again, quite successful, the program looked like it was ready to go forever.

At the end of that first year, the Hewlett Packard representatives returned to the universitys campus at Chico and deemed the experiment a success. They, however, offered a challenge that we had not expected. They said we are willing to support this effort totally, the first year; we now know it works; we want to challenge the university to take not only the academic risk but the financial risk of carrying this program out on your own. For those of you involved in public higher education institutions, you know that was a very scary situation for us. We almost clutched. Fortunately, maybe we were just lucky, but we decided to launch forward. Hewlett Packard representatives introduced us to their colleagues in the private sector corporations at Texas Instruments, at IBM, Alcoa Research Labs and others that are illustrated on the receive sites of this slide. And we currently now have a 20 state network with approximately 200 to 250 corporate employees each semester taking live courses in realtime from the campus of Chico.

I think I will move from here at this point and make some comments of a more generic nature that will hopefully stimulate some thoughts. I wonder if we might at this time show the video tape that I have prepared. Is that a possibility?

(Showing of video film)

R.F. Meuter: Thank you. I would like to make one or two comments as a conclusion to what we have found in our experience which I believe is sharable whether you are developing an innovative institution and delivery system or simply using an innovative delivery system to share conventional programming to students and clients who have not had that before.

First of all, we feel very strongly about a live and interactive system. We realize that other methods are adequate but given the choice there are certain significant subtleties about the psychology of learning, that the live interactive situation emphasizes. If a person makes a decision to be at that class they have said something about the priorities and the importance of that class which is very different from saying I cannot go to my class at the time that is appointed. I will watch it later because something else in my life is more important. There is a significant subtlety about that decision-making process of the importance of the academic program and the training situation in a company.

The technology as a second point should be transparent. All of us say that and we all attempt to pull that off. Yet in fact, when we are best able to do that, our successes are greater. We sometimes become dazzled by the gadgets, as I call them, but we must remove those gadgets and have the basic fundamentals of teaching and learning take

precedent over technology. The technology must relate to the instruction going on.

Instruction must be provided to the remote student and all of the service to the remote student must be integrated into the program, simply providing instruction is not as powerful as instruction plus all of the services of a university experience. That is where a giant challenge is in front of all of us. Most of us have figured out whether to use audio, video or however to get instruction to students in remote areas. What we still have in front of us are the remainder of the services and rich environment that a university provides, that we all experienced. It is something ephemeral; it is difficult to describe but it is there.

I believe that we should use the existing policies and procedures. We do not need to develop a new bureaucrats policy manual or procedure on environment for simply a different method of delivering the instruction. Our old tried and true policies and procedures ought to work. If they don't they ought to be changed. However, the separation of distance technologies should not imply the development of new policy.

We should treat students in an equivalent fashion, whether they are on our campuses in a conventional setting or remotely isolated from us. It should be our goal that those students are equivalent in every way.

Finally, we need to be assured of ourselves. We need specialize and differentiate the functions of developing these distance delivery technologies. The content area must be developed by the academics, by the educators, the professors. The conduit or delivery system needs to be developed and maintained by the technicians and the engineers. The programs need to be developed for specific clients, be they corporate training, regular students at a college or university, elementary or secondary students whatever the program should be developed for them. And most importantly, a fourth function of coordination of those various other functions I just mentioned, content, conduit and client must be interfaced to have a successful program. The results of using educational technologies to deliver programs are amazing and the opportunities that they present us are only limited by our imaginations. I appreciate the opportunity of being here with you and hopefully we will have some time to respond to any questions you might have.

Thank you.

Chairman: Thank you very much, Dr. Meuter. His presentation covered the overall application of satellite microwave all the way to the application of the satellite. The next presentation is by Mr. Kamata who is the president of NEC Institute of Management, Ltd., after serving in an important post of chief of education section in the Education/Training Department and general manager in charge of R&D Administration Division.

T. Kamata: Thank you, Mr. Chairman, for your kind introduction. We have received various support and cooperation to the works of NEC by all the participants here so I should like to express our appreciation to all of you for supporting us and also it is my great privilege and pleasure to be able to take part in this highly sophisticated academic symposium of International Symposium on University Distance Education.

I would like to present the example of satellite-relayed educational system for employees of our group of companies at NEC. Our in-house educational system is called NESPAC which stands for the NEC Satellite Pedagogical Network for Advanced Creative Education. This is the acronym we use. Let me explain to you the background of our decision to introduce the NEPAC. In doing so I would like to explain to you the history and background of NEC Corporation and the group of companies.

NEC Corporation was established in 1899 and went on to specialize in Computers and Communications, C&C and we are celebrating our 90th anniversary this year. Through the past 90 years the business areas we engaged in have changed, developed and diversified, especially after 1964 under the leadership of Koji Kobayashi. Under his presidency, the policy of business expansion and internationalization have been promoted.

As a result, we have seen a thirty-six times increase of our sales between 1964 and 1988. And this transparency shows the current profile of our company. The major areas of products would be communications, computers, electronic devices and home electronics. In deploying these business activities, NEC began the work of dispersing or distributing plans in various locations starting sometime around 1969, because we began to feel the shortage of young labor force.

It was very difficult to recruit young work force in a metropolitan or the central areas, so we decided to distribute our plant locations to other local areas. Some time around 1975, our works in software area increased very much so we established the series of subsidiaries specializing in software. The first of such subsidiaries was established in Tokyo. However we could not secure enough work force in Tokyo so we established in local areas by and by and now we have subsidiaries and plants throughout the country in 32 entities from Sapporo in north and Naha in the south.

While this kind of distribution policy to local areas was conducted out of the need of the company itself, at the same time it greatly contributed to the revitalization of local economies. In addition to newly setup subsidiaries, NEC Corporation has increased its number of branches across the country. As the result of that, about 60% of the NEC Group's domestic employees work outside the metropolitan areas.

In the NEC Group as a whole, we began to feel very keenly the importance of cultivation of human resources because human resources is the pillar supporting the development of our business.

Therefore, in 1983, we established the NEC Institute of Management, Ltd., which is the company specializing in the in-house training and education of our employees within the NEC Group. And this Institute now offers educational and training courses for executives, supervisors, production system personnel, employees of overseas affiliates and personnel going abroad.

Our program covers our employees from the management level to the ordinary employees. Our Institute also offers an educational system via satellite called NESPAC, which is the subject of my presentation this morning. As this transparency shows, in NEC Group we have a various entities and department in charge of training and retraining in addition to the NEC Institute of Management, Ltd., Human Resources Development Division, Personnel Relations Division, and also NEC Technical College, Institute of Technology Education. Not only the NEC Head Office but subsidiaries have the section in charge of these education and training, so we share the burden with each other and cooperate together.

Could you go back to the previous transparency describing the total number of our employees? As I mentioned earlier, in NEC Group as a whole we have 58 subsidiaries overseas and 124 subsidiaries or companies in Japan so the total number of affiliated companies in the NEC Corporation Group is 182 and the total number of employees are 158,000 altogether.

With this large number of employees in NEC Group, the need for the education and training and volume of contents of education also diversified. From 1975 to 1985, as you can see, the number of recipients of the educational courses and the number of courses taken by a employee per year have increased. From a different angle, there was an increased need for in-house education. We conducted a survey of the engineers asking them the question after graduation, how many years did you feel the gap expanding between the current necessary technological level and what you acquired in universities? For 1 to 2 years, only 8% felt some disparities, but after 11 to 12 years after the graduation, as much as 58% of the employees felt that there was disparity between the state of art technology and what they learned in the university. This was the time of 1970 to 75. However from 75 to 80, only after a year or two, many of our employees began to feel disparity, 53% of those who entered our company in 1975 began to feel that disparity immediately after entering our company.

In addition to a quantitative increase of the need for education, there was qualitative need for continuous in-house education. The need was so keenly felt by the employees themselves, we were propelled to improve the contents of the in-house education. Our institute was established in 1983.

Let me talk about the contents of the education, the satellite-relayed education. As other professors pointed out, there are various advantages we can accrue from the

satellite education. The first would be the wide coverage and also the simultaneity in broadcasting and the multiplex connectability and the high resistance against any natural disasters and mobility. With a wide dispersion of our activities throughout the country from Hokkaido to Kyushu, we have to provide the kind of education with the same and equal level sophistication we can provide in Tokyo. Our communication satellite education covers 8 centers throughout the country from Hokkaido to Kyushu, Sapporo and Fukuoka and within this year, we will add two more satellite classes. In other words, altogether in 10 locations, the satellite-relayed education will be provided in our Group.

And this NESPAC system has two central classrooms in Tokyo and Kawasaki and have satellite classrooms in Sapporo, Sendai, Nagoya, Osaka, Hiroshima, Fukuoka, Kanazawa and Takamatsu.

This is the central classroom in the NEC Technical College in Kawasaki. This is another central classroom in Tokyo, the training center in Tamachi area in Tokyo. This also is the auditorium in the NEC Junior College and the lecture sessions over the audience of about 400 could be organized and conducted here. This is the scene of the satellite education center in Tokyo. This is in Tohoku, Sendai, organizing the local classrooms.

The classroom consists of about 36 students and 2 TV screens of 70 inches. As I mentioned, in our NESPAC we use a satellite system and also have 2 channels full motion video that can be translated 2 ways simultaneously. By a 2-way communication system, students can ask questions of the instructors and make presentations from any classroom in the country, while their faces are being seen by all the participants in other classrooms.

About the need for two channels of full motion video, as you would clearly understand it is important for the students to be able to watch the faces of the lecturers but at the same time, various images, pictures or printed material or other materials should be displayed simultaneously. Since we needed to have such a device to enhance the effect of the education, we organized this NESPAC based on the 2 channels of full motion video.

In case of this Tokyo Satellite Education Center, as you can see the students can see the lecturer and the other materials simultaneously on 2 screens. As professor Kobayashi and Professor Shimizu explained earlier, there is a need for the interactive 2-way communication; the one-way presentation by the lecturer alone would not suffice since the students should be given an opportunity to respond to the presentation immediately, this ability or capability should be available this way, the instructor can react to students by giving comments and there will be a close interaction between the instructors and students. Two-way communication is an

essential element.

This is therefore one aspect we adopted in our NESPAC system. Another point of importance for our in-house education would be the point to multipoint system. By pressing a button the student can raise questions from any satellite classroom to the lecture in the central classroom. The condition in one of the satellite classrooms could be displayed in another satellite classroom. So that even though the classrooms are a great distance apart, each can have a strong sense of participation. Therefore, a point to multipoint system would enable such participation.

We encourage discussion and debate amongst students in different classrooms in our educational program.Since our start in 1987, 3 years have passed after we introduce the NESPAC and the number of people who use this program increase constantly. On an average, the system is used almost every day. The utilization coefficient in terms of hourly basis is about 85%.

The contents of education are also diversified; software education, management education, English language courses, productive knowledge education, and the maintenance education. Of course, we need the contents and most of the education through NESPAC as you can tell, could be used for management purposes, technologies, technical skills, software, marketing and internationalization. In terms of the modes of education, we not only use one-way lectures, but have introduced the active discussion or debate type of education.

We also conducted a questionnaire study asking for the reactions on the part of students to this kind of satellite classroom education. For example, one question on the questionnaire was, "How do you access this system?" The answer was on a scale of 1-5, and the average response turned out to be 3.95. As a system to convey educational information to distant locations, the student reaction to this sort of system was a score of 4.35 which was very favorable. Based on the questionnaire results, we listed some of the advantages and effects of the introduction of NESPAC.

One is that we can enlarge the educational opportunity throughout the country and this is advantageous for both students and the company. Secondly, we can provide high quality education compared to correspondence education or other forms of in-house education. The content and quality of this sort of education are remarkably higher. Also, the facility of education and learning is much better because the students can have a sense of participation rather than studying alone in correspondence education.

The third advantage is saving in time, that is, the greater increase in disposable time for both students and lecturers when they are requested to come to one place and get together which will require travel time. Students who are requested to come to one of the classrooms nearby their work place are saving much more time. If they were to

travel all the way from Sapporo to Tokyo for a three-day training session, the travelling alone will take almost one day and another day to return home. But using the NESPAC system, only 3 days for the actual education would be needed. Also, this sort of system would facilitate specialists from outside to come and give us lectures. We do not have to expect the specialist and experts to come to a central classroom but only to the nearest satellite classroom.

Concerning the reduction in educational cost, we have not yet fully recovered the investment in a way of return on investment. Over the long run, however, we can save time, we can save companies quite a lot in total educational cost.

Now, before concluding, I should like to list some of the future issues and the ways we shall cope with them. One is the exact knowledge of cost effectiveness and high quality education. How we can structure the educational courses, which are effective and highly needed? In terms of time utilization, the rate of operation of the system is not the highest. We still have some inefficiency and we would like to make usage of this system most efficient and effective.

From the 29th of this month we shall start the satellite business college as an in-house course. And the first one is the marketing course. Through this we would like to provide long-term courses on a continuous basis to improve the efficiency and effectiveness of our educational courses. This shows the content of curriculum.

The second subject we should be tackling would be the improvement of teaching skills and methods. In this university and institute I was impressed by well management of the systems based on the good knowledge of technology and the need for education.

We would like to achieve this steady improvement on the contents of the education in terms of teaching skills and teaching methods and so forth.

The third point is closer cooperation with universities and public sectors. Probably, we could make it into satellite university in Japan by establishing closer cooperation between private sector, universities and public sector.

From 16th to 19th of October this week, we held the NEC International Convention 1989. We have an extensive international network in our business operations and we wanted to establish an international educational network in our Group. Consequently, we organized this NEC International Convention 1989 from 16th to 19th of October in Singapore. Singapore and the NESPAC network in Japan were connected via Intelsat, to conduct a management study session for employees of Japan and ASEAN countries. We used the video conferencing facility of KDD and it was linked up via Singapore through Intelsat. Until the day before yesterday I was there in charge of organization of this conference, and I realized that it is a very effective method to organize the international convention as such. A 4-day conference was composed of

management forum and production forum and the management conference watching and following technology trend as well as area studies.

It was interactive 2-way discussion. We sent information from Japan and received information and views from Singapore. It was a very effective ways of communication and we became more confident about this sort of possibility.

Since the time differnce between Singapore and Japan is only one hour, it was very convenient, facilitating our communication across the national borders. If we extended to different geographical areas, to the United States and the European countries, we may yet face another problem of greater time differences or languages. Nevertheless, based on the achievement mode in Singapore, we would like to establish a global network system of satellite-relayed education. With this, I would like to conclude my presentation on our NESPAC.

Thank you.

Chairman: Thank you very much. In terms of in-house education, you have 8 locations in Japan. You are now expanding your system to cover some points overseas. thank you very much for sharing with us the wealth of your experience in a short span of 30 minutes. We learned a great deal and was impressed by your presentation.

We started our session this morning at 10 oclock, and we have been discussing new media. Within the University of the Air, we worked with the National Institute of Multimedia Education connecting Kumamoto and Saitama and lot of other places using new media in the form of INVITE 64 to give actual teaching environment. This was by direction an audio visual system covering different points, point-to-point connection. This was the first program we heard.

The second one was the NUTN system, a one-way audio using computer and facsimile for 2-way communication using live broadcasting allowing for the use of live sound.

The next presentation was the way NUTN is being used not for strictly point-to-point communication because it is seen throughout the United States. It has an almost two-dimensional coverage across the United States.

The next example was the Tokyo Institute of Technology; 4 bi-directional interactive type of distance education with HDTV was one example. Then we had an example of the USA Chico one-way video and two-way audio plus telephone and then satellite communication was added. I think I heard Dr.Meuter say that 20 states, 250 people were covered and it is now at a developed stage of being able to give Masters degree in science.

Then we had the NEC example. Now, we have some twenty minutes. If you have questions for the speakers, particularly the earlier speakers, we would like to invite

your questions and comments. Please raise your hand, and please make sure to identify yourself by stating your name and affiliation.

S. Futagami: Futagami is my name. I was recently in China helping them develop the University of the Air there. Mr. Kamata, in a country like China with their unique conditions, which would be better the use of optical fiber or satellite? What would be the merits and demerits of using either satellite or optical fiber in a country like China, particularly with a potential of developing an active system? How would you evaluate the advantage and disadvantage of optical fiber and satellite system? Mr. Shimizu and Mr. Kamata. Mr. Kamata first and Mr. Shimizu.

Y. Shimizu: I believe I can refer to Mr. Kamata for a technical opinion, but comparing satellite and optical fiber, one major difference is that satellite can cover a wide area, which means that any place you can put up a dish antenna, you can receive the transmission. Whereas in the case of optical fiber, there is a physical necessity of laying the fiber cable. So there is a limit with regard to the coverage. However, when you look at the transmission capacity, it is the fiber system that provides a larger capacity.

In our case we were able to use four channels for one transform mixer, so the optical fiber system provides a better efficiency. So both have merits and demerits. There are good points and bad points to both but in the final analysis, I believe in our case at least, What we wanted was a live sort of atmosphere as close as possible to the live classroom situation. This is why we were more interested in fiber cable system and we were successful in our experiment. However, using optical fiber is not all that unrestrained, cannot be done freely. You cannot try to lay your cable system on any road system. Therefore, if you are to expand optical fiber system, there may be limitations even though the NTT has a plan to establish a network covering the wide area. A system already connects Hokkaido with Kyushu.

So gradually, even with the fiber optic system a wider coverage will become possible.

S. Futagami: What about the vulnerability to disasters?

Y. Shimizu: I believe satellite is stronger in terms of resistance against disasters.

T. Kamata: I think Professor Shimizu has covered everything. I really have nothing to add. I can say, however, that in a large country, a satellite system will be a very efficient means. We use a satellite system in Japan as well and now that the system has been liberalized, private companies have recently entered the e field of satellite

communications. So I guess it will depend on the circumstances, case by case.

Chairman: What about our participants from the United States? Do the two of you have any comment on this issue, satellite versus optical fibers? NO? Okay.

Professor Wakamatsu.

S. Wakamatsu: My name is Wakamatsu from the NIME. I was very much interested in the presentations by various lecturers this morning. I would like to ask two questions.

First, to Dr. Oberle, and then second one to Prof. Meuter, about interactive two-way system. Mr. Kamata explained to us the NESPAC system and also there was a presentation about Tokyo Institute of Technologys full motion picture system.

Now, in your cases, Professor Oberle and Professor Meuter, you have one-way video and two-way audio but in two-way interactive way. Does one-way video, two-way audio facilitate enough interaction between the lecturers and students or the center and the other points? Or is it because of the financial constraint? If it becomes economically possible in the future, do you think it would be desirable to have the full interactive system? Or do you think one-way video, two-way audio would suffice? This is one point.

The second point is that the Masters of Science is provided in the computer or information science. In such a program, is there a necessity for a special educational equipment or training at the receiving site? Or the students or in some cases instructors to facilitate a learning process? How would you react to that, Dr. Meuter?

Chairman: So you are comparing the two-way interactive video with one-way video, two-way audio system? What is your reaction to that, Dr. Oberle?

E.M. Oberle: Yes, I certainly think the two-way video and two-way audio is advisable. However, that limits the number of participants. The meeting rooms for the two-way video and two-way audio are certainly very expensive. With the kind of distribution that we do point to multipoint we look to serving a large number of people that does limit the interaction. However, I think that much of the interaction is a mind set. We try to instruct our sites that they will have an opportunity to ask questions and we also advise them that their question might not be the one that would be answered if we have, say, a hundred or two hundred sites.

However, the likelihood of their questions being answered is great because in a given subject, by the time you ask 20 questions, you probably ask most of the questions that they are to be asked. So in this sense, if the expectations, I think, of the participants are met, that is whats important. Whats really serious is if you do not

think that your question was answered. So part of our orientation to a groups such as this would be to say, "this is how the interactive works. You may not have you specific question taken from you but it probably will be answered." We have other ways of responding if more questions come then we can answer live and those can be answered by computer; they can be answered in a newsletter; they can be answered by fax — but is it very important that we get those questions answered?

R.F. Meuter: On that same question of two-way video versus one-way audio two-way audio, I would conclude that at this point it is so costly to consider all potential receive sites to have video connection back that many of us who are in the field have not considered how to do it because the costs are so outrageous.

Conceptually, at the top of my head, it sounds to me that it would be desirable to have two-way audio two-way video but there needs to be a giant step on cost and not simply equipment cost. As Dr. Oberle mentioned, we are talking about personnel and infrastructural cost at the site. Its much simpler technically to receive than it is to technically originate a facility; its a whole different ball game.

While I am speaking I might address your second question, if you don't mind. As I recall your question, it was regarding special equipment that a Masters degree level in computer science or information science may demand is there a necessity for specialized equipment on the site at the plant? The answer is "no, it is not essential!" In fact, what actually is required, most of these companies have that equipment available to their employees. Even if they did not, there are very simple electronic means for a remote student via modem to connect back to campus computers and campus machines that can do whatever are necessary. Interestingly enough, at a graduate level in computer science, there is relatively little hands-on machine-oriented exercises. It is more conceptual and theoretical and that has not been a problem at all.

Chairman: Are there any other questions? Yes, you have the floor.

H. Ito: My name is Ito from the same institute. Various examples have been shared with us concerning the use of various types of new media. In general I have understood that those experiences have been successful experiences. For you to have had this success, what were the things that you devided or what were the things that you did specifically to bring about certain successes? For example, a format of lecture, program of the course, the way in which the lecturers give classes or courses. Have you had any specific examples of the preparatory work which ultimately brought about this success?

Chairman: Professor Kobayashi.

Y. Kobayashi: Since Ms. Ito is one of the members of NIME institute and has been involved in various projects, I understand that she knows to a certain extent the answer. INVITE 64 system was tried with Saitama Study Center as a host center and Tokyo Second Study Center was linked with this Saitama Center. Both the students and the professors were monitored in this project. Three subjects were the subject of this project: Japanese literature, food or nutrition, and earth science. The Japanese literature subject was the subject in which various questions were asked to the students in an interactive mode. The nutrition of food subject was largely given only in the form of a lecture; it was a lecture time course.

The earth science classes were given by Professor Nasu who did use a lot of images and pictures. So the three professors did try very hard to better appeal to the students with innovative measures. Preparation of various classes given at Study Centers can of course do done, but many of the professors who are giving classes at the Study Centers are outside professors. Sometimes it is very difficult to ask them to take a lot of preparatory time and energy for that kind of work at the Center. However, for this specific study, a lot of preparations were made.

Professor Oberle, what about you, have you had different preparatory work and devised different innovative format for your specific project as against the ordinary preparative work for classroom teaching?

E.M. Oberle: I would respond that because my experience is non-credit, we do put a lot of important creative instructional designs into our national teleconferences but these are non-credit.

Chairman: Professor Meuter?

R.F. Meuter: I think some points might be worthy of mention. One is a commitment to faculty in an honest way, that, in fact, resources and personnel will be at their disposal if they so desire to use it to utilize the technology to improve instruction, not simply to just deliver the same quality of instruction as before.

Another thought that I would have on your question is what I would call the principle of inclementalization, going in slow steps. It has been my experience that to attempt to innovate simultaneously in many different areas usually means failure. It would be wonderful to be that revolutionary and change things that need to be changed. In fact, I believe that it is an inclemental act — a little gets moved and a little bit more and then it is infiltrated into a system and we look back and see gigantic

change.

Chairman: Thank you very much. Do we have more questions?

(Floor): This question is for mainly Dr. Oberle. In the NUTN system, it seems that while you are covering a wide area with many programs, I think you are going to have the problem of copyright. I understand in some cases they charge high tuition, but given that copyrights could be expensive. Do you encounter any difficulties or problems such as difficulty to produce programs because of copyrights infringement.

E.M. Oberle: It has not been a problem since multiple institutions develop programs. They own the copyright. We serve as a distribution system and marketing system for that teleconference. So each institution or organization, if it is an international trade and development, they would hold that copyright. We would respect the fact that if any participant who participates needs to, they have to sign permission that the program can be viewed and distributed widely. So with proper planning, we are able to avoid any problems of copyright.

Does that answer your question?

(Floor): Yes, I understood. But if that is the case, can people take video or record the video of the original program? If that happens another possibility for copyright infringement arises. How can people freely make use of the original program? Can they record video text?

E.M. Oberle: In most cases, all of our programs can be taped for further use. We are in the business of service and providing education. So in most cases, we give full freedom to tape and use those programs however you would like to use these programs.

R.F. Meuter: I think it is a very significant matter. I agree totally with Dr. Oberle that our business is education, to share and open people's minds. We should be attempting ways to involve people rather than cut them out. However, there are some practicalities in life. I believe, we, in the institutions of higher education, the University of the Air included, have some of those things, credit-supplementary materials, for example, that make the program better. Those are things that you can only receive if you register and pay the fees so that in fact there are built-in so-called hooks so that people who want to experience the full benefit of the educational experience will do it.

In addition, the instruction is simply out there for those who are just incidental

learners.

E.M. Oberle: Another comment. Exceptions would be that some of our outstanding speakers are accustomed to being paid a lot for presenting — such as Peter Drakoff, a name that many of you might know. Now we would have to restrict taping in that case. But on each program you are advised whether you can take or not take a program. So, of course, there are those exceptions.

And since our programs are not credit, Dr. Meuter has a different concern with his credit programs.

Chairman: Thank you very much. It is one oclock. I am sure you have more questions that you would like to ask. Unfortunately we are not able to have time to make further comments but having heard the discussions from the 5 Panelists, I was reminded of the heightened need for life-long education. There was a time that only 8% of the people felt the gap between what they planned in higher education and actual life or business but now the percentage is higher, 53%. So there is a greater need now for life-long, continuous education to reduce that gap between the school education and the education that you have to obtain in real life.

In this respect, distance education assumes its own importance. In distance education, the teacher and learners must be able to communicate real time. It was towards that end that we were able to hear the experiences of the 5 Panelists who individually have had their own experience in terms of experimenting or creating systems to allow such realtime communication, real live contacts and communication between people. I think that relates to "high-tech, and high-touch", expressions used by Dr. Oberle.

I believe also that this new media is going to be "technology transparent", the phrase coined by Dr. Meuter. We today communicate face to face in a somewhat closed environment but eventually we hope to be able to have a global network where such close, face-to-face communication or contact becomes possible throughout the globe so that education or things can be learned anywhere, every where. And I think such a day is gradually approaching.

There might have been some oversight on my part as a Moderator because I was too keen on listening to the valuable contributions by the Panelists and I was not able to keep time adequately. However, I would like to take this last opportunity to express our appreciation to our 5 Panelists and also the sponsors, the University of the Air and Institute of Multimedia Education.

With regard to language problem we would like to thank the interpreters who helped us carry on with this face to face communication. Now that I have thanked

everyone, I would like to conclude this part of the Symposium.

Thank you.