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Session 1 Trends in E-Learning in Post-Secondary Education

Trends and Issues of e-learning in Japan
-University Education Reform Based on Information and Communications Technology-

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1. Recent Trend of National Policy

The last years of the 20th century and the beginning of the 21st century provided a timely opportunity for the Government to highlight the Information Technology (IT) Revolution and educational reform as important national policies. The Diet passed the Basic Law on the Formation of an Advanced Information Telecommunications Network Society - the so-called IT Basic Law -, which came into effect on January 6, 2001. Article 16 of the law states that "... it is essential to further expand such networks, to produce satisfactory information content in the form of text, voice, image and so on through advanced information and communications networks, and to acquire the abilities required for using information and communications technologies; and as each issue is closely related to one another, to promote a challenge to address all these issues as a whole." In addition, Article 18 provides that "... measures shall be taken to develop creative human resources with expert knowledge and skills who should take on the responsibility of developing advanced information and communications networks as well as further education and learning, so that the whole nation can use such information and communications technologies."
Furthermore, on January 22, 2001, the Advanced Information and Telecommunications Network Society Promotion Headquarters (IT Strategy Headquarters) declared in its e-Japan Strategy Statement that it sought to: "improve the information literacy of all the public, with due consideration to seniors and the disabled, and drastically exceed the estimated Internet diffusion rate of 60% by 2005" and to "reinforce IT-driven education systems at elementary, junior and senior high schools and universities and enrich the lifelong education on information for all adults."

For these reasons, it is expected that there will be a rapid push in the early years of this century to utilize and reinforce information literacy education and information media to the public at large. A number of background activities lie behind this trend. The G8 Education Ministers' Meeting and Forum in April 2000 singled out the importance of lifelong learning, distance education and information and communications technologies. At the Kyushu-Okinawa Summit the leaders of the respective G8 countries also focused on the IT revolution with advisory panels and general discussions under the auspices of the Government. The Report of the Study Group on Young People and Media Literacy in the Field of Broadcasting issued on June 23, 2000 by the Ministry of Posts and Telecommunications interpreted "media literacy" as the ability to function in the media society, and stated that "the emergence of the Internet and digital broadcasting has exponentially increased the amount of information in our environment, while the form in which we receive information has shifted from printed media to electronic media including image. In addition, the form of the information itself is undergoing significant diversification, from mass media sources such as newspapers and broadcasting, to personal media such as the Internet; and at the same time there is a certain amount of crossover, since the conventional mass media also provides information on the Internet. ... In view of the fact that the senders of information are far fewer in number than those who receive it, despite the diffusion of personal media, the mass media should consider the variety of values in society, and should set higher moral standards; while citizens should actively participate in the media society, and take the initiative to inform themselves about the issues and technologies involved."

Proactive attention to the use of media in lifelong learning was directly addressed in a report entitled "Measures to Promote Lifelong Learning Using New Information and Communications Technology: Prospects for Expanding Lifelong Learning in the Information Age," issued on November 28, 2000 by the Lifelong Learning Council. The report highlighted a number of points and recommended their incorporation and promotion: setting up training schemes and creating opportunities for people to master information literacy; promoting the informatization (Information and Communications Technology Environment) of facilities used for lifelong learning; enhancing the environments in which Internet use takes place; developing instructional materials for use in lifelong learning; building up a database of learning opportunities; building a system to make university extension courses more widely available to ordinary citizens, using public facilities such as community centers; and, in particular, more and better learning opportunities at graduate school level and expansion of learning in the University of the Air via satellite communications and the Internet, together with simultaneous coordination of these two types of communications methods.

2. Educational Policy for Achieving an Advanced Information, Communications and Technology Society

Currently an important promotion priority, Japan's educational reform policy for the 21st century was launched with the Ministry of Education's "Promotion of Educational Policies Adapting to Developments in Multimedia (January 1995) (panel summary)." This report discussed and summarized most of the basic measures needed to prepare for the developing information society.

On February 21 1995, the Headquarters for the Promotion of the Advanced Information Communication Society, headed by the Prime Minister, published "Basic Policies for the Promotion of the Advanced Information and Communications Society." This document compared today's information revolution to a Civil Revolution, or Industrial Revolution, in respect of its potential to change and reform society. The Ministry of Education responded in August by issuing "Implementation Guidelines for the informatization in the Fields of Education, Science, Culture, and Sport." Specific measures included provision of advanced information and communication networks and satellite communications, development of teaching methods making use of them, provision of software, and training of teachers involved in the development effort.

In July 19 1996, the 15th Central Council for Education published its first report, entitled "The Model for Japanese Education in the Perspective of the 21st Century (first report)." This had a profound effect.

The report argues that present school education lacks "yutori," or "room to grow" because too many subjects are taught. School curricula should therefore be carefully reduced, while of course ensuring that basic and fundamental subjects are maintained. Many other auxiliary subjects can be taught outside of school in cooperation with children's families and local communities. Schools should use the hours gained in this way as a "period for integrated study," in which they can teach international issues, information technology, advances in science and technology, environmental issues, and related subjects, so as to help children adapt to changes in society.

Implementing these measures will secure sufficient time for teaching information and these other newly essential subjects. In addition, the report made particularly up-to-date recommendations on informatics education.

These recommendations contain four principal components:
- Systematic implementation of informatics education;
- Qualitative improvement of school education by means of information and communications networks;
- Construction of a new type of school that can adapt to the advanced information and

communications society; and

- Overcoming undesirable aspects of the information society, cultivation of well-balanced individuals, and development of information ethics.

The report made clear that children must understand that technology is simply an instrument to support their own activities, and that interacting with other people is of much greater importance. The use of computers and similar equipment delivers no more than "virtual" experience.
It is necessary to make children understand that such experiences are much less important than real experiences in life, society, and nature. The report also emphasized that information ethics concerning privacy protection, copyrights, security, etc. must be taught. These views set the direction for informatics education in Japan.

Regarding the integration of information with education, the following suggestions have been made. In July 1996, the Ministry of Education set up a task-force entitled "Ideal State of Higher Education Using Multimedia in the 21st Century," which published a report under the same title. Now that the reform of higher education is underway in many areas, the report addressed the need for "constructing an open and flexible new system of higher education" to support such reform, and proposed measures to promote higher education using multimedia. Issues discussed in the report included: improvement of networks by the use of satellite communications, improvement of hardware as the basis for establishing an implementation system, provision of instructional materials, establishment of new teaching methods, and provision of support to teachers.

Following this report, on May 16, 1997, the cabinet endorsed an "Action Plan for the Reform and Creation of Economic Structure", in which acceleration of the use of technology in education was discussed. This action plan stated, "Improving the information literacy of every citizen of Japan is indispensable to maintaining and increasing the country's economic vitality and international competitiveness in the advanced information and communications society." It also emphasized the importance of "using networks and multimedia effectively."

Adapting to an advanced informatization requires appropriate environments, a need which was addressed in the Ministry of Education's "Educational Reform Program," revised in August 1997. These environments are created by installing hardware, providing software and providing and utilizing the Internet.

Various other proposals were also presented, dealing with networking using satellite communications, education using multimedia, accreditation of courses using multimedia and establishment of correspondence graduate schools. These led to a comprehensive review, as a matter of national policy, of the application of multimedia to higher education and distance education.

Furthermore, on November 18, 1997, the Cabinet Committee for Economic Measures announced "Emergency Economic Reform to Pioneer the 21st Century."
This report focused on a plan for economic structural reform, with deregulation as its central issue, and dealt with reform in the field of education as well as in info-communications, welfare and health care, employment and labor, finance, and distribution and transportation.

With regard to the use of multimedia in higher education, the plan endorsed:
- Promotion of networks using inter-university satellite communications;
- Research & Development (R&D) of content and methods of education delivered using multimedia at the National Institute of Multimedia Education (NIME) and provision of the results to institutions of higher education; and
- More active use of multimedia in higher education.

In December 1997, the University Council proposed that up to 30 of the 124 credits needed for graduation should be achievable by distance learning.

This can involve various types of information communication, such as text, speech and still/moving images that are interactively communicated in real time. No attempt was made to set a limit for master's courses. The Council also proposed the establishment of a correspondence graduate school system.

These recommendations were implemented in fiscal year (FY) 1998. Further, in the October 26 report entitled "University in the 21st Century and Future Innovation Strategy -- Competing with Individual Characteristics," the University Council proposed that up to 60 credits be exchanged between universities and up to a further 60 be accredited from multimedia-based "distance classes." This proposal was implemented in FY 1999.

In November 2000, the University Council compiled a report entitled "Higher Education Required in the Age of Globalization," suggesting that accreditation should be granted to courses using the Internet for up to 60 units of credit, that correspondence universities should be allowed to provide complete courses (i.e. 124 units of credit) via the Internet, and that the Internet should be used to support courses of study as well as to develop new teaching materials, etc. Following these suggestions, it was established that up to 60 credits could be accredited in the form of Internet learning in attendance universities, and that all 124 credits required to obtain a bachelor's degree from a correspondence university could be earned through the Internet from FY 2001.

3. Informatization of Education in Universities

Use of Communications Satellites

The initiative for informatization of education in higher education was first taken by the SCS with its HUB station placed in the NIME. SCS (the Space Collaboration System) is a satellite communications-based educational exchange system between universities. At present, 150 VSAT stations are installed in a total of 123 universities and institutions, and are used for exchanging lectures, seminars and academic meetings between universities. Kyoto University, the University of Tokyo and some other large universities are equipped with more than one VSAT stations, while others are installed at such private universities as Waseda University, Keio University, Tokai University, Hosei University, Doshisha University, and Kansai University.

The University of the Air also has VSAT stations. The SCS is used for 3,000 hours per year. As the system provides usually two parallel channels, two satellite communications-based classes can be conducted simultaneously.

Thus, five or so hours are used per channel per week. Some graduate schools recognize regular credits in jointly held distance classes and seminars and provide distance tutoring to graduate students on an individual basis.

Apart from the SCS, MINCS-UH (Medical Information Network) is also in operation, linking 30 university hospitals with transmissions of high-density video images. Hokkaido Information University uses a communications satellite to deliver distance education in correspondence courses to 16 branch schools around the country, and simultaneously uses a terrestrial system to secure interactive communications, providing three lessons every afternoon, of 90 minutes each. Tokyo Institute of Technology and Hitotsubashi University exchange satellite communications-based classes through a system called ANDES (the Academic Network for Distance Education).

Use of Broadcasting

Though broadcasting provides only one-way transmission, the University of the Air and University of East Asia broadcast their lectures nationwide via satellite networks. The University of the Air, which is a core institute for lifelong learning, has more than 81,000 students -some 47,500 in general courses, enrolled for all the credits (students completed the full course), and about 32,500 in other courses (students completing some courses). 2,870 students graduated from the University in the 2000 academic year. The oldest graduate was 80 years old. Students in their 30's and 40's

account for 60% and thus constitute the majority, while students out of college or graduate school account for 15.3%. These figures indicate the ever-increasing significance of the University as a source of lifelong learning opportunities to people at all levels of society. In its capacity as a correspondence college, the University of East Asia broadcasts its lectures (each for 50 minutes) between 6 a.m. and 12 p.m., including those related to regular graduate school courses.

The el-Net system, with terrestrial stations in 1,544 educational institutes (including VSAT stations and receiving stations), is also used for providing lifelong learning for teachers and others concerned with education, and for the Open College, which provides lifelong learning for ordinary members of society. As well as the Open College, 51 other universities (20 national, five public and 25 private universities and one public graduate school) now provide the general public with access to 172 different university courses.

Use of the Internet and Videoconferencing

As with the use of communications satellites, the last few years have seen a rapid increase in the number of virtual universities offering interactive distance learning using the Internet and videoconferencing. According to the National Center for Education Statistics (U.S. Department of Education), 78% of U.S. public senior colleges now provide this service.

There are even independent distance learning universities such as Jones International University and the University of Phoenix. However, most virtual universities are managed by a unified body, or consortium, of two or more universities connected by their intermediary machinery. Students can obtain academic degrees from such universities only by learning over the Internet. As universities providing online courses are emerging in Canada, Australia and Europe as well, it is now possible for Japanese nationals to obtain certification from overseas universities while actually living in Japan.

In Japan too, some universities have started to provide distance education via the Internet and videoconferencing. Of particular significance is the growing number of Japanese universities that are linked in this way to universities overseas.

For example, in the Digital Communities Project, there are exchanges of courses, symposia, open lectures and discussions in English, nursing science and informatics between Mie University, Mie Prefectural College of Nursing, Iwate Prefectural University, the University of Tokyo, and North Carolina University in Wilmington (USA). The English course is provided as part of a regular curriculum, and has 10 or so participants each from Mie University, Iwate Prefectural University and the University of North Carolina. Videoconferencing has been used in this project, but the course in informatics was presented via the Internet from America. Dusseldorf University in Germany and Louis Pasteur University in France joined the project as an experiment in participation.

Aoyama Gakuin University provides a joint lecture as part of the regular curriculum of its International Business Course (Graduate School, Division of International Politics, Economics and Business) with the Department of Business Administration at Carnegie Mellon University. This lecture is conducted by videoconferencing, and deals with aspects of finance. A course in general business is also provided, as asynchronous collaborative learning. The Center for Information and Multimedia Studies of Kyoto University offers a regular course on "information media study" using ATM leased lines in cooperation with University of California at Los Angeles (UCLA), as well as other regular courses on "astrophysics" and "Introduction to physics." Waseda University has implemented an interchange of courses on English, multimedia, general lectures, etc, with overseas universities, using such communication tools as CU-SeeMe and TeleMeet. The Graduate School of Global Information and Telecommunication Studies of Waseda University delivers lectures on information and telecommunication technology to the Post and Telecom Institute of Technology in Vietnam via a video conference system. The Faculty of Humanities at Toyama University gives lectures on "comparative sociology, its seminar and the principles of liberal arts" in cooperation with three

universities in Germany. This inter-university exchange is mainly implemented through websites and mailing lists with a video conference system partly applied to the course. Tokyo Metropolitan Institute of Technology offers a regular class on "specialized studies in collaborative engineering" in cooperation with the Postgraduate School of Stanford University, using both the Internet and a video conference system. However, this class is not provided in the form of lecture, but conducted as a joint project. Chuo University, National University of Singapore, Singapore Polytechnic Institute, Osaka Prefecture University, and Komazawa University give lectures on "information processing," "advanced English," and "macro economics" as part of a regular course through ISDN. In addition to the above examples, some domestic universities are also linked together to provide distance education. Examples that use systems other than SCS include a class provided by Waseda University on a network shared with 16 other universities, and an online link between Toyohashi University of Technology and three technical colleges. Nihon University, Keio University and Kochi University of Technology also have projects of their own under way.

4. Issues concerning Virtual Universities

There are various issues to be addressed in order to ensure that such educational projects proceed satisfactorily.

In 2000, the National Institute of Multimedia Education (NIME), as the secretariat, held a forum using SCS on seven occasions with researchers, educationalists, concerned people from business and other fields who have one or another kind of involvement with virtual universities. These forums have provided an opportunity for multidirectional discussions on the state of virtual universities and other related issues. The following 21 issues were identified as objectives that universities, faculties, society and Government offices should seek to achieve:

Issues to be addressed by individual universities:
1. Enhance the info-communications infrastructure on campus, including a backup system to allow access to distance education from several sites.
2. Prescribe distance teaching in the code of a school, enrich the curricula of subjects available for distance education, and state clearly how credits may be earned.
3. Provide training on how to conduct distance teaching effectively, with each lecturer preparing specific teaching materials.
4. Provide consideration and support in terms of human resources, technical issues, budget and schedule in terms of creating materials for distance education.
5. Help to develop media specialists, so as to support the promotion of distance teaching.

Issues to be addressed by universities as a whole:
1. Promote cooperation in R&D on virtual universities.
2. Form a consortium of virtual universities so as to coordinate the contents of distance-learning courses provided by each university, together with enrollment procedures, lecturers' pay, course fees, copyright issues, etc. Designate a leader university in each area of specialization.
3. Expand the consortium of virtual universities at an appropriate pace.

Issues to be addressed by faculties:
1. Clarify distinctions between face-to-face teaching and distance teaching so as to harmonize and unite the two styles.
2. Establish a cooperative learning community on the Internet. Provide positive assistance to classes as required.
3. Develop materials, create website content and improve methods of evaluation in cooperation with students, graduate students, and other academics.
4. Promote R&D on all aspects of distance education.

Issues to be addressed by business and society:
1. Develop and standardize a plan for creating, storing, researching, assessing, managing and using

teaching materials.
2. Establish an industrial-academic-government cooperative system to create and provide website contents for teaching in each area of specialization.
3. Develop and provide easy-to-use distance education systems and interfaces.
4. Promote learning or reeducation of members of society and respect its results.

Issues to be addressed by public and private sectors:
1. Establish website-based schemes for enrollment, payment of course fees
and credit acquisition in inter-university distance education, to facilitate student participation.
2. Establish centers for providing teaching materials and website contents, for preparing teaching materials, for improving teaching methods, etc., in order to facilitate public access to distance learning.
3. Give financial support to universities tackling and implementing R&D on virtual university teaching.
4. Give priority to providing large-capacity info-communications networks to universities participating in a virtual university.
5. Collect, organize, and provide information about virtual universities in Japan and abroad, and support the foundation of a virtual university consortium to help in the exchange of inter-university distance learning.
To resolve these many issues, further efforts are needed.

5. Actual Conditions in Universities' Use of Multimedia

The NIME has conducted a number of investigations of actual conditions in the use of multimedia. According to a survey of institutes for higher education, the actual situation in using media in faculties of national universities and graduate schools in 1999 (response rate: 66%; effective responses: 1,059) and 2000 (response rate: 63%; effective responses: 1,063) is as follows:

	1999	2000 (%)
1. Use of prerecorded videos in class	88	80
2. Building up database of books and materials	87	74
3. Administrative communication through e-mails and electronic bulletin boards	83	92
4. Presentation using a PC	74	78
5. Submitting reports by e-mail	60	59
6. Provision of teaching materials over the Internet	56	-
7. Questions on lesson contents and debates among students through electronic bulletin boards or e-mail	54	59
8. Use of audio cassette tapes	53	55

Regarding the use of multimedia in education:

	1999	2000
Satellite communications	41	39
Terrestrial communications	33	28
Online education over the Internet	20	39

There is clearly a significant shift from conventional media to e-mail, and a rapid increase in online education.

Regarding the purposes for specific media (including plans):
Satellite communications:

	1999	2000 (%)
1. Study group	34	32
2. Education at a graduate school	29	26

3. Specialized education in a department	26	21
4. Open lecture	20	12
5. Meeting	20	25

Terrestrial communications:

1. Meeting	26	26
2. Specialized education in a department	25	13
3. Education at a graduate school	21	18
4. Study group	21	20

These rates show a consistent decline. By contrast, figures for the Internet:

	1999	2000 (%)
1. Specialized education in a department	20	35
2. Education at a graduate school	14	33
3. General education	10	19
4. Open lecture	9	16
5. Study group	7	21

All these utilization ratios have risen significantly.

Purposes for use of multimedia:

	1999	2000 (%)
1. Educational effect	95	95
2. Publicity activities	90	96
3. Announcements	90	93
4. Motivation	90	88
5. Improvements in administrative efficiency	86	86
6. Application of new technologies to education	83	85
7. Sharing research	82	89
8. Reform of curricula	71	64

Issues highlighted as a hindrance:

	1999	2000(%)
1. Burden on individuals	98	97
2. Lack of support staff	97	97
3. Initial costs	95	95
4. Lack of facilities	93	89
5. Maintenance costs	92	91
6. Lead time	88	87
7. Lack of teaching materials	78	85
8. Unfamiliarity with media	67	60

Compared to face-to-face teaching, the following features of interactive teaching over the Internet are pointed out:

	1999	2000(%)
1. Can support outside lessons	91	95
2. Can be used to prepare teaching materials	88	89
3. Aids needed for face-to-face teaching	82	-
4. Increased enrollment	80	80
5. Allows class exchanges with other institutes	79	76
6. Used as aids in face-to-face teaching	79	-
8. Applicable to education on state-of-the-art technology	71	66
9. Should be combined with face-to-face teaching	-	95

Use of the Internet in education has made significant progress, although there remains a strong feeling that face-to-face teaching is also important.

6. Supporting Activities by NIME

NIME produces and distributes teaching materials for teacher training courses, English-language education, basic engineering courses, nursing science courses and curator education. These materials are in various forms, including video, CD-ROM, DVD video, DVD-ROM and so on. NIME also creates various types of databases and provides services for their users: among them are databases of movies and video for teaching, databases of subject matter for use in University of the Air programs, databases of classes using multimedia, and an information database to process copyright matters.

In respect of media materials provided by NIME, a complete count study (response rate: 43%) was conducted in November 2000, with the following results:

Video	30%
Internet	27%
CD-ROM	26%
DVD video	8%
DVD-ROM	7%

As for media materials requested for teaching:

Internet materials	30%
CD-ROM materials	21%
DVD-ROM materials	18%
DVD video materials	16%
Video materials	15%

These figures show that more requests are made for new multimedia materials than for video materials. However, only 14% of all universities have an organization or capacity to support the production of educational materials.

According to a survey of databases (rate of collection: 42%), universities with five or less academics participating in research or education on development of media materials account for 85% of all the universities; as a result, the influence of such academics on a university is negligible. Only 15% of all universities have a plan to build up or operate educational databases, and they know almost nothing about NIME's databases. At the same time, there is a need for databases for specific courses (53%) and specific subject matter (40%); and 79% of universities presently express a wish to develop educational materials jointly with NIME.

7. Conclusion

As discussed in this paper, some progressive universities use communications satellites, videoconferencing and the Internet for teaching, but overall, these new media have not been fully adopted. In many cases, media use is restricted to video or databases of books and materials, or to the use of e-mail to enhance administrative efficiency. Presentations via PC are only a recent development, as is the use of e-mail in the distribution of teaching materials and tasks, questions and answers, and debates; such usage is only now beginning to increase. A noticeable trend in media use this year has been a shift from communications satellites and terrestrial media to the Internet.

National universities generally make use of communications satellites, since most of them have SCS installed. This allows them to communicate on a regular basis, save time and traveling

expenses and secure high-quality interactive image and voice communications. Use is relatively frequent in study groups, graduate school teaching, and professional education in departments where material preparations are more flexible than on an online course. In addition, national universities are generally ahead of local public and private universities in adopting new media as shown in the following table.

2000 (1999)	National Univ.	Local Public Univ.	Private Univ.
Satellite	59 (64)	12 (13)	18 (21)
ISDN	50 (53)	33 (39)	33 (47)
Internet	62 (32)	43 (25)	55 (30)

While it is true that the use of multimedia has a positive effect on education and publicity and improves administrative efficiency, its adoption by institutes of higher education is still restricted due to the burden falling on specific individuals, a lack of staff, and considerations of budget and facilities. Nevertheless, it is strongly hoped that multimedia use will be deployed more rapidly in the future, riding on the recent wave of the IT Revolution and educational reform.

Note:

"In January 2001, the "Ministry of Education" was renamed the "Ministry of Education, Culture, Sports, Science and Technology."

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