

## **Telecommunications-Based Training in Europe: A State-of-the-Art Report**

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Telecommunications used as a vehicle for distance education has become a major focus of research and development in Europe. This article reports on a recent European Community-sponsored seminar in which state-of-the-art projects involving the use of different forms and combinations of telecommunications for training and instruction were presented and Europe-wide initiatives were discussed.

Telecommunications-based training can be described in different ways. Very broadly defined, telecommunications refers to electronically-mediated forms of communication, either using wires and cables or radio and microwaves. This definition of telecommunications includes telephone and television as well as computer-to-computer transmission of data. What is communicated can be in digital or analog form and thus includes video and audio transmissions as well as electronic text in computer-readable form.

In this context, an important development, both in North America and Europe, is the steadily increasing use of satellites. Some important initiatives have been occurring in Europe that involve using satellites with multi-national "footpaths" for broad-scale delivery of education and training. However, in Europe, cross-national means not only cross-regulatory, but also cross-language and cross-cultural, involving layers of important considerations with respect to the cost-effectiveness of broad-scale training. In addition, when satellite connections use the existing television cable services there are sometimes legal barriers to the use of the cable—a not-uncommon situation in European countries.

It is natural that trainers looking for the most cost-effective approach to distance learning in a European context will consider the advantages of combinations of terrestrial computer-mediated communication (CMC) and satellite transmissions. One approach is to structure training programs that make use of both types of transmission media. Another approach is to explore transmitting the sorts of data that can be carried in terrestrial channels through available space on satellites being used for educational video and audio transmission.

Given this background, a recent seminar on the topic "Telecommunications Based Training Systems in the 90's," sponsored by Directorate General XIII of the Commission of the European Communities and held in Madrid, Spain, January 21 and 22, 1991, attracted considerable interest.

### **Madrid Seminar**

This seminar consisted of three general streams of information. One stream related to the final reports of seven cross-European projects funded in part by the European Community and operating over the last two years as "Action Line III" of the so-called Exploratory Phase of the DELTA Project (Developing European Learning Through Technological Advance). There were five "Action Lines" in the DELTA Exploratory Action involving research into characteristics and standards for advanced learning technology systems in Europe, for overcoming market and regulatory barriers confronting the use of advanced learning technologies in Europe, and for better human and technical networks for information integration and collaboration. This was a two-year project, from March 1989 to March 1991, and will be followed by "DELTA-2." Over 250 industries, universities, and government agencies were contractually involved in the DELTA Exploratory Action. The overall sponsor was the Directorate General XIII (Telecommunications, Information Industries, and Innovation) of the Commission of the European Communities.

A second stream of information at the Madrid seminar presented the experiences of other major trans-European projects in the area of "state-of-the-art TBT" (Telecommunications-Based Technologies) applied to distance training and education. A third stream related to upcoming initiatives in Europe-wide TBT, including the so-called DELTA-2, whose theme is "Research and Development in Telematics Systems for Flexible and Distance Learning." The equivalent of approximately 75 million U.S. dollars will be provided by the Community for this research and contracts will be awarded during 1991.

### **Action Line III Project Reports**

The following reports on Action Line III projects were presented at the Madrid Seminar.

*LAT: Learning by Advanced Telecommunications* (presented by F. von Stachelsky). LAT is a project involving three partners: CONDAT, a software house in Berlin; Berlitz International; and the European School of Management. LAT began with the assumption that "new communications systems in which video, audio, and data processing equipment are combined are excellent media for distance learning. However, essential for this is a system design which is adapted to the specific requirements of students, teachers, type of course, and the organization of the school" (von Stachelsky 1991, 2-3). The LAT project executed seven different video-conferencing experiments involving studios in different countries where professionals were involved in short courses to improve their foreign language skills for business transactions or their cross-cultural managerial interactions in a multi-national European setting. Both Integrated Services Digital Network (ISDN) networks and satellite broadcasting were used. An actual class session under the guidance of a teacher in Paris occurred during the seminar, with students in Madrid interacting with students in Berlin (Reif 1991). The LAT report presented recommendations for further "virtual classroom" activities involving TBT, concluding with:

Finally, the learning system should be capable of supporting team work in the classroom or between learners at different locations, enabling work material to be exchanged between and displayed at other locations. In contrast to most group experiments, in distance learning advanced telecommunications can be used to extend collaborative learning beyond the classroom (von Stachelsky 1991, 9).

Berlitz is planning a European Electronic Language School to continue the use of the TBT in European-wide language and personnel development programs.

*OLE: Organizational Learning in Enterprises* (presented by M. Ringsted). OLE began with the assumption that the training classroom should be temporally, geographically, and technically opened so that the "virtual classroom" can simulate a well-functioning "real classroom." OLE tried to involve "virtual classrooms" of workers at shoe production factories in Denmark and Portugal in sharing some common multi-media training experiences. Although an ISDN network could only be simulated and satellite connection between the two sites could not be arranged, the project did successfully combine slow-scan television image exchange through a picture telephone with a computer conferencing system and local PC support. OLE's major findings related to the

technical, educational, and cross-cultural difficulties in attempting international collaboration. In particular, knowledge of effective strategies for stimulating collaborative authoring or teaching in multi-site settings was found to be a major educational problem.

*OLEW: Open Learning Experimental Workshop* (presented by P. Rossi, written by E. Rovida). The OLEW project involves partners in Italy, France, Denmark, and the United Kingdom (UK). The presentation focused on the language problem of cross-European videoconferencing. Two approaches were tried: 1) multiple audio tracks with a different language on each track, and 2) simultaneous translation at each site. Computer conferencing was also part of the OLEW project, but results were not presented at the seminar.

*SATDOC: Satellite Medical Education and Data Transfer* (presented by P. Grob). The SATDOC project involved the use of satellite, terrestrial, and cable distribution systems to provide medical doctors in five European centers in Dublin, Madrid, Nottingham, Leuven, and Amsterdam with distance-based, flexible professional educational opportunities. The doctors were able to receive their professional updating via technology already available to them, when and where they wanted it, most frequently in their homes. A considerable amount of effort went into the production of a small, inexpensive controller that would switch on the doctor's home video recorder in response to a broadcast signal when an instructional segment was transmitted via a satellite or terrestrial broadcast. Only doctors participating in the project could receive the broadcast signals. A beeper device was built into the controller so the doctor could be alerted to any disaster call being sent through broadcast networks. If the physicians wished to send a message or ask for clarification about the broadcast material, the doctors' own PCs with modems were used. A number of tests were carried out relative to the language used in the broadcasts, including English with English subtitles.

*JANUS: Joint Academic Using Satellite* (presented by M. Nouri and P. Bacsich). JANUS is a project developing the use of interactive satellite communication links with voice and data communications. JANUS is being developed to handle the simultaneous exchange of telephone contact, audioconferencing, facsimile traffic, electronic mail, computer conferencing, point-to-point and point-to-multipoint data transmission, document transfer, and access to remote data bases. Satellite transmission will be used to transfer these signals from site to site; once at a site, local area networks and telephone systems will continue to handle the

data. An important goal is to support joint authoring of courses by members of the European Association of Distance Teaching Universities (EADTU). Another goal is for students and faculty members at universities belonging to JANUS to be able to access the JANUS network through ordinary CMC connections, even from their home PCs using ordinary modems and existing public data (terrestrial) networks. JANUS had as its task the planning of such a network, which could develop into a "European Electronic University Network."

*CAPTIVE: Image Transmission in Distance Education* (presented by D. G. Jameson). The Collaborative Authoring, Production and Transmission of Interactive Video for Education (CAPTIVE) project involved partners in the UK, Norway, Belgium, Portugal, and the Netherlands. As part of its activities, CAPTIVE developed video material for medical education and has developed a prototype image base of this material on an optical disk. During audioconferences, participants can ask for certain video segments which are then transmitted through the satellite-mediated network to the participants. At present, the optical data base is controlled by a person receiving requests from the audioconference. Remote control of the video data base is seen as a future step. The CAPTIVE project also investigated a procedure to index video segments for eventual online accessing by multiple users.

*Channel e: Development of a European Educational Broadcast Service by Mass Audience Satellite* (presented by P. Crookes). Channel e is Europe's first and only multi-lingual service for educational and training broadcasts using space on satellites which in turn broadcast to mass audiences in a number of European countries. In some countries, Channel e programs are then carried on the regular public television channels at no additional cost or receiving burden to the viewer. In addition, viewers can receive Channel e directly if they have a privately-owned dish antenna. Part of Channel e's work during the DELTA Exploratory Action was to get as much access as possible on existing satellite and distribution services. Another task was to determine the market interest in Europe-wide educational and training programs and to experiment with various approaches to dealing with Europe's language diversity. The most promising approach to the multiple language problem may be to broadcast the same program a number of times, each time with a different language on its sound track. A third task was to acquire interesting programs for transmission and to stimulate a market for subsequent transmissions. Programs have focused on language teaching, such as English, German, and Welsh; on understanding computer

systems; on programs for migrant communities dispersed across Europe; on employment opportunities for young persons; and on European affairs. Costs and future possibilities for wide-market educational and training programs in a multi-lingual setting have also been considered by Channel e during the DELTA Exploratory Action.

*Contributions of Action III of DELTA.* Only after final technical reports are completed and analyzed by the DELTA Office in Brussels can the contributions be determined. However, the DELTA Exploratory Action did achieve a major goal: to stimulate cross-European questions relating to advanced learning technologies. The work of the seven Action Line III projects has been consistent with that goal. The possibilities explored in the seven projects are generally not new, but their combination is, and it presents considerable challenges. Some of these challenges are technical, others financial or regulatory. Perhaps the major challenges are human and educational. How much interaction, when, and between whom is optimal in distance learning and training? What happens to interaction when people do not speak the same language? When and where are multi-media components important in learning? How does adding the ability to see or hear an instructor and to talk to distant "classmates" improve the effectiveness of training? What has happened to computer-based training (CBT) involving "traditional" formats such as tutorials, simulations, etc., in the context of all this discussion about satellites and ISDN channels and video-audio-computer conferencing? What is the educational and European "added value" relative to the costs of distance and flexible learning using telecommunications-based training? When do the benefits justify the costs? Who should pay the costs? The experiences of Action Line III have contributed to our better understanding of these questions but also indicate that there is much more work to be done, not only in Europe but throughout the world, before we have some consensus on these issues.

### **Other European Projects Involving Telecommunications-Based Training**

The seminar also highlighted the work of several other European-wide projects involved with telecommunications-based training as well as some U.S. experiences.

European-Community Sponsored Projects were described (presented by R. Walker). EPOS, a DELTA Project from a different Action Line, involves a consortium of various European PTTs, national telephone and

telecommunications utilities, interested in developing an "Open Learning Service." Building on current large-scale training networks for PTT employees in Germany and Italy and the continued spread of ISDN services, EPOS is searching for innovative ways to create a distance learning service.

Technical perspectives were presented in other discussions of projects including the need for European standards involving ISDN and "integrated broadband communications," workstation design to support multi-media communication and information handling, and the status of a current policy initiative for liberalizing satellite communications in Europe.

A report was presented on distance learning strategies used by IBM in the United Kingdom for training internal staff and customers (presented by J. Rueda, written by Scott 1991). The learning environment consists of an instructor in a teaching studio in London and "students" in classrooms at IBM Centers in six other UK centers. The classroom work stations, using microphones and video cameras, allow communication between student and instructor. Computers transmit graphics, text, and student responses for immediate collection and summary. This environment has been used for over thirty internal courses at IBM UK with good, cost-effective results, and will be implemented in Germany during 1991. A similar system has been in place in France IBM since 1989.

The EuroPACE Project (presented by S. Nipper), operating since 1989, is a provider of distance-delivered professional education, primarily advanced engineering and managerial topics. Founded by a consortium of twelve major European companies, EuroPACE uses satellite transmission of specialist courses or special events to subscriber settings. Accompanying the video delivery is access to a CMC electronic mail facility, so that students have the opportunity to send questions immediately to the instructor or to technical support persons. Print support materials are supplied, using ordinary mail. Nipper noted several reasons the CMC portion of EuroPACE courses is little used. Instructional materials are not designed to stimulate its use, there is not a critical mass of users, and user interface is difficult. There is a sense of the instructor "speaking into a black hole." EuroPACE has not found an answer to the question of how interaction among professionals in different countries and companies can best be stimulated, or if it is necessary to stimulate interaction.

EUROSTEP, the "European Association of Users of Satellite in Training and Educational Programs" (presented by J. Van Heddegem), is a service able for a certain period of time to provide low-cost educational access to a satellite distribution network for educators and trainers who wish to experiment with satellite broadcast of their pre-recorded materials.

A German ISDN (integrated services digital network) project, "Interactive Remote Training" (presented by N. Maassen), involves a connection with a tutor in one place and students elsewhere. Transmission of training software, tasks, and exercises goes out from the tutor; screen copy can be transmitted between students and tutor; the tutor has interactive control of the trainees' CBT program by remote editing; and simultaneous discussions occur through a parallel telephone channel.

An overview of the extensive experimentation with training via ISDN in France (presented by T. Le Clercq) indicated that there appears to be a shift toward a model of distributing information and away from the ideas developed in computer-based training. American experiences with business television, the wide-spread use in the U.S. of satellite-based distance learning with one-way video and two-way audio, was also discussed (presented by P. Rash). A number of United States' projects using satellite-based distance education in schools were mentioned, including TI-IN and a network based at Oklahoma State University. Given the focus of the Madrid seminar on European telecommunications-based training, it is understandable that there was only one non-European speaker and that she was the only person to mention distance education in a school context. However, the considerable amount of distance education experience which has been accumulated in the U.S., Canada, and Australia, among other countries, should not be overlooked as a source of insight. Many of the pedagogical, cultural, managerial, and technical telecommunications problems discussed by the representatives of European training projects have been grappled with for many years by educators and trainers involved in distance education in other countries. Although the European context adds some unique aspects, it also shares much common concern.

### **DELTA 2: New European Initiatives**

Discussions of future initiatives (presented by L. Rosello) included further directions for the Commission of the European Communities



(CEC) and CEC-sponsored work in relation to educational technologies in Europe. "Research and development in telematics systems for distance and flexible learning" was identified as a priority in order to respond to growing training needs. Discussion focused on the main thrusts of the upcoming DELTA-2 initiatives, which include:

- Implementation strategies, including assessment and evaluation;
- Pilot testing, including different didactical approaches and involving a cost analysis of each of the pilot tests; and
- Development of services and tools "to allow accessibility of learning materials on a European-wide scale, the design and production systems making possible joint courseware development, training services, and learner/teacher support tools." (p. 7) There is a particular focus on "facilitating interactivity at a distance."

Within 1991, proposals will be accepted from throughout Europe for participation in this DELTA-2 initiative. Partners in a proposal must represent at least two member states, with encouragement given to collaborations between universities; small and medium-sized research, development, and training services; large industrial partners; and government agencies. The stimulation of this sort of large-scale initiative is providing a substantial impetus to the investigation of telecommunications-based possibilities for learning and training. One must hope that exploration of the potential of telecommunications as a medium for education and training can also flourish in a way that is responsive to new developments and opportunities not only on a European basis, but on an intercontinental basis. The world as a "global village" means we have much to learn from each other. An important step is supporting mechanisms for better information exchange and integration among the professionals in many different countries with involvement in telecommunications-based learning. Finding a way to better learn from each other remains one of our major goals.

## References

All of the following references are papers presented at the "Telecommunications Based Training Systems in the 90's" seminar, Madrid, Spain, January 21-22, 1991. People mentioned in the text who are not listed here presented oral reports rather than written submissions. The organizers of the seminar are preparing proceedings which will contain the papers. More information about the proceedings or the seminar

may be obtained from its technical coordinator, Manuel Fernandez de Villalta, FUNDESCO, Alcala 61, 28014, Madrid, Spain. Fax: 34-1-578-3148.

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