



# Synchronous e-learning systems in European e-learning provision

Desmond Keegan\*

Distance Education International Dublin, Ireland

dei@eircom.net

## Abstract

E-learning today is a multi-billion training industry. In the United States of America there are two forms of e-learning: asynchronous e-learning systems and synchronous e-learning systems, also known as live e-learning and virtual classrooms. Live e-learning systems are little known and little used in Europe and do not figure in European Commission publications on e-learning.

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\* Desmond Keegan was General Director of the Italian Open University system (Consorzio per l'università a distanza). He is managing director of Distance Education International and director of the Irish Centre for Distance Education Research and Applications (ICDERA).

## 1. The distance education background

It can come as a surprise to European experts in Open Universities and distance education to learn that the term «distance learning» as used in the United States of America in the 1980s and 1990s can refer to both group-based distance learning and individual-based distance learning. They tend to think that all distance education was structured as the individual-based systems to which they are more accustomed.

Distance education in the 1980s and 1990s in Europe was organised by open universities and correspondence schools with the student being taught as an individual usually at home or at work. In many ways this was one of the great strengths of distance education as it freed learners from the need to go to a university or training centre in order to learn. In this way distance education anticipated many of the values of lifelong learning that are so appreciated today:

- training when it is needed;
- training at any time;
- training at any place;
- learner-centered content;
- avoidance of re-entry to work problems by provision of bridging courses;
- training for taxpayers, and those fully occupied during university lectures and sessions at training centres.

Eventually it became possible to offer university degrees, college diplomas and training certification for studies undertaken at a distance.

In America there was no open university but distance education programmes were offered from correspondence schools and correspondence departments of many American conventional universities. But this is only half of what Americans understood by «distance learning». The other half was group-based distance education.

In America a common form of ‘distance learning’ was group-based systems via satellite. A common structure for provision was for a professor to deliver a lecture at the conventional university with a video camera in the lecture theatre. The feed from the video camera was uplinked to a satellite and then downlinked to a series of groupings of students brought together at other sites throughout the state. Feedback from the students at the remote sites to the professor was usually provided by a telephone link.

In a similar way group-based distance education was organised in America via videoconferencing. Students enrolled at, say, the University of Albuquerque in New Mexico in, say, a Masters Degree in Nursing could avoid the 300 km journey to the university and back after a day’s work in the hospital by gathering in a group in front of a videoconference machine at the hospital and receiving their lecture

there. This proved a satisfactory method of study as the two-way audio, two-way video link of the videoconference system provided full interactivity, even though the link was frequently a fragile 112 kb per second.

Distance education for groups by satellite and by videoconferencing did not prove popular in Europe and was little used.

## 2. The e-learning scene today

It can come as a surprise to European experts in e-learning today to learn that the term «e-learning» as used in the United States of America today can refer to both group-based e-learning systems and individual-based e-learning systems. They tend to think that e-learning refers to the individual-based systems to which they are more accustomed.

«Traditional» e-learning courses are usually organised for students studying on their own, at home or in their office, using Learning Management Systems (LMSs) or Virtual Learning Environments (VLEs) like Web CT or Blackboard. The study is usually individual, with or without contact with a course tutor for feedback and assessment. University degrees, college diplomas and training certification can be awarded for study in this way.

In the United States of America the term e-learning is also used for a different form of e-learning that is group-based. In these group-based e-learning systems a lecturer or trainer is linked electronically with a virtual class of many students located in any part of the world. The class comes together, with the teacher, at a fixed time on a fixed day for a fixed duration and the trainer delivers the class live to the students wherever they are. Many electronic means are made available for the teacher to communicate with the students and the students to communicate with each other.

These electronic groupings of students for e-learning are little known and little used in Europe. Their importance in America is underlined by the fact that many of the market leaders in traditional e-learning are having to provide a synchronous e-learning system, side-by-side with their asynchronous one, to meet the market demand.

## 3. Terminology

Considerable confusion exists in the terminology used to describe these group-based e-learning systems. Three terminologies are used to refer to these systems by the various providers: «synchronous e-learning systems» or «live e-learning» or «virtual classrooms».

The term virtual classrooms emphasises that a grouping of students is set up for the learning experience in a class as in ILT (Instructor Led Training) but not

as in traditional e-learning where students study mainly individually. It also uses the word «virtual» to show that the classmates do not meet face-to-face but are brought together electronically or virtually and it can be in any part of the world. The weakness of the term is that people use the term virtual classroom for a wide variety of educational structures not limited to the synchronous e-learning systems under discussion.

The term «live e-learning» has strengths in that it emphasises that it is a form of e-learning that is live. The use of the term «live» shows that the class comes together at a certain time and for a certain duration and that they hear the trainer's voice «live» and can communicate «live» with the other students in the class. The weakness of the term is its vagueness and the lack of clarity as to what live e-learning refers.

The term «synchronous e-learning systems» has strengths in that it emphasises that one is dealing with a form of e-learning and that this is a synchronous form of e-learning. The term «synchronous» differentiates this form of e-learning from more traditional forms which are clearly asynchronous and gives the idea that one is dealing with a live event going on synchronously at a number of locations. The weakness of the term is its use of the cumbersome word «synchronous», a term that is little used outside education circles.

Synchronous means happening, existing, or arising at precisely the same time or recurring or operating at exactly the same periods or having the same period and phase. In digital communication it refers to a transmission technique that requires a common clock signal (a timing reference) between the communicating devices in order to coordinate their transmissions. It means occurring at the same time or at the same rate or with a regular or predictable time relationship or sequence.

Asynchronous means not happening, existing, or arising at precisely the same time. In computing it refers to not synchronised by a shared signal such as clock or semaphore, proceeding independently. It is a process in a multitasking system whose execution can proceed independently, in the background. Other processes may be started before the asynchronous process has finished.

#### **4. Differences between synchronous e-learning and ILT, video-conferencing and traditional e-learning**

It is important to be able to differentiate synchronous e-learning systems from other forms of educational and training provision with which they are often confused.

##### **4.1 Instructor Led Training (face to face education)**

ILT means Instructor Led Training or face-to-face education and training provision in a lecture theatre, classroom or training centre. Examples of synchro-

nous education and training provision are found in the classroom and the virtual classroom. In both scenarios, the participants and leader have a common time element. In the case of the physical classroom, participants and leader also have a common location.

The benefits of using synchronous e-learning provision include (a) the familiarity of the classroom model, (b) learners receive immediate feedback from other learners and the leader (c) the ability to create content quickly in the classroom. A synchronous environment provides particular value for those who learn best by working with others, listening, viewing and questioning. This environment is also helpful for those who have difficulty in organising their time. Additionally, most learners are comfortable and familiar with the classroom environment.

The differences between synchronous e-learning and ILT are that the class is brought together electronically and not physically, and forms a virtual classroom. The students sit anywhere in the world at computers on which the synchronous classroom software is displayed and follow the course delivered by the teacher from a remote location. Thus many of the benefits of a conventional classroom are recreated electronically.

## 4.2 Videoconferencing

Videoconferencing provides a two-way audio, two way video link between one or more persons at one or more remote sites. In an educational setting all the students can see and hear the teacher and all the students at the remote site(s), and can be seen by and heard by the teacher and all the students at the remote site(s). A student coughing at one site can distract the students or teacher at the other site(s). The interactivity of the face-to-face classroom is electronically restored.

From the point of view of education and training there are two major forms of videoconferencing: ISDN-based videoconferencing, and computer-based systems like Microsoft's NetMeeting.

ISDN stands for Integrated Services Digital Network. ISDN is a high-quality, switched digital communications service that gives your standard phone line the ability to transmit voice and data simultaneously. You can use the same line for regular telephone service, faxing, computer communication, or even live videoconferences.

For educational use of videoconferencing the recommended transmission standard was 6 ISDN lines X 64 kbit per second, giving a total of 384 kbit per second. This enabled the codecs in the videoconferencing systems to hold the movements of the teacher steady and allowed for a satisfactory educational atmosphere. But in the United States of America educational videoconferencing was carried on at 112 kbit per second or 2 X 56 kbit lines. Videoconferencing provides an excellent context for education and training but its popularity has waned in

recent years. This is due to two causes: the impact of e-learning on all forms of distance education and cost. E-learning has become a worldwide phenomenon and has reduced the use of most forms of distance education, including videoconferencing. Cost remains an issue for most institutions who hesitate to pay for 6 (or even 2) ISDN lines for many hours for a training session.

Synchronous e-learning systems are easy to differentiate from ISDN videoconferencing as they are internet-based technologies whereas videoconferencing was largely telephone-based. In synchronous e-learning systems the students can hear and talk to the teacher but they see the teacher's presentation, usually Powerpoint slides on their browser. The facility of videoconferencing to see the teacher and the movements and reactions of the students at the remote site (if the teacher is not alone at the remote site) is not available.

Systems like NetMeeting are less satisfactory for teaching groups of students at a distance. As its name implies it was designed for meetings and not for education. When using NetMeeting for education or training file transfer could be interrupted because of the bursty nature of the communication medium. To avoid this an institution could reserve a part of its network for videoconferencing classes but then the reserved part of the network would not be available to other users. In addition, it is difficult to get groupings of students to sit in front of a computer and follow the NetMeeting session, and thus one of the great attractions of videoconferencing – the ability to recreate a class at one or more remote locations is lost.

Synchronous e-learning systems are less easy to differentiate from NetMeeting-type videoconferencing as both are internet-based technologies. In the synchronous e-learning systems the system is designed for education and training and students can hear and talk to the teacher and see the teacher's presentation on specially designed web browser software whereas the NetMeeting browser design is less directed at education.

### 4.3 «Traditional» e-learning

Much of the current confusion about the identity of synchronous e-learning systems comes from a failure to distinguish them clearly from asynchronous e-learning systems or «traditional e-learning». The main difference is that the application running on the students' browsers in synchronous systems allows a synchronous event to run, whereas in an asynchronous e-learning situation the application allows an asynchronous event to run.

In essence both synchronous and asynchronous e-learning systems are client-server systems, using IP technology, to access services located on the internet, which are accessed by a web browser. It is what is downloaded by the browser that identifies whether it is a synchronous or an asynchronous form of e-learning that takes place.

Difficulties can occur because most providers of synchronous e-learning are corporate providers whose systems are firewalled. This means that the teacher or trainer is within the firewall and the students are scattered throughout the world. The usual solution is to co-locate the server so that customers outside the firewall can get access to the server as it has a public IP address and thus the system can receive customers from outside the firewall.

From the many providers of synchronous e-learning systems today, six have been chosen as examples. These are Centra, Horizon Wimba, SumTotal, LearnLinc, Elluminate and Interwise.

#### 4.4 Centra

The Centra Corporation presents itself thus: «Online business collaboration solutions from Centra create workforce efficiencies and enable organizations to share and exchange business-critical information with geographically distributed customers, partners, prospects and employees.

Centra's solutions integrate real-time collaboration and departmental business processes with specialized applications that increase sales effectiveness, improve collaborative learning and accelerate enterprise application rollouts and customer acquisition initiatives».

Based on best practices gained while working with more than 1,200 leading organizations worldwide, Centra's four solution areas — Centra for Enterprise Application Rollouts, Centra for Sales Effectiveness, Centra for Collaborative Learning, and Centra for Customer Acquisition — automate and facilitate the planning, execution and evaluation phases of mission-critical online business initiatives. With each of Centra's four solutions, the Company has delivered all of the necessary components — a proven collaboration platform, customized workflow tools, an integrated learning content management system, third-party integration capabilities and professional services — for completing the steps necessary for successful online collaboration projects. All solutions include Centra's hallmark Voice-over-IP (VoIP) technology to realize significant savings over traditional teleconferencing services.

From this it is clear that the Centra synchronous e-learning system, referred to as *Centra for Collaborative Learning*, is a component of a series of products for business communication the rest of which are not focused on education and training.

Centra Symposium, as the Centra system for education and training is called, replicates typical classroom interaction — with a complete set of features for highly interactive, effective group learning, bringing together voice, video, data and graphics in a structured online learning environment for up to 500 simultaneous users.

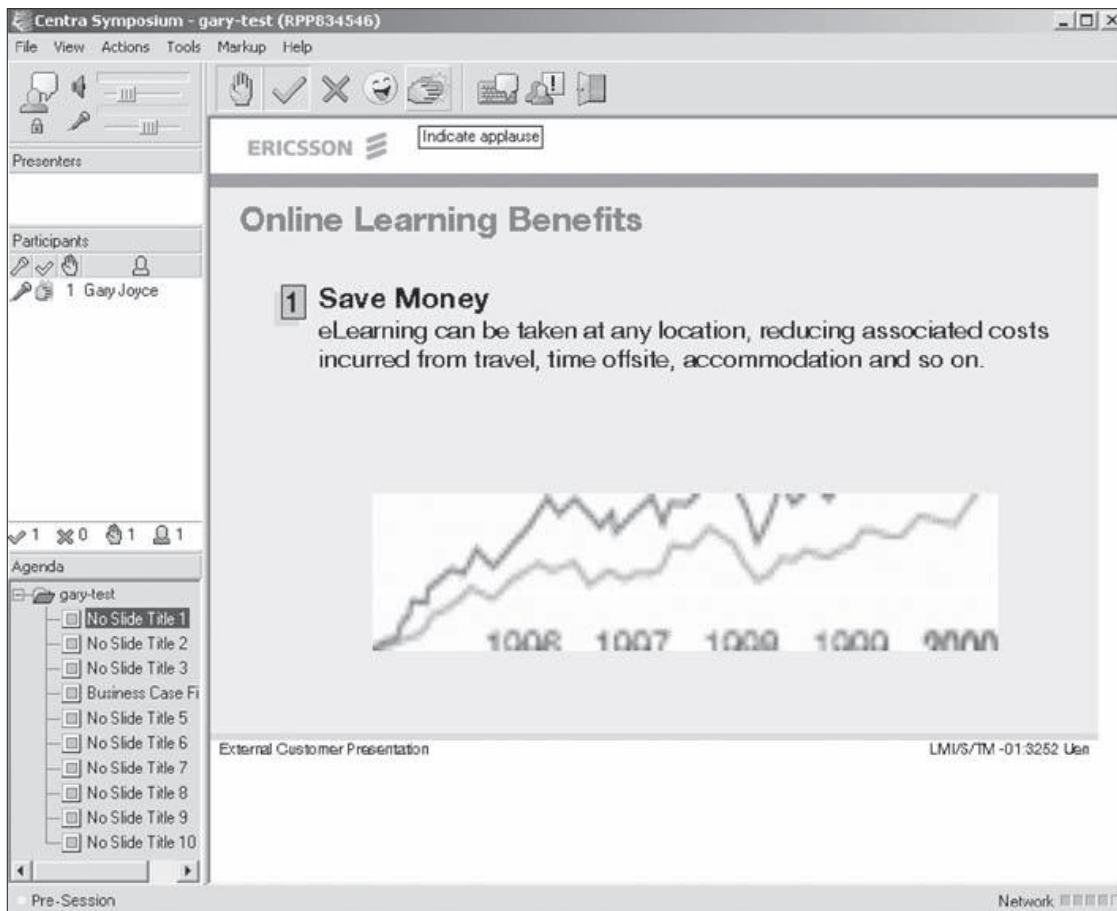


Figure 1 Centra Live Classroom presentation.

In the illustration above the student interface for a course on Online Learning Benefits is shown. A more complex interface is available for the presenter.

In the centre of the presentation there is a PowerPoint slide on Saving Money. In the top left hand corner there is a box for the presenter or presenters. This has volume controls for microphone and speakers and a facility for handing the microphone to a student who wishes to speak. Below there is a box for listing the participants in the course, each with a number and indicators for indicating agreement or disagreement or wanting to «raise one's hand» to ask a question. Opposite each name is a microphone which can be activated by the presenter to enable the student to speak. Below there is a plan of the course which lists the PowerPoint slides which are to be presented during the length of the course.

Across the top of the screen are a series of icons which indicate:

- raise hand: to be clicked by the student if he or she wants to ask a question or make a comment;
- agree: to be clicked by the student to express agreement with a question asked by the presenter;



- disagree: to be clicked by the student to express disagreement with a question asked by the presenter;
- laughter: to be clicked by the student to indicate laughter or amusement;
- applause: to be clicked by the student to indicate applause and support for the course;
- text chat: to be used to send or receive a text message to the presenter or to all the students;
- feedback: to be used to send feedback on the course;
- volume control: to be used to control volume.

The presenter has a more complex provision of icons. This includes, in addition to the above, icons for application sharing, surveys, web safari, white board, break out sessions (dividing the students into smaller groups), video, session start and stop, recording facility.

Features provided include: Real-Time Interactivity, Yes/no polling, instant surveys, hand raising, laughter/applause, public/private text chat, and «open floor» audio chats, Multi-use, interactive whiteboards that can be saved for later review. Web Safari allows the session leader to take the participants on a synchronized Web tour. Participants can see the leader's «pointer» and will automatically scroll when the leader scrolls up and down on a Web page. The leader can also choose to open the «floor» to several participants at a time for peer-to-peer interaction and learning and to enable peer-to-peer text chat that allows participants to send a private text chat message to other participants.

Further features include: Rich Multimedia Content, integrated Flash, Shockwave, JavaScript, animated GIFs, and streaming audio and video; application Sharing with Mark-Up; Share any Windows application, including your entire desktop or even a remote server, with other participants for IT and software product training. Multiple Presenters, Just-In-Time PowerPoint Import with Animation, Breakout Rooms and Labs, Tests and Quizzes, Integrated VoIP or Teleconferencing, Integrated Video Conferencing Currently available in 12 languages, Centra solutions can be deployed as on-site software or through its ASP service. Headquartered in Lexington, Massachusetts, Centra serves a worldwide customer base throughout the Americas, Europe, Asia and Australia. For more information, please visit <http://www.centra.com/>.

#### 4.5 Horizon Wimba

On June 16, 2004, Horizonlive and Wimba, two well-known providers of live e-learning, formally combined to form a new company, Horizon Wimba. As part of the transition to the new company some of the existing products have been re-branded in order to maintain current market awareness of both the product lines and to better position new products in the future. Horizon Wimba develops

web-based collaboration software for online distance education, language learning and live interactive communications. These collaborative learning applications enable instructors and students to fully embrace the new wave of pedagogical opportunities afforded by campus-wide networks and the internet, regardless of geographic location, bandwidth or operating system. The virtual rooms enable instructors to conduct live, online classes, meetings, office hours and study groups, and the vocal collaboration technologies, and to add also oral content directly into course content, webpages and assessments.

Horizon Wimba believes that approximately 1,100 universities and colleges worldwide are using a live e-learning system, of which a little more than 25% use the Horizon Wimba Live Classroom for live online classes, office hours, study groups, meetings, and professional development training.

They claim that in terms of using voice tools for language learning, there are only about 200 colleges worldwide that use them, and they all use Horizon Wimba voice tools, as there is no other software company that makes voice tools for language learning. This is quite noteworthy. After all, with the prevalence of course management systems (such as Blackboard and WebCT) there are literally thousands of language courses that have some online component, yet the majority of them do not have any speaking or listening components to them - which seems counterintuitive for learning languages.

A presentation of the Horizon Wimba Live Classroom is shown (fig. 2) during a course on the «Path to the American Dream». In the centre screen one finds the PowerPoint slide that the teacher is describing and showing to the class. In the top left-hand corner are the tools for use during the presentation. In the top right-hand corner is the volume control for use during the course and when a student is given the microphone to address the class. In the bottom left-hand corner is the email facility using which a student can send messages to the teacher or the whole class. In the bottom right-hand corner is the administration centre. This provides facility for agreement (Yes), facility for disagreement (No), facility for asking a question (raised hand), list of participants on the course and picture of the course presenter.

Horizon Wimba list their competitive advantages as:

- we integrate with both Blackboard and WebCT;
- our Live Classroom is the only solution that is accessible to the hearing and visually impaired (very important in the United States);
- we're low-bandwidth friendly;
- cross-platform and cross-browser for both students and instructors;
- have a built-in phone back-up option for those with faulty speakers or PC microphones;
- thin-client (no thick download for dial-up users);

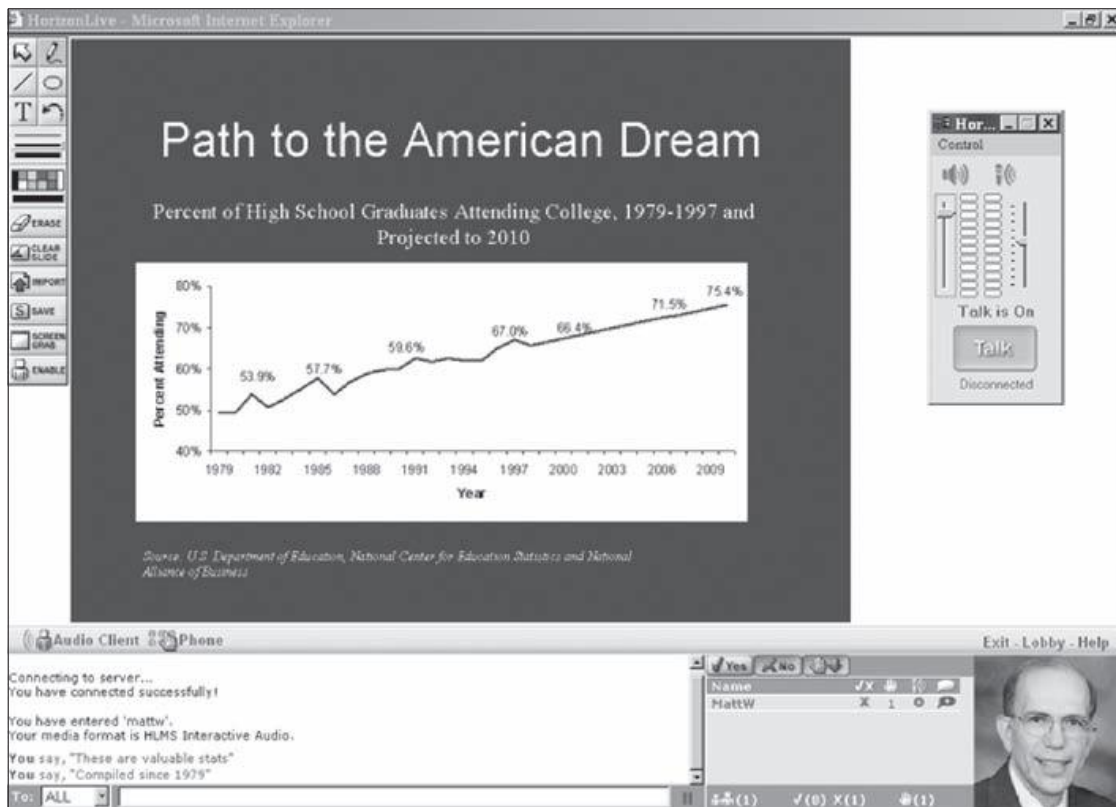


Figure 2 Horizon Wimba Live Classroom presentation.

- we solely focus on the education market which allows us to have more enriched partnerships and integrations with other software that universities currently use.

For more information, please visit <http://www.horizonwimba.com>

### SumTotal

Sum Total has its headquarters at Mountain View, CA 94043. Like Horizon Wimba the company was formed through the 2004 merger of e-learning software leaders Click2learn and Docent.

For more information, please visit <http://www.sumtotalsystems.com>

### LearnLinc

LearnLinc is a live virtual classroom environment that enables corporations to deliver live e-learning courses to employees or students via the Internet, corporate intranet, or wide area network. Developed with principles of traditional learning techniques in mind, LearnLinc offers the interaction of a classroom combined with the benefits of online training.

For more information, please visit <http://www.ilinc.com>

Interwise

What if your employees, customers, and partners could connect to any important meeting, seminar, or class without having to remember complicated dial-in instructions and event codes?

For more information, please visit <http://www.interwise.com>

Elluminate

Elluminate is a leading provider of live Web conferencing and e-learning solutions for the real-time organization. Serving corporate and academic sectors, the company ensures the best user experience through superior quality VoIP communications.

For more information, please visit <http://www.elluminate.com>

## 5. A lacuna in European provision

It is clear, therefore, that a lacuna exists in European e-learning provision. In America group-based e-learning systems exist side by side with individual-based e-learning.

This lacuna is being addressed by the Socrates Minerva project *Virtual Classrooms in educational provision – synchronous e-learning systems for European institutions*. The partners in this project are:

- Ericsson, Ireland
- the FernUniversität in Hagen (the German Open University)
- the Corvinus University of Budapest, Hungary
- DEIS, Cork Institute of Technology, Ireland
- Norwegian Institute of Information Technology

Studies have been completed by the partnership on the knowledge of and use of synchronous e-learning systems in Europe. This research confirmed the view that these systems were little used and little known in Europe. The methodology used was the identification of 5 leading e-learning experts in the 25 EU countries and the distribution of a questionnaire to them. Unfortunately many of these experts did not know what was being referred to in the questionnaire, and the partners had to engage in lengthy international phone calls to explain the nature of live e-learning. Studies were also carried out on the pedagogical and cost effectiveness of these systems. Demonstration courses were developed and taught to students in Ireland, Norway, Germany and Hungary and data collected on the success and value of this form of e-learning provision. The Corvinus University of Budapest had success in teaching university courses to large groupings of students in Slovakia. Ericsson Education Ireland is a leader in the provision of live e-learning courses to corporate students worldwide.

As the literature on the subject was unacceptably weak a major book was published as volume 126 in the well-known ZIFF-Papiere series of the Zentrales Institut für Fernstudienforschung of the German Open University, the FernUniversität in Hagen under the title *Virtual classrooms in educational provision: synchronous e-learning systems for European institutions*.

The findings of the project can be studied on the project website at <http://learning.ericsson.net/virtual>.