Benchmarking of Virtual Campuses

Financial Agreement number 71055-CP-1-1999-1-ES-ODL-ODL

Deliverable 1
Case study descriptions

Index

Introduction

The Benvic project is aimed at developing, testing and establishing an education approach to evaluation of "virtual campuses" experiences. That means setting up a system to make comparative analysis and define quality criteria for the development of virtual learning platforms.

For those institutions willing to set up a virtual campus from scratch or for those wanting to improve their existing learning platform, the system becomes a useful tool which has been tested and evaluated positively until now, although it is expected to improve by the use that institutions will make of it.

This benchmarking system has been based on the analysis of five real experiences. These cases have been described and compared from different points of view (institutional context, start-up phase of the virtual campus, infrastructure, design principles, technical aspects,…). The analysed institutions present different stages of development, which enriched the comparative study. They are all pioneer institutions in the use of virtual environments for teaching and learning purposes.

The research institutes involved in the project have contributed with the methodological approach for educational evaluation of these Virtual Campuses. These institutes have long experience in the establishment of quality criteria for ODL products.

The following five cases have been analysed:

1. Universitat Oberta de Catalunya (UOC), Barcelona, Spain
2. Äbo Akademi University, Turku, Finland
3. University College of London, London, England
4. Virtual University for Europe (VirtUE) and Europace, Katholieke Universiteit Leuven , Leuven, Belgium
5. Virtual University of Bavaria, Germany

This brought to the definition of organisational and educational indicators related with the management systems and working processes of all the institutions. These indicators are hoped to work on the definition of a map of competencies, which describe the basic criteria to take into account when evaluating virtual learning environments.

With the enlargement of the project deadlines with one more year, a club is being created in order to give the chance to a major number of organisations to take part and test the system.

Further information is available at the Benvic project address: http://www.benvic.odl.org

Case study descriptions

- **Universitat Oberta de Catalunya (UOC), Barcelona, Spain**

1. THE CONTEXT

1.1 The originating organisation (e.g. University) and its socio-economic environment

The Universitat Oberta de Catalunya (Open University of Catalunya, UOC) is a fully accredited distance education university established in January 1995 with its headquarters in Barcelona.

The creation of a new university was promoted by the Catalan Government and was designed as a complement to the Catalan university system making university studies available to all members of the society who, because of work, place of residence, age or other personal factors, opt to enrol in more flexible courses.

Since the UOC is not a standard university, it is important to consider the particular nature of its student community, primarily an adult population. Most UOC students are between 25 and 40 years old, most of them work and four out of ten have children. The UOC has to commit itself to offering service that truly matches the needs of its community. Today it has about 16,000 students: about 12.500 are undergraduate and nearly 3.500 are participating in continuing studies. The UOC also has more than 600 part-time faculty.

It offers a wide range of open-university degrees (philology, education, business and economics, computer science, law, humanities, information studies…) and 235 different courses. One of the particularities of the UOC is its advanced pedagogical model based on the set up of the first virtual campus to interconnect university students, professors and central services.

Also in the last years Catalunya has experienced a great demand of university studies, especially distance learning programs. This is mainly due to the need of part-time studies, the need of lifelong learning and corporate and professional training, the difficulty to commute to traditional universities or college and attend traditional classes, and the great demand for graduate studies in traditional universities. This demand can not be attended because of lack of resources and infrastructure.

The target of the UOC is to provide the highest quality university education based on distance learning, delivered via the latest information technologies, to Catalan students anywhere in Catalunya and throughout the world.

1.2   A historical view of education in the organisation

In the last years society have become aware of the need to base education not only on a face-to-face interaction between a teacher and a student. Different models are needed. In Europe, and all the world, a new paradigm is being consolidated, adapted to a new society: changeable and diversified in terms of age, activity, economic level, place of residence and personal situation.

The UOC was created to give a real response to the new situation and fulfil these new needs. This response is based on a flexible and open educational model, which takes advantage of the possibilities of the information society technologies as support tools.

From the very beginning, and according the educational offer of the traditional universities in Catalunya, the UOC was created as an efficient alternative of distance higher education with the following characteristics:

- according to the Catalan cultural, social and linguistic reality
- open to the different characteristics of nowadays society
- with a new and innovative educational model
- using new technologies
- co-operating with the rest of universities in Catalonia in order to improve the educational offer in the country
- offering regional and local services all along the territory
- through a flexible and easy management system

The educational model is based on an innovative teaching and learning system which encourage students to feel part of the university community as a way to communicate with others and learn. So that they acquire knowledge, not only through what it is taught to them, but also by means of the interaction and co-operative work between the members of the community.

1.3   The institutional context and the place for the Virtual Campus experiment

The "Virtual Campus" is the tool that the Universitat Oberta de Catalunya uses to develop its educational model, turning the Virtual Campus into a product rather than a mere concept. It is, nonetheless, impossible to define the Virtual Campus by a single, limited definition. The Virtual Campus has to be understood as a dynamic entity that permits the creation of a community dedicated to training and education.

Universities are not self-contained institutions, but rather open and dynamic links in their educational, regional and international environments. Virtual campuses also make these relations possible.

The new "Information Society" provides us with the new tools for taking on the challenge of teaching and learning in a different way. Information and communication technologies (ICT), i.e. multimedia, e-mail, etc., open new ways for learning. These new ways involve:

- new teaching tools: flexible in space and/or time and openly and widely accessible (computer conferencing, videoconferencing, interactive TV);
- new electronic learning and information resources, e.g. stored on CD-ROM and/or made accessible all over the world through Internet-World Wide Web;
- new communication links with people: Internet access (through e-mail and newsgroups) to a world-wide human network of peer learners, experts, teachers, trainers, and tutors. These communication links open new ways for personal and group interaction and support and provide access to a global network of distributed personal knowledge and expertise;
- new methods for learning: constructive, self-regulating and interactive learning via hypermedia packages which not only present knowledge in a rich multimedia and hypertext format, but also offer powerful instruments for self-activity, creativity and interactivity, via tasks, tests, simulations, etc.

The Virtual Campus platform of the university is an example of these revolutionary advantages offered by the information age, which are necessary in order to meet the changing needs in the world of education. **That is why the institution entirely supports the Campus**, which is nowadays a reality, and also invests in research and development in order to improve its functionalities.

1.4   The start-up phase: Who initiated the idea that the organisation should set up a Virtual Campus? When did this happen? Which was the motivation/the needs expressed? Which were the initial goals? Which was the economic investment/budget allocated?

One of the UOC's main principles focuses on the overcoming of time and space barriers in order to offer students the highest level of flexibility possible in order to carry out their studies.

Activities taking place on a traditional campus require participants to coincide in time and space as it is based on face-to-face relations. This creates a lack of flexibility because people must coincide in time and space although face-to-face teaching is interactive, immediate and personalised.

In tele-training activities, participants are in different places but coincide in time. Here, the immediateness is possible but there is neither interactivity nor personalisation.
Resource centres require participants to coincide in space; however, participants go there at different times. In this case, there is no interactivity, immediateness or personalisation.
Activities in virtual environments allow for the flexible time and location of participants and are interactive, immediate and personalised.

The UOC organises its activities in a virtual environment, so **that was the main reason to set up a telematic application**: the Virtual Campus platform. It allows students and professors to participate in the learning, social and communication activities from their homes and at any time during the day or night. On certain occasions, however, specific activities can coincide in time (i.e. chats), in space (i.e. consultation of materials at a study centre) or in both time and space (i.e. attended meetings twice every semester).

The experiment was set up at the beginning, in 1995, with a pilot project of 200 students taking a degree in Psychology. The main goal was to set up an educational community and offer a distance degree program through an electronic mail system. After 4 years, those 200 students have become 10.000 and Psychology is only a part of the 9 official university degrees offered from the UOC.

2   DESCRIPTION OF THE VIRTUAL CAMPUS

2.1   Design principles: what are the policy objectives, which is/are the target group/s, etc.

The university will be virtual as long as it is a reality in a different environment using technologies. Its mission and objectives do not necessarily need to change. It is the educational model what needs to change to a more explicit one. The university no longer is a physical temple of knowledge but a shared open space for the construction of knowledge as well as a learning provider. The virtual campus is the tool that allows this shared space and provides contents and facilitates communication to the target group: students, educators, administrative and management staff.

We believe the construction of a shared training space will be based on variables placed around the following axes. And these are our objectives:

- *Accessibility*. Training access must be guaranteed by bringing the university into every student's home, overcoming barriers of space and time, as well as language barriers in the near future.

- *Learning model*. Improving the learning models to be applied to the new environment such as virtuality. This change forces us to be creative in our planning and not to repeat eternally what we have been doing until now.

- *Teaching model*. Teaching profiles must change from being instructors to facilitators. Thanks to technology, the teaching staff becomes part of the model at the same level as the student and the learning materials, but with a different role that must be further developed.

- *Cultural and organisational style*. We must work on the mechanisms necessary to introduce the cultural and organisational elements typical of training institutions on to the net, inside the global approach, in order to provide it with richness and diversity as well as to make everybody's participation in this space worthwhile.

- *Cross-cultural*. The possibility for different cultures to relate on the net is already a reality. The challenge will be to turn such a space, which at the beginning encourages participation regardless of everybody's cultural and racial origin, into a rich, diverse, tolerant and non-uniform space. If we tend to uniform globally we will be creating a fictional space for relationship in which people and institutions are not seen, as they are, that is diverse.

The reality is that the world of training is moving towards the future at a very high speed. The existence of a world-wide training space is already becoming a reality. However, we must take care, both as people and as training institutions, to maintain our own styles and our own institutional values in the global space that is opening up, without loosing sight of our main objective: the training of people through the exchange of knowledge, as well as the diversity recognition and respect– a passionate challenge which the UOC wants to overcome.

2.2 How formally/explicitly is the notion of Virtual Campus articulated? Is there a formal statement/declaration? Are all actors aware of its existence?

The Virtual campus is the main tool for the development of the university. All members of the community (students, faculty, management staff…) make use of it daily. So, it is useful as a working tool for students and administrators.

Moreover, as a platform, its structure allows a widely shared training space, which makes it possible the creation of a real educational community. The need for a virtual community in order to offer a real learning space was seen and supported from the very beginning. All members of the community can interact. From their homes, by means of the Virtual Campus, students receive personal attention, interact with their classmates, counsellors and tutors, gain access to university services, take part in virtual work or debate forums, and have the opportunity to come in contact with the world's extensive university scientific and cultural community.

The interaction and exchange of information between the student and the teaching staff is not enough to achieve a significant learning of a certain issue. Interactivity and relation with other members of the institution make the students feel identified with the university, and that may contribute them being more motivated.

2.3 Which infrastructure has been set up?

The Virtual Campus is an Intranet based entirely on the client-server web technology which integrates a series of services and applications by using the same interface. All functions of the

Virtual Campus are applications that have been specifically designed to provide an efficient environment for tele-co-operation and tele-education.

2.4   Which software is being used?

The end-user platform is composed of the following elements: the personal computer, the software and the network connection.

The software necessary to work is basically:

Microsoft Windows'95 – Windows'95 is the de facto operating system standard in the market for PCs, with a market share higher than 80%. The advent of Windows'95 has nearly extinguished the famous MS-DOS and its commands, necessary to remember for getting the most common functions. With Windows'95 provides a more intuitive and user friendly environment where nearly all functionality is accessible by clicking on the mouse. Windo0ws'95 is improving the configuration of any peripheral attached to the system such as CD drive, printer, scanner, etc.

Microsoft Office Pro **–** The work on the campus will requires the elaboration of assignments, reports, answer to exercises, etc. Most of this work will have to be shared among the rest of student collages -e.g. for co-operative work- and with professors -e.g. for evaluation, tracking student performance, etc.-. In order to guarantee compatibility, Microsoft Office Pro has been chosen as the common tool. Microsoft Office Pro suite includes a word processor (WORD), a spreadsheet (EXCEL), a graphical editor (POWERPOINT) and a database (ACCESS). One important aspect of Office'97 is that all applications will have the ability to publish in HTML format.

Internet Web Browser **–** A browser is a specific application designed to navigate and retrieve information from Internet resources. Browsers have recently expanded their functionality and now support different kinds of media. There are two main browsers on the market -Microsoft Explorer and Netscape Navigator. Either can be used as a web browser in the Virtual Campus. However, the versions are extremely important: Netscape 3.01 (gold versions does not work properly) and Explorer 4.0.

2.5   How is the Virtual Campus structured?

The Virtual Campus is made up of a series of functions that reproduces the structure of a traditional university. This is done in an innovative way that backs up a revolutionary student-centred pedagogical model, which focuses on endowing the learning process with maximum

flexibility over time and space. Through the Virtual Campus students can access on-line educational materials, library resources, general academic and cultural information, enquire about student management services, and interact with professors or other students through pre-defined communication channels such as forums of debate, activity spaces, etc. So that it is used to support all educational processes that take place between the university community (students, teachers, university staff). The VC provides such tele-educational services as forums of debate, access to library resources, general academic and cultural information, student management services, etc. The Virtual Campus actually supports a total number of 15.000 users.

The specific functions of the Virtual Campus (mailboxes, HTML Hyperlink, application Hyperlink) give it high adaptability, scalability and configuration capacity to other educational frameworks.

It is the result of the integration of several building blocks that carry out specialised tasks. The overall software architecture addresses the specific needs of tele-education and collaborative work, provides flexibility, responds to the different needs at the end-user level, and is based on open standards and designed to support a large number of users.

The technical architecture of the Virtual Campus is based on three main support systems:

- The user platform.
This consists of a standard PC connected to the server platform by means of Internet. The recommended platform is Microsoft Windows'95. The WWW browser must support HTML 3.x, Java and JavaScript, such as Microsoft Explorer and Netscape Navigator (version 4.0 or higher).

- *The communication system*.
The communication system facilitates access to the server platform from the user terminal with the Internet transport protocol TCP/IP. The server platform is connected to Internet via high capacity links so that it can support a large number of concurrent users. The user connects via a dial-up connection.

- *The server platform.*
The server platform has been conceived as a modular architecture divided into three main levels (the user-interface level, the application level and the application-server level), each of which carry out specialised tasks within the overall system.

2.6 Which actors are involved in the initiative (level/position? number of actors out of total)

All in all approximately 250 people are running the system and using it as a working tool. But, at the same time, all these people are asked for proposals of improvements from their different fields of expertise: technological, methodological… so that the tool may be always adapted to the users needs and the goals of the institution.

The UOC is structured in different areas. This structure is far from the concept of organisation and working style of traditional universities. A part from the management areas and other departments running the institution daily, the teaching and learning process takes place within the virtual campus thanks to the following actors:

- **Faculty**. Three different types of educators carry out the teaching activities:

- *Professors:* full-time teachers. They design the teaching plan of each subject and take care of contents;
- *Counsellors:* distance teachers. They guide the students all along their studies at the university;
- *Tutors:* distance teachers, experts in each subject or speciality of knowledge.

They do not usually have face-to-face contacts with the students, but give guidance, deal students' doubts and needs and provide them with tools and approaches to help them carry out their own learning process. The teacher no longer acts as a source of information and becomes a facilitator of learning.

- **Co-ordinators of educators**. They train and co-ordinate the job of educators (full-time teachers, counsellors and advisors).

- **Instructional designers.** They design the learning materials from a pedagogical and methodological point of view.

2.7 How is communication managed and delivered?

All in all approximately 250 people are running the system and using it as a working tool. But, at the same time, all these people are asked for proposals of improvements from their different

---

fields of expertise: technological, methodological… so that the tool may be always adapted to the users needs and the goals of the institution.

The UOC is structured in different areas. This structure is far from the concept of organisation and working style of traditional universities. A part from the management areas and other departments running the institution daily, the teaching and learning process takes place within the virtual campus thanks to the following actors:

- **Faculty**. Three different types of educators carry out the teaching activities:

- *Professors:* full-time teachers. They design the teaching plan of each subject and take care of contents;
- *Counsellors:* distance teachers. They guide the students all along their studies at the university;
- *Tutors:* distance teachers, experts in each subject or speciality of knowledge.

They do not usually have face-to-face contacts with the students, but give guidance, deal students' doubts and needs and provide them with tools and approaches to help them carry out their own learning process. The teacher no longer acts as a source of information and becomes a facilitator of learning.

- **Co-ordinators of educators**. They train and co-ordinate the job of educators (full-time teachers, counsellors and advisors).

- **Instructional designers.** They design the learning materials from a pedagogical and methodological point of view.

2.8   How are classes taught? What subjects are taught?

Classes are taught virtually and take place in this virtual campus teaching area. This area has the following functionalities:

- *message to the tutor: f*rom here the student can send a message to the tutor; the important point here is that the Virtual Campus automatically configures this option so that for each student, the appropriate tutor's name is selected and automatically used for this message.
- *subject mailbox:* this is a common area with access for students and tutor; this would be considered the equivalent of a traditional classroom. The Virtual Campus ensures that after

logging in, the students access to the correct "classroom"; i.e. the students and tutor virtually "meet" and can communicate with if they belong to the same group. By clicking in this area the participants will find a bulletin board, a forum and a debate space.

- *list of students:* the students classroom list is where all fellow students and their tutor are listed (photo, names and curriculum).
- *related material:* the materials area is where everybody can find materials related to the subject, activity or course.

2.9 What kind of materials are available? How are materials delivered?

One of the UOC's main goals is to create a learning system where students can not only acquire knowledge and promote their skills but also learn to learn. In this learning process, achievement in the assimilation of the different objectives is primarily based on the quality of the materials, which are carefully designed to be dynamic, intuitive and self-explanatory for students in a distance-education environment.

For each course, students are provided with a set of multimedia study materials (print, Web-based, discs, videos, computer programmes, cassettes, etc.) which contains objectives, contents, self-assessment instruments, activities and assessment criteria. As a result of the research and development carried out by the UOC in the field of new technologies, the university is currently developing and experimenting with new innovative types of educational materials. Therefore, there tends to be an increase in the number and quality of digital-based materials.

2.10 Are any innovative learning methods applied (group work, project work, problem solving etc.)

One of the great challenges facing the UOC is to apply the latest technologies and methodologies available in order to offer a higher quality education. For this purpose, the UOC has the mission of staying ahead of the newest technological developments and being informed on the progress made by other institutions. Among the innovation priorities of the UOC it is worth pointing out the methodologies and techniques used in the creation of teaching materials for distance education, the creation of applications specifically designed for interactive education, computer sciences and communications, and evaluation methodologies and techniques. Other projects of innovation and research the university is carrying out are, more specifically: the organisation of the teaching action support area, the telematic academic

management system, training virtual trainers, the methodological resources assistant and the web-based learning materials.

In order to forge new ground in the field of open and distance education, the UOC is always interested in establishing new collaborative relationships with universities, institutions and companies from all over the world.

The innovation efforts made by the UOC have been recently rewarded with the Bangemann Challenge Prize of the European Commission for the best telematic initiative in distance education.

2.11 How is the Virtual Campus managed, i.e. what mechanism exists for co-ordinating the initiative organisation-wide? Which actors are involved?

The Information Systems Area manages the virtual campus, technologically. Nevertheless, all members of the community control different parts of the application, depending on the type of work to develop. i.,e, people training and co-ordinating virtual teachers have access and may decide on the structure of the teaching areas.

Finally, the Rector and management staffs at the charge of the institution have control and manage the whole project.

3. LEARNERS SERVICES AND IMPLICATION

3.1 Which services have been set up for learners (administrative, technological help etc)?

In distance learning, permanent encouragement and support are fundamental for academic success. The Universitat Oberta de Catalunya was born with a profound spirit of service vocation in order to break with the isolation of students in traditional distance-learning models.

Since the UOC is not a standard university, it is important to consider the particular nature of its student community, primarily an adult population. Most UOC students are between 25 and 40 years old, most of them work and four out of ten have children. The UOC has to commit itself to offering service that truly matches the needs of its community.

A wide range of services addressed to students are made available through the Virtual Campus:

- *Administration services*. Students can access the University secretary from home at any time of the day or night, consult UOC regulations and study plans, register for new courses and exams, consult results, modify contact data, request certificates, and ask for answers to specific questions.

- *Associations*. Students have the option to create their own student associations and have a restricted discussion area in the Virtual Campus where they are able to exchange information and organise activities.

- *Community forums.* There is a series of different discussion forums open to everybody at the UOC in which students, professors, etc. can discuss topics of interest in a free and open way. Some forums are organised around specific topics of common interest: culture, sport, games, etc.

- *Notice Board*. Within the Virtual Campus students are able to send and read messages using the general notice-board which posts messages concerning the buying and selling of computers, cars, houses, etc., as well as the advertising of events and activities.

- *Purchase Co-operative*. La Virtual is a co-operative that belongs to the students, professors and staff of the UOC and allows them to negotiate product cost and buy products at reasonable prices. Currently, La Virtual offers hardware and software applications and programmes, books, bank services, house supplies, etc.

- *Publishing.* EDIUOC is the UOC publishing house and is dedicated to publishing book series which may be of interest to the students of the University.

- *Employment Bureau*. A specific space where the job offers are made available.

- *Library*. The virtual library at the UOC allows student to access documentation services, the library catalogue, loan services, the information desk, inter-library loan, user training, etc., from home via the Virtual Campus.

- *Cultural activities*. Information on cultural events, as well as discounts on tickets are made available to the UOC community.

The UOC has also a network of Support Centres that also organise cultural, entertainment and leisure activities all over Catalonia.

Moreover, students can make suggestions and consult the services offered through the different mailboxes and forums that make up part of the Virtual Campus. A survey is conducted at the end of each semester in order to gather student opinions, and is aimed at improving the quality of UOC studies and services.

3.2 How are learners tutored and guided? How many students are followed by each tutor?

The tutoring action addressed to students includes two types of professors: tutors and counsellors. Students are assigned a **tutor** for each course. The tutors are specialists in a particular subject and their main functions are to guide, to stimulate and to evaluate the progress of the student's learning process. Each student has been assigned as many tutors as subjects he/she is registered.

The **counsellor** is the person who provides general advice throughout their studies and who becomes their personal advisor and their main interlocutor during the semester. So, every student has one tutor.

Both, tutors and counsellors are assigned a maximum of 75 students per semester.

In order to maintain a good interaction with the students tutors are encourage following some recommendations: use short open comments that invite response; be clear about expectation of the participants; read and answer the messages every day, in order to maintain a fluent communication and not accumulate the messages; send messages to the different mail-boxes, depending on their intention; establish clear norms for participation and procedures grading on-line work that gives credit for good-participation; be a process facilitator: encourage meta-communication about the process, and make suggestions for improving the experience for all the participants.

3.3 How is their work assessed?

Tutors and counsellors are mainly assessed through a survey answered by the students at the end of each semester, in which they evaluate dedication, ability to solve doubts, level of knowledge on the subject taught, ability to encourage students to work together, attention paid to their questions and requirements…

Moreover, tutors and counsellors are trained at the beginning of each semester and guided by the full-time teachers during the first period. This is also, from the point of view of the staff, a clear indicator of the progress, level of work and efficiency of distance teachers.

3.4   What accreditation mechanisms have been established?

Students have two possibilities according to their assessment:

- Accomplishing a *final exam* at the end of the semester or the course;
- Following a *continuous assessment*: it provides activities to be completed during the semester. They are the best guarantee of the achieving of the students learning objectives.

4. EVALUATION SYSTEM

4.1   Which evaluation approach has been adopted: which are the objectives of evaluation? which are the objects? which actors are involved? what criteria, methods and tools are being used to monitor/evaluate the progress/success of the initiative

The virtual campus and the institution itself are evaluated as follows:

- by means of surveys: answered by all members of the community (faculty, students, management staff, administrators,…);
- by means of the open forums of debate (suggestions, new proposals, complains,…everything is taken into account in order to evaluate the state of the art of the university and work on possible improvements).

4.2   Are evaluation results available? What has changed for the target group(s) ever since the Virtual Campus initiative was started? In what way did they benefit from the initiative? What kind of new knowledge was gained by the initiators (maybe the plan did not work the way they wanted it to work; what did they change during the process?)

In 1995 the UOC was established as a small virtual community, with 200 students and no more than 30 people as administrators or professors. They communicated through the "First Class" electronic mail system and teaching and learning process developed this way.

Now, the initiative has become a wide virtual distance education community with 16.000 users.

The reality is that the world of training is moving towards the future at a very high speed. The existence of a world-wide training space is already becoming a reality. However, we must take care, both as people and as training institutions , to maintain our own styles and our own institutional values in the global space that is opening up, without loosing sight of our main objective: the training of people through the exchange of knowledge, as well as the diversity recognition and respect - a passionate challenge which the UOC wants to overcome.

4.3   What were the innovative aspects of the learning activities that can be applied again? What other side effects did the initiative have so far (other organisations carry out initiatives with the same concept/approach/method etc.) Are there any future plans for continuing/expanding the initiative?

Opening university spaces to virtuality was something innovative when the university was set up but it has become a key item for the future plans and expansion of the initiative. Four adavantages to be obtained by opening these spaces to virtuality could be analysed:

Collecting new students. New technologies can supply university access to students who could not because of timetable or geographical location. But we must remember it is not only opening the university by incorporating these new technologies but also bringing the university to every single student's home, going in search of the ever growing group of people keen on learning.

Improving the university's image. At the moment the new technologies are giving institutions a better image. But we cannot fall into a cult to technology within educational institutions. It should be placed as a tool, not as a goal in itself.

Costs reduction. It is widely known that technology applied to education can produce a short-term reduction in costs. But they will be reduced only as long as the transformations in the educational process is rationalised according to quality considerations and not just to economy interests.

Improving the educational model. Some universities may take advantage of new technologies to introduce pedagogical changes in teaching dynamics, as well as to foster innovative materials. It is not only about doing the same through internet, but understanding there is a change in roles which affects the agent and the subject (teachers, students, materials, evaluation, etc.) that take part in the educational model.

Äbo Akademi University, Turku, Finland

1   THE CONTEXT

1.1   The originating organisation (e.g. University) and its socio-economic environment

Åbo Akademi University considers its principal task meeting the Swedish-speaking population's higher education and research needs. The Swedish-speaking population (approximately 300 000 or 6 %) lives in a geographically spread area along the Finnish coast (1000 km). The university is situated in Åbo/Turku and offers both undergraduate and graduate studies to some 6,500 students. Åbo Akademi University has seven faculties, five of which are located in Åbo and two in Vasa; it also has many institutes, institutions and centres offering teaching and research services. Co-operation with other universities especially in Åbo is of great importance, and ties with industry and society at large are considered crucial.

The Centre for Continuing Education (CCE) meets the needs for academic education among adult students. Each year approximately 7,500 mature students in different parts of Swedish-speaking Finland take part in open-university courses and continuing external studies.

1.2   A historical view of education in the organisation

In 1640 a Swedish count, Per Brahe, founded the Royal Academy on the same site occupied by Åbo Akademi today. In 1827 a dreadful fire broke out in Åbo destroying a large part of the town and the university. The following year the Academy was moved to the new capital of Finland and subsequently became Helsinki University. In 1918 the new Åbo Akademi was founded as a full university. This was initially a private institution and was maintained by the Foundation for Åbo Akademi until it became a state university in 1981.

In 1918 Åbo Akademi was founded with three faculties: Arts, Mathematics & Natural Sciences, and Political Science. During the following decades the faculty of Chemical Engineering (1920), Faculty of Theology (1924), School of Economics and Business Administration (1927), Faculty of Education (1974/Vasa) and Faculty of Social and Caring Sciences (1992/Vasa) were founded.

The Centre for Continuing Education (CCE) was founded in 1987 as an independent institution within the university. In 1990 another Centre for Continuing Education was founded in connection to the faculties in Vasa. The CCE serves different professional groups, individuals and organisations mainly outside the university. During the last few years the co-operation between the CCE and the faculties has increased and the undergraduate students at the university are now a growing part of the CCE-students.

The activities at the CEE are largely based on the academic expertise existing within the area of the university research and education. Types of training offered by the CEE are open-university courses, long continuing education programmes (3 month - 3 years), short training courses (up to 10 credits) and seminars. The CCE also tailors courses according to the clients wishes and needs. In the activities the CCE aim at a multidisciplinary and problem-focused approach. The CCE is emphasising the pedagogical development work and is largely seen as the centre for pedagogical development of the university.

1.3   The institutional context and the place for the Virtual Campus experiment

The **Åbo Akademi University** is on a principal level interested in developing the virtual university concept, but because of a lack of resources there is no project overlapping every department. Two years ago the Rector founded a working group with the main task to develop the infrastructure for virtual contacts (teaching, meetings and other administrative purposes) between the university campuses in Åbo and Vasa. As a result of this group an ATM-network was established. Several departments have also developed different web-based solutions for delivering study material, teaching and study information to the students. The Department of Computer Science should here be given special recognition.

On a national level the **Ministry of Education** has set up a national strategy for education including the development of a virtual university. In recent years the electronic industry has grown rapidly in Finland, and the Finnish people belongs to the top-users of the Internet in the world (60% of the population has access to the Internet.) Every school and every library is connected to the Internet. The readiness for virtual learning is supposed to be on a high level.

Information networks is seen as a means of offering new opportunities to support teaching and learning in a country with long distances and a small population. The Ministry stresses the need "to incorporate the numerous virtual study projects of individual universities and researchers networks into a nation-wide network to guarantee more flexible study opportunities and to strengthen networking in research". The Ministry of Education has launched a project to plan and co-ordinate the national virtual school and virtual university project. Additionally the goal of the Ministry is to establish a multidisciplinary virtual university "to produce and transmit high-quality educational services and enable network-oriented research. The network will include the services offered by the virtual open university". (For further information about the open university in Finland check INFO@avoinyliopisto.fi. An English version is available.)

As mentioned before **the CEE at Åbo Akademi University** has for a long time been involved in pedagogical experiments and new ways of teaching and learning (Baltic Sea University Programme, Virtue, Humanities etc and many regional distance education programmes). The experiences include different kinds of flexible learning environments using telephones, videoconferencing, radio, computer-networks, written material, tutor-supported learning, books, face-to-face teaching etc. In Finland this concept is called "mixed mode" and is considered to be a rather effective way of learning. The experience is that the advantage of contact education must not be ignored.

Although the Ministry of Education is planning a nation-wide virtual university, Åbo Akademi University has a special responsibility to look after the Swedish interests. The CEE will have a crucial role in developing the "Swedish" virtual university in Finland, particularly as the borders between the CCE and other university departments are disappearing.

1.4 The start-up phase: Who initiated the idea that the organisation should set up a Virtual Campus? When did this happen? Which was the motivation/the needs expressed? Which were the initial goals? Which was the economic investment/budget allocated?

Due to geographical facts and the decreasing interest among university teachers to travel far away to teach classes of local groups of adult students, the need to develop various kinds of distance learning possibilities has increased. This evolution is still on its way.

The idea of the virtual university emanates from experiences of flexible learning environments and the increasing use of computers in education, business and everyday life. There is an obvious need and demand among students of all ages to develop new learning environments. The university departments also see a virtual university as a competitive advantage, and as a way to get money and students.

At the CCE a three-year project has started in 1999 aiming to develop open and flexible learning environments (virtual university). The goal is to achieve a 70 percent rate of "virtualisation" of the courses by the end of 2001. The rate today including all kinds of flexible and open learning solutions ("mixed modes") is about 15 percent. The virtualisation project is part of a bigger quality project of the Centre. The money invested in the project is about 2,5 million FIM (415 000 euro).

In the following we will describe the virtual university project at the CCE at Åbo Akademi University.

2   DESCRIPTION OF THE VIRTUAL CAMPUS

2.1   Design principles: what are the policy objectives, which is/are the target group/s, etc.

The goal of the development of the learning environment is to give access to and to reach new target groups, to adjust the educational programs to meet the students needs, to create opportunities for life-long learning and to use information technology as a means to achieve a high-quality education.

Within the process the focus is both on the content, the pedagogy and on the technical design and performance.

One particular goal is to offer the Swedish speaking people the same learning possibilities as the Finnish speaking people. At the same time the virtual university will hopefully serve as a platform for international educational ambitions. Another goal is to maintain market shares and finally to achieve other strategic goals which are set up for the CCE.

2.2 How formally/explicitly is the notion of Virtual Campus articulated? Is there a formal statement/declaration? Are all actors aware of its existence?

In strategic documents the Åbo Akademi University has clearly expressed a wish to develop the virtual university. Due to decreasing budgets, the university as a whole has unfortunately no energy to realise these ambitions. Furthermore being an old and traditional university changes happen very slowly. It is of course possible that the money promised by the Ministry of Education will activate the university departments. By the year 2002 the universities and the polytechnics are by the ministry requested to present a strategic document of how they are going to develop their virtual university concepts.

The CCE's concentration on developing flexible learning environments is financially made possible thanks to a quality award from the Ministry of Education. The personnel and the board of the Centre have accepted the plans and about half of the staff (totally 45) is involved in the work. The Rector and the university management has agreed to and supported the plans by earmarking money for the project. At least indirectly the project will also serve the undergraduate students at the university.

2.3 Which infrastructure has been set up?

As described above the CCE has experimented with different kinds of technical equipment during the last ten years. Within the appropriate project the infrastructure consists of

A server: Pentium 500 MHz PIII with 512MB RAM

3   x 18 GB SCSI-HD RAID5 -> totally 36 GB storage

Window NT server operating-system connected to a shared 10MB ethernet LocalAreaNetwork

The co-ordinator /course-director has as minimum a multimedia Pentium 100Mhz 32 MB and at maximum a Pentium 350Mhz 64 MB or more.

Additionally CCE has a videoconference studio and equipment for audio-conferencing.

To the infrastructure we also include the supporting staff.

2.4   Which software is being used?

In the current project:

Windows NT workstation 4 as operating system

Microsoft FrontPage as a design tool

LotusLearningSpace for virtual learning environments

2.5   How is the Virtual Campus structured?

This is one of the bigger jobs needed to be done, but the main content is:

Practical information

Registration

Library services

Course schedule

       Course list

       For each course

       Practical information

       Participants

       Course material / Resources

       Discussion forum or chat-room

       FAQ on course contents

Self test

  Learning Styles

       Prerequisites

       Demo course for learning the system

Helpdesk

Study guidance

Evaluation

Tips to the teachers & administrators

2.6 Which actors are involved in the initiative (level/position? number of actors out of total)

All in all approximately 25 people are involved in the project. In addition to the administrative board, mainly CCE-staff (education managers, course leaders/co-ordinators, technical expertise) and university teachers. During the next two years the intention is to offer courses in a new flexible way in about ten university subjects. For each subject there will be different teams of experts (content-experts, technical support, pedagogical support, study guidance, administrative support), whose responsibility is to find out the best solution for each subject.

2.7 How is communication managed and delivered?

Depending on the design of the course or educational program, communication between the actors (teacher, technical support, tutor, study adviser, learners) is structured in different ways; whole group, project groups, ad hoc groups etc.
The communication actors are shown in the picture below.

2.8 How are classes taught? What subjects are taught?

Subjects: Courses in: Fine arts, Law, Women's Studies, Theology, Psychology, Computer Science, Intercultural Communication, Accounting, Information Sciences, Economic Geography.

2.9 What kinds of materials are available? How are materials delivered?

Books will probably be the most important study materials. Complementary materials are articles, case studies, audio-tapes (radio programs) and videos. In the virtual learning

environment web-based material (including on line guides, textbooks) and Power Point applications will be used.

2.10 Are any innovative learning methods applied (group work, project work, problem solving etc.)

At the CCE several innovative learning methods have been used (co-operative learning, suggestopedia, problem-focused learning as well as various modes of examination) and these methods will be adjusted to the new learning environment. The starting point of the course development is student oriented and the technical solutions are supposed to support the learners' learning processes. There is no standard solution applicable to every course. The aim and the content of each course indicate the learning method to be used. In a Swedish context in Finland the virtual university has to be adjusted to small groups. This is one of the new demands.

A great importance is attached to developing the pedagogical competence and ICT-competence among teachers and course leaders.

2.11 How is the Virtual Campus managed, i.e. what mechanism exists for co-ordinating the initiative organisation-wide? Which actors are involved?

During the next two years the virtual university will be managed within the project that has been set up for this purpose. For the moment there is a co-ordinating board and two subprojects, one for developing the technical platform and the other for the pedagogical adjustments. Additionally there are teams for developing content and learning environment on a course level. In the future the virtual university model is hopefully the most used way of delivering education at the CCE.

The CCE is a project-based and team-oriented organisation and is used to changes caused by new demands. The challenge is to get university teachers and researchers involved in order to maintain high quality contents.

3. LEARNERS SERVICES AND IMPLICATION

3.1 Which services have been set up for learners (administrative, technological help etc)?

The technical services should manage with an Internet-connected PC with a standard browser, version Netscape 4.5 or newer. Furthermore, real-audio is required for audio-applications.

For this purpose a CD-ROM will be prepared containing program files, as well as a technical resource page on our campus. The page will have info links to different kinds of technical support. The technical support person, who is part of every course team, will also to a certain degree function as a technical tutor for the course itself.

The students will have portable computers at their disposal that they can borrow for the duration of their studies.

The administrative assistance will first be given by an appointed course leader and locally by a tutor (under the guidance of the course director). Curricular information: time, place, teacher, prerequisites, registrations etc. will also be available on the Internet.

The network of local adult education institutions, which co-operates with the CCE, take care of practical arrangements locally and offers practical assistance.

3.2 How are learners tutored and guided? How many students are followed by each tutor?

Curricular information and guidance will be available on both the Internet and on paper, and is supplemented by oral information given by the tutor or the course director in charge.

This form of curricular information and tutor support has been used by the CCE before, but the delegation of tasks among those involved needs to be fine-tuned. From the students point of view it is important that the information is adapted to its purpose and easily accessible.

As described above the Swedish virtual university is not intended for mass instruction, as the learning environment is developed with small groups in mind (10 students per tutor at the most).

3.3   How is their work assessed?

The courses are assessed much in the same way as 'non'virtual' courses, i.e. through written exams at local study centres, home exams, essays, logbooks, and exercises on the Web. However, we encourage the forms of examination that require more reflection and application by the students than 'traditional' written exams. In virtual courses we emphasise that all exercises and activities are part of examination. All or a selection of exercises are assessed (the students know which exercises are assessed and which ones do not influence the grade).

3.4   What accreditation mechanisms have been established?

The CCE is an institute at the university and the courses delivered are mainly identical with the courses in the undergraduate programmes. The professor for open-university courses at the department sets the goals, approves the teachers and decides on examination. Certain administrative routines guarantee the accreditation of external courses.

4   EVALUATION SYSTEM

4.1   Which evaluation approach has been adopted: which are the objectives of evaluation? Which are the objects? Which actors are involved? What criteria, methods and tools are being used to monitor/evaluate the progress/success of the initiative?

At present we evaluate

- **courses** using different kinds of written inquiries. The learners fill in certain forms at the end of a course. Here the learners evaluate the teacher's teaching ability, the materials, the learning process, the learner's own contribution, timetable etc.

- **the teachers' qualifications** are evaluated by a professor at the university (open-university courses)

- **the course leaders' competence** and skills are evaluated in discussions with the director or team leader.

- **The activities of the centre** are evaluated in yearly discussions with the Rector of the university

4.2 Are evaluation results available? What has changed for the target group(s) ever since the Virtual Campus initiative was started? In what way did they benefit from the initiative? What kind of new knowledge was gained by the initiators (maybe the plan did not work the way they wanted it to work; what did they change during the process?)

At present there is no evaluation available for the <u>virtual</u> university concept. A system for evaluation is under construction.

4.3 What were the innovative aspects of the learning activities that can be applied again? What other side effects did the initiative have so far (other organisations carry out initiatives with the same concept/approach/method etc.) Are there any future plans for continuing/expanding the initiative?

The methods and learning activities are being tested during autumn 2000-sprin 2001. However, we are going to continue using the sameactivities in the future, only modifying them based on the feedback we get.

In the virtual concept we use more exercises requiring reflection on and application of the theories. During face-to-face meetings the students are expected to be active, working in groups (we use various co-operative learning methods, case-studies, problem-oriented activities etc). We encourage other forms of examination than 'traditional' written exams, e.g. logbooks and project work; all activities in a course are part of examination.

The initiatives within the project at the Centre for Continuing Education have positive spin off-effects for the departments at Åbo Akademi, as their teachers are welcome to take part in pedagogical training organised within the framework of the quality project. Thus the new ideas also influence the teaching given to ordinary undergraduates at the departments.

- **University College of London, London, England**

1. CONTEXT

1.1 The originating organisation and its socio-environment

Student and staff numbers:

Student numbers:	Undergraduate	10,338	
	Postgraduate	5,280	
	Total	15,618	
Overseas student		4,694	(European Union – 1,900)
Staff		2,500	

UCL was founded on radical principles and has never shied away from challenging orthodox approaches to research. The transfer of technology innovation to industry has resulted in the founding of 15 new-technology companies at UCL in the past five years. UCL is the largest of over 50 colleges and institutes that make up the federal University of London. It is the oldest university in London.

University College London is a high-level research university rated consistently amongst the top five universities in the United Kingdom.

1.2 A historical view of education in the organisation

1.2.1 The particular position of University College London in the development of English Universities.

In 1825 Thomas Campbell, the Scottish poet, wrote an open letter in the Times to Henry Brougham, MP, calling for the establishment of a university in London. At that time, the only universities in England were those at Oxford and Cambridge, which were restricted to members of the Church of England. Brougham became the driving force behind a campaign which was actively supported by those excluded from university education – religious non-conformists, Catholics and Jews. The campaign was inspired by the ideas of Jeremy Bentham, the philosopher of Utilitarianism, who at the age of 78 was a venerated figure, especially amongst the followers of his free-thinking ideas.

In 1826 the University of London (now UCL) was formally founded on 11th February. A fundamental principle was that not only would students of all beliefs be allowed entry, but that no religious subjects would be taught. The established interests of Oxford and Cambridge Universities and the Church prevented the University of London receiving a royal charter, so it was set up as a joint stock company. The new University was vilified by the Church as 'The Godless Institution of Gower Street', and by the Tory press as 'The Cockney College', because of its aim to extend access to university education from the very rich to the growing new middle class. The new 24-member Council adopted the building design submitted by William Wilkins, who later designed the National Gallery in Trafalgar Square.

In June 1828, a meeting was held to set up King's College as a rival to the new University, supported by the Establishment and the Anglican Church. The first academic sessions of the University started in October. Chairs were established in several subjects that had not previously been taught in English universities, for instance modern foreign languages and English language and literature. The systematic university study of law began at UCL. Instruction at UCL was primarily by means of lectures and written examinations - reflection of practice in Scotland and Germany rather than Oxford and Cambridge Universities.

In 1836 the University was renamed 'University College' and received its Royal Charter on 28th November. On the same day, a new 'University of London' was established with the power to award degrees in Medicine, Arts and Laws to students from both University College and King's College.

In the 1840s UCL constructed the first purpose-built laboratory for the teaching of chemistry and founded the first chairs of Civil Engineering and Architecture in the country.

In 1846, at University College Hospital, Robert Liston performed the first ever operation under anaesthetic in Europe. From 1863-65 the first Japanese to study in the West came to UCL - and eventually played leading parts in the creation of modern Japan. In 1869 the first series of 'lectures for ladies' was given, under the auspices of the London Ladies' Educational Association. The courses were given outside the College premises, by Carey Foster, Professor of Physics, and Henry Morley, Professor of English and the prime mover in the extension of university education to women. Later that year, women were allowed to attend classes within the College in the Physics and Chemistry labs.

In 1871 the first mixed classes for men and women were held. Until then, women were always taught separately from men, and used separate entrances to the College. In October, the Slade

---

School of Fine Art was opened in the newly built North Wing. Students at the Slade School of Fine Art influenced the course of British art for decades - including Wyndham Lewis, Stanley Spencer and Augustus John. In 1878 women were admitted for the first time as full degree students to the Faculties of Science and of Arts and Laws.

In 1890 Professor William Ramsay established the existence of the inert gases argon, neon, xenon and krypton. Professor Norman Collie took the first X-ray in Britain to be used for clinical purposes. In 1904 Professor Ambrose Fleming invented the thermionic valve - which made radio possible and marked the birth of modern electronics.

During the period 1940-41 the building was extensively damaged by war-time bombing, more than any other British university or college.

1.2.2 The involvement of University College London in early experiments in distance and open learning.

As a member of the University of London, in 1985 UCL was a partner in an important experiment designed to enable the constituent colleges of the university to work more closely together, both in teaching and administration and to share their resources. The objective was to enable the constituent colleges to share teaching staff and offer to students a wider variety of courses; at the same time using modern technology to avoid much travelling around London, which due to the size of the city was very time consuming. It was realised that administrative meetings could also take place over the network, which would again save, time and travelling.

This University of London network was also linked to the European Olympus satellite through EUROSTEP (an European educational users organisation) and this took place in one of the early European Community projects, CAPTIVE (Co-operative Authoring and Production for Teaching with Interactive Video in Education), linking various universities and medical institutions in Norway, Belgium, Nederland and Portugal.

Since this time UCL has been involved in a number of European distance teaching initiatives in the COMET I and II programmes and in the SOCRATES Programme. Also UCL has played a leading role in the UK SuperJANET programme linking 6 major UK medical schools for collaborative real-time synchronous teaching of medical student in the teaching of surgery. The video network used a 2Mbps channel carried over the SuperJANET ATM network. A major part of the use of synchronous interactive video networks has been concerned with medical applications.

The University now has the largest medical school in UK. Currently the medical syllabus is being reviewed and renewed, to be based upon resources based learning methods. Also the University is taking its first look at distance learning and determining whether this is an area in which its should be active, or whether its role is that of an institution dedicated to traditional teaching methods based around the tutorial system.

1.3 The institutional context and the place of the Virtual Campus experiment

1.3.1 The technology context:

In 1986 the University of London set up the LIVENET (London Interactive Video in Education Network) Project to link the major university institutions of the federal university with the main object of reducing the time spent on travelling across London, especially for students and staff taking part in intercollegiate courses. This project had British Telecom as an industrial sponsor. The project ran until 1992 when it was taken over by University College London and one of the main applications was medical education, as the medical campus was distributed between different sites.

LIVENET was an analogue optical fibre network with a star configuration. Each site had 4 input and output optical fibre channels, carrying video and audio signals and in addition a 2Mbps data link for control purposes. This enabled multiple interactive audio and video links to be made between all connected sites and was used for teaching in a wide variety of subject domains including science, medicine, engineering and the humanities.

This network has been upgraded to operate as a hybrid network using both ISDN and analogue audio/video links. ISDN H.320 technology was used operating up to ISDN-6 (384 Kbps). Links could be made with other centres throughout the world, and multi-point conferences were possible at low cost using the UK Videoconferencing Multi-point Control Unit (MCU) at the University of Edinburgh. Currently new technologies based upon IP videoconferencing technology are being tested, such as H.323 together with low-latency MPEG-1 and MPEG-2 technology. The latter is providing higher resolution images at up to 10 Mbps. Also regular teaching is taking place transmitting high resolution Power Point slides over IP with the ISDN video-conferencing facility providing moving pictures of teacher and students.

1.3.2. The models explored

Five models have been explored and developed over a number of years. The overall conclusion at this time is that this technology is best applied in small group teaching in relatively small rooms (seminar rooms), in the more advanced stages of the courses, where interaction is a valuable and important factor in the teaching process. This real-time synchronous teaching process should ideally been complemented by asynchronous teaching and learning which currently can take place over the INTERNET using web-based learning resources.

1. Initially a special room was provided at each site on LIVENET, and this was provided with 3 cameras and a large display screen for the incoming picture. The cameras provided images of the teacher, the students and a document camera. The appropriate image to be transmitted to the distance sites was selected by the teacher. As this was an analogue system there were no audio delays and interaction was instantaneous. Commonly between 5 and 10 sites would take part in session.

   This model concerns networking between different campuses of the same university which are sufficiently close that private or leased optical fibres can provide connectivity. These campuses share the same administration and support organisation, and the objective is to reduce time and cost of travel for students and teachers in a large city.

   The activities are teaching, seminars and meetings.

2. The same rooms and equipment are used as in model 1. The difference is that connectivity is provided through a public service provider, e.g. a telecom company supporting ISDN services.

   This configuration permits both intra-institutional connectivity as in model 1, but where the distances between sites are too great for direct fibre links. The configuration also supports inter-institutional links. Multipoint videoconferencing permits the inclusion of several sites – the optimal number is considered to be about six.

   The activities supported are teaching, seminars and meetings. This includes conventional video conferencing but a distinction must be made between the use of

such systems for teaching and conferencing; teaching over video network does requires awareness of a number of factors which make the inter-person interaction different from face-to-face teaching.

3. The same rooms and equipment are used as in models 1 and 2, except that an additional digital channel is provided to transmit digitised images over the INTERNET. The INTERNET channel can be used jointly with either the analogue LIVENET system or the ISDN system.

    When this system has been applied at UCL, the teacher is remote from all the students and it was found convenient to install a camera in the classroom, remotely controlled by the teacher, to assist in the interactivity between teacher and students.

4. This model would be very similar to model 3, except that the analogue or ISDN channels would be replaced by IP conferencing technology, including H.323. This would permit the network to be more pervasive and systems could operate in the desktop environment as well as using specially equipped teaching rooms, as above.

5. The technology can be further enhanced so that the system is fully digital and MPEG-1 or MPEG-2 used to give improved image quality. Currently MPEG-2 technology has a latency problem. This model would allow video-streaming facilities to be included, which opens the possibility of on-demand learning.

This case study considers two applications, one in medicine and the other in physics.

1.4 Start-up phase:

1.4.1 Who originated the idea?

The two applications discussed in this report were started at different times in the development of the video network. Medical applications have been tested on a number of occasions, principally as demonstrations, but this work then became part of the routine method of delivery of the surgical course and has continued for a number of years. Recently this has been re-assessed and an investment made in re-equipping and re-designing the rooms used for teaching. The physics application was started recently and was designed to overcome some

limitations of the medical system. This has been done successfully and these developments have now been incorporated in the medical courses.

Medical Application: This application has been running for seven years. It was the reason for UCL taking over LIVENET. This application runs every day, providing a clinical topic lecture in surgery shared between two sites of the medical school. This was started at result of discussion between the Dept of Surgery and MMSCC to provide a means of running undergraduate surgical topic course simultaneously on two sites and now being extended to three sites. The inclusion of the third site requires that all communications will be digital.

Physics Application: This application started one year ago, and the objective is to allow lectures to be given to students in the main campus in Gower Street, London by teaching staff who are research workers at the Mullard Space Science Laboratory at Dorking, 40 km outside London. The idea of this project arose from discussions about technology available in UCL and whether it could be used to provide innovations in teaching and learning.

1.4.2   When did this happen?

The original video network, LIVENET was set up in 1986 in a collaborative venture between the University of London and British Telecom. There was a major change when British Telecom's involvement in the project came to an end and the university had to decide whether to continue using this technology independently. Some partners in the BT experiment did not continue, but UCL decided that it provided a suitable and desirable method of teaching in medicine between different sites on the UCL campus and also enabled it to continue some long-standing intercollegiate course. UCL therefore decided to take over and manage the network. Since this time a number of video networks for medical teaching have been set up in UK universities where the sites are distributed.

At this time the system was modified to include ISDN links between sites of the original star network, saving on the costs of some of the direct optical fibre links. The staff on the original LIVENET project were transferred to UCL.

It was an interesting development because this occurred at a time when universities in UK were becoming increasingly competitive and intercollegiate courses were being stopped. The ease with which telecommunications links could be maintained was a major factor in enabled these courses to continue.

1.4.3   What were the initial goals?

The initial goals were to determine if face-to-face teaching could be replaced by a video network teaching with the consequent saving in time and travel in a geographical region where there was considerable collaboration and intercollegiate teaching. Also the economics of this operation had to be determined.

1.4.4   What was the investment?

The original investment at each video teaching site was about 70KEcu and the central site approximately 100Kecu.

The cost of equipping a video teaching site is now 40Kecu. The annual running costs for the network – e.g. ISDN charges and the rental of one analogue link are 20KEcu. The salary costs for support staff are 112KEcu.

As the system adopts IP technology and runs on the INTERNET these running costs and installation costs will continue to fall.

2.   DESCRIPTION OF THE VIRTUAL CAMPUS

2.1 Design principles

2.1.1   What are the policy objectives?

The learning environment is required to provide teaching facilities within the institution and is not concerned student performance monitoring or administration. The objective is to facilitate cost-saving and teaching efficiency. To achieve this, teaching experiments were carried out with a tried technology (video conferencing), and these have progressed to the routine implementation stage. However technology change and development is an integral part of the policy, but the most difficult problem is to provide a network which is reliable, and in particular functions correctly at the times it is required. (In practice our present day experience demonstrates that the technology is reliable, and that almost all failures of the system are due to human error.

The educational content has to be determined and controlled by the teacher, and the role of the LIVENET video network is to facilitate remote interactive teaching and learning. Provision has been made to prepare the content in a suitable format for the technology used.

The policy objective is, in both applications (medicine and physics), to use technology to provide an effective teaching and learning environment which allows staff and students to use their time more effectively, e.g. to save time travelling between different sites on a distributed campus and to share resources.

The current proposals for the learning environment have two components: -

- Real-time (on-line) connectivity across a multi-site campus
- Web-based learning off-line.

A more general approach is to recognise that technology involvement will be through a wide use of INTERNET technology as a delivery mechanism involving for example video networks, video-streaming, handling of high resolution still and moving images and the learning environment will be formed through integrating these technologies.

Considerable effort has been expended at UCL adapting videoconferencing technology to teaching applications and it was realised at an early stage in the experiments that teaching would be significantly different to conferencing. Although the equipment was essentially the same, the way it would be used, in particular the way interaction took place would be different. In conferencing all those taking part expect to interact with their opposite numbers on other sites. In teaching the environment for interaction has to be generated and the students persuaded to take part. This required the whole structure of a teaching session to change and become more visually orientated. It is our belief that the relationship between visual and audio means of communication is different in videoconferencing compared with face-to-face teaching. The talking head of a lecturer with occasional intervention of images and illustrations is particularly boring in the video medium, and other techniques had to be evolved to give the students a sense of involvement, and the confidence to interrupt and make their views known.

Once the immediate objective of facilitating the teaching using videoconferencing technology has been met the next objective is to examine other technological initiatives, such as video streaming, to see if the teaching and learning environment can use these to improve educational facilities.

2.1.2 What is the target group?

Within UCL the target groups have been specifically science and medical students although other applications in the past have included language and humanities subjects. Either the teaching staff or the students have had to travel around London for the teaching to take place. Considerable work has been carried out jointly between UCL and Exeter University in teaching languages over video networks, in this case using low bandwidth IP video technology (EC MICE Project). Currently initiatives are being explored using video streaming for language teaching to bring in foreign broadcasts from satellite.

There is a continuing need to publicise this approach to teaching and learning within UCL (and elsewhere) as the level of awareness of academic colleagues to how technology can be used to improve teaching and learning remains amazingly low. Videoconferencing is becoming more commonly recognised, but there is a need to make people more aware that this technology can be adapted to teaching applications.

2.2 How formally is the Virtual Campus articulated – formal statement?

The virtual environment has come about to meet a practical need within the institution for certain types of course, and is not a unique venture such as setting up an Open University, hence no formal statement has been considered necessary. The Virtual Campus is one of many methods of teaching and learning within the university and the current issue is identifying and defining where this approach is most appropriate within the overall activities of the university.

Efforts are being made through web-sites and demonstrations etc. to raise the awareness of the institution to the availability of this technology for teaching. Probably one of the most effective methods is by carrying out successful implementations and thereafter recommendation by those members of the academic staff involved.

Current experience suggest this approach is more suitable for postgraduate courses or specialised course, attended by small groups of students and which are taught in a distributed manner, where the sharing of resources is an advantage.

2.3 What infrastructure has been set up?

The infrastructure has gone through 3 phases.

Phase 1:

A fibre optic network was set up joining a number of colleges in the federal University of London. This linked sites 50 kms apart. This network carried analogue audio, video and data signals and permitted fully interactive teaching to take place between a number of sites. The system was based upon a central switch supporting a star network.

Phase 2:

The same network configuration moved to digital transmission techniques, primarily based upon ISDN (ISDN-2 and ISDN-6) video conferencing technology. Some analogue links were maintained where a high resolution was required, e.g. medicine. Current practice is to mix ISDN and IP technology, ISDN for video and audio information, and IP for data in the form of high-resolution images. The adoption of digital techniques permitted the network to be connected to sites at much greater distances, and allowed collaboration to other parts of UK, Europe and world-wide.

Phase 3:

The network is moving to adopt IP packet switching videoconferencing technologies and to embrace H.323 and M-Bone technology. This eventually will permit a fully pervasive coverage of the area and the ability to link up with sites world-wide. Developments such as video streaming are being set up and R and D effort is devoted to improving both network and AV facilities.

Infrastructure considerations should recognise there are two requirements:

4   Technical infrastructure as discussed above
- physical network
- technical support staff

5   User Support infrastructure which is concerned with:-
     4   preparation of content material,
     5   maintenance of the network

6   training users to handle the network technology.

The technical support for this infrastructure is two engineers who maintain and develop the technology, and AV technicians locally who maintain the AV equipment in the teaching space.

2.4 Which software is being used?

The system does not run on specific software. Control systems are designed and built locally using languages such as Video Basic and C++. The central switch is computer controlled, using locally written UNIX software.

The overall design of the video teaching network must take into account the production and support of a delivery system, and so it should be able to support various digital platforms. The users and developers should ensure, as far as possible that any solutions are capable of common use and that courseware is does not have features that are platform specific. UCL has been a partner of the ARIADNE Project and has used that system.

2.5   How is the Virtual Campus structured?

These systems have been developed to meet an existing teaching need in a distributed campus, which functions within the overall university administrative and Registry structure. Registry and other administrative services are not directed specifically at the video network and are part of the general structure of the university and make no concession to the network.

2.6   What actors are involved?

The technical support is provided through the Multimedia Support and Communications Centre. The responsibility for the support service lies with the Head of Department. The day to day support is carried out by the engineer and his assistant, supported by a systems analyst who maintain and develops the operating software. Liaison takes place with the University Information Service network group on networking matters.

Teaching is carried out by academic members of the university staff, and these people are encouraged to undergo a short introductory course. Teaching staff are also given help in designing their slides and lectures to make the best use of the video medium.

Students also have a short introduction on how the network operates and the facilities available at the beginning of their courses.

2.7 How is communication managed and delivered?

Originally LIVENET was a private communications network using leased optical fibres provided by British Telecom carrying analogue video and audio signals. This network was managed by the LIVENET project and was independent of the university computer service centres.

The first major development was the introduction of ISDN. Each site set up ports supporting both ISDN-2 and ISDN-6, replacing the leased fibres and reducing costs as the running costs then depended on the amount of use of the system. The system was still managed by the LIVENET group, independently of the computer centres. In UCL the internal analogue video network provided a high level of flexibility to link the ISDN ports to wherever connectivity was required within the campus.

As video communications technology is now becoming digital, the demands on UCL's backbone digital network are becoming significant. A gigabit backbone network has recently been installed and there is now a liaison committee, which ensures collaboration and consultation between the video network staff and the network group in the computer centre. The requirements for video streaming are also being handled by this working group. In the next few years it is expected that the analogue circuits will be replaced and the video network will be entirely digital and an inherent part of the universities network provision. This implies that desktop provision for video will become part of the services provided to the university and probably there will be a working group concerned with video communications as a special service.

2.8   How are classes taught?

In the early experiments teaching was conducted in the same way as face-to-face teaching, i.e. a lecture transferring much information and at the end the opportunity to ask a few questions. This did not work in the remote environment and students were reluctant to ask questions and so interaction was minimal.

The first problem was to introduce an interactive culture into the teaching. Several methods were tried, but the most effective was that one student on each site was the rapporteur for that group. All questions to the group from the teacher were directed through this person, and likewise all replies were given through this person. This person usually held the mobile microphone for this group. This method meant that the person responsible for the answer to individual questions was not identified and so the students were more willing to experiment with their answers.

The students wished to have more multimedia in the lectures, and in medical lectures to have a patient present to illustrate the points being discussed. As a consequence to being more interactive and having more multimedia, the actual information transferred in a lecture reduced and it was important to have back-up material in the form of handouts and additional information available on web-sites, so that the student could access material in their own time – asynchronous learning material.

As a result of considerable discussion a format for video teaching was developed where at specific stages in the lecture interaction was encouraged, and at the same time students were encouraged to interrupt if there were points to be made or questions to be asked. The lecture therefore became more structured, but this did not interfere with the personal style of individual teachers.

2.9 What kinds of materials are available? How much are delivered?

Multimedia material was freely available in the form of slides, overheads, and video. Video could be played from a central image store on demand into the lecture, which was a precursor of the video-on-demand and video-streaming technology now being developed.

It was essential that all students in video network teaching see and hear the same information. The students at the same locations as the teacher viewed illustrated material from a screen in the same way as their remote colleagues.

A recent development made possible by the video-streaming technology is to record lectures to the streaming server and then make them available for viewing by student at different times. This is convenient for revision, later discussions and as resources of medical information. There are issues about how to make suitable recordings for these purposes, and this may have an impact on how the lectures are delivered in the first case.

2.10 Are any innovative learning methods applied (group work, project work, problem solving)?

The basic approach in the medical teaching was problem solving. The teaching was concerned to train students in patient treatment management and not in clinical diagnosis. Diagnosis cannot be precise until a considerable body of data has been assembled, and this data has to be collected, and the time do so may not be in the patient's interest. The teaching is directed at making the best decision about the patient's treatment in the light of the information available and directing the student to consider what information is required and can be available.

The topic being taught was handled by a logical approach that can be displayed as a flow chart. The objective therefore was to teach the students to determine what decisions they could make with the information available to them and what were the deficiencies in their information. The emphasis was on the student using the information they had been given in the lecture, from multimedia and the patient examination, to make clinical decisions.

In both the physics and medical lectures there was a need for high-resolution images and these are increasingly being made available by transmitting this information through PowerPoint or NetMeeting over the INTERNET, which can be done speedily.

2.11 How is the Virtual Campus managed?

As described above.

3. LEARNERS SERVICE AND IMPLICATION

3.1 Which services have been set up for learners?

The real-time synchronous distance teaching over the video network is backed up by asynchronous web-based information, questionnaires etc.

Networked terminals are provided for students to access web-based material, and to access video material available on demand by video streaming technology of lectures and demonstrations of basic clinical techniques, e.g. taking blood.

3.2 How are learners tutored and guided. How many students are followed by each tutor?

Normal methods used in face-to-face teaching. It has been found that although the teacher is not physically present the students are using short periods after the lecture to ask specific question relevant to their own problems.

A visualiser can be used effectively to show text and to develop paper arguments and lines of discussion – e.g. mathematical formulae can be developed writing on paper under a camera. (One intercollegiate course in wave-mechanics is taught, with the formulae being developed stage by stage on paper under the camera).

3.3   How is their work assessed?

Normal methods used in face-to-face teaching, i.e. written examinations and vivas.

3.4   What accreditation mechanisms have been established?

Not relevant as these matters are handled by the Registry. All student, whether taught by remote video methods or conventional methods are regarded as students of UCL and academic matters are handled by the Registrar.

4.   EVALUATION SYSTEM

4.1   Which evaluation approach has been adopted?

Evaluations have been carried out principally using questionnaires and interviews.

4.2   Are evaluations results available?

This section gives a summary of the learning environment (a combination of real-time synchronous video network lectures supplemented by on-line material available asynchronously on laptop computers) based upon tools available from the EC ARIADNE project.

The evaluation material takes three forms: -

- results gathered from interviews
- results gathered from questionnaires
- results gathered from observation.

4.2.1 Results of interviews

Multiple Choice Questionnaires (MCQs)

The design principles such as interactivity, structured material, preset goals, extensive feedback with background information appeal to students.

Th diagrams in the feedback-reinforced knowledge provided a good level of detail.

Feedback from the tutor was equally important.

Helpful in the final assessment, and were useful for self-assessment.

Case studies were useful as they reinforced need got interactivity, background information and explanation of the correct answer. The organisation of the material in short modules with a preset goal help give feel of achievement.

Video-streaming

The topic videos gave student chance to catch up on missed lectures or opportunity to review lectures already attended.

The quality of the video material was as good as the actual lectures.

Omissions, lack of experience in handling technology and quality of projected material did effect the streamed video.

Other modules

The presentation of the lectures in HTML format, e.g. illustrations and diagrams did not add to the quality of the course.

4.2.2   Results of questionnaires

Multiple Choice Questionnaires (MCQs)

The questions were clear and the illustration useful.

There could be some improvement in the feedback, e.g. more detail.

Video-streaming

There were improvements required in the control buttons of the video-viewing tool.

Some users had higher expectations of quality of the images and audio.

Other Modules

User attitudes were positive about flow diagram presentation of Management Pathways (this the flow-diagram approach to treatment management decision mention in section 2.10).

4.2.3   Results of observation

Multiple Choice Questionnaires (MCQs)

MCQs are popular especially as the end of term examinations was imminent.

Self-assessment exercises were the first to attract attention.

Video-streaming

Students were taking notes while watching them.

In discussion with the tutors it was felt it would be difficult for the tutors to design and develop such a course alone, without external support on technical issues, the administrations of the servers and computing infrastructures, as well as the pedagogical design of an on-line curriculum and the development of the modules and pedagogic documents. Although enthusiastic for the use of new technologies the tutors were reluctant to undertake the additional task of re-structuring their teaching strategies and the supporting material they use.

4 2.4   Comments on earlier evaluation of on-line synchronous video-network teaching.

Previous surveys have been consistent in that the proportions of student who favour the use of this technology have been the same.

In favour	52%
Do not mind	40%
Strongly against	8%

These figures come from two unpublished evaluations (the 6 university medical teaching project and the physics teaching project mentioned above).

It is possible that the student and tutor reactions are not the only criteria to take into account, because increasingly financial factors and other convenience factors have to be taken into consideration. Therefore in UCL we anticipate that the medical and physic course will continue to use this technology and there may be pressures for other course to use the same technology.

We also expect that desktop videoconferencing technology (particularly over the INTERNET, rather than using ISDN) will be used for administrative purposes between different sites and departments over the distributed campuses, with other universities and research organisation and within departments.

4.3   What were the innovative aspects of the learning activities that can be applied again? What are the side effects and are there future plans?

This approach to remote or distance teaching and learning has applications in a wide range of subjects. Increasingly, with the expansion of higher education, teaching does not take place on a single campus, and methods, which maintain effective teaching and learning in a distributed environment, are useful. In UCL we will shortly be facing the situation in medicine, where the course is delivered on three sites at three major teaching hospitals, which comprise the Royal Free and University College Medical School.

Either the same lecture is delivered at the same time on each of the three sites by three teachers, or we use telecommunications technology to give this lecture once and transmit it to the other sites. The latter will be the more cost effective, but it is necessary from the pedagogical viewpoint to ensure the remote student are not disadvantaged in any way and that full vision, audio and interaction is available for all students. The current plans are for the lectures to be given on the three sites except for the department of surgery who will conduct experiments delivering the lecture at one site and transmitting it to the remaining two. The plan will be for different lectures to be given by different sites, sharing the teaching load, as was done in the previous experiment linking the six major UK medical schools. This experiment should be easier to manage as all sites belong to the same institution and are under a single head of department. Hence there should be no differences in the educational content required at each site.

Future plans are to continue to look for more economic and effective technology, to do things that we could not or would not have done before, and to continue to work with the teachers who are innovative to implement the new technologies in a pedagogically satisfactory manner.

A considerable amount of effort will be necessary to train the teacher to work with the new technologies and also student have also to be introduced and trained to use these new technologies effectively.

There is a serious resistance to change in teaching and learning environments, which is masked by reports of innovation seminars etc. If critical assessment is how many courses/student/academic staff are actively involved in changing the method of delivery of their teaching and learning, and this is still small. This is a matter for concern as many changes are taking place in general living conditions which are based upon Information Technology and the technologies being discussed here for application to teaching and learning in most cases are the same changes.

- **Virtual University for Europe (VirtUE) and Europace, Katholieke Universiteit Leuven, Leuven, Belgium**

INTRODUCTORY REMARKS

EUNITE (European Universities Network for IT in Education) has been initiated as a direct result and successor of VirtUE (Virtual University for Europe). A preparatory phase started at the beginning of 1999. This phase has been used to develop basic principles and discuss these in view of an agreement between the participating universities, to outline possible models of cooperation, and to define a number of taskforces that elaborate on these models and principles in view of the launch of EUNITE operations (expected to start from October/November 2000 onwards).

This start up phase implies that to date (31 August 2000), the description of a number of issues remain provisional, but will be filled in within the first year of operations.

1   THE CONTEXT

1.1   The originating organisation (e.g. University) and its socio-economic environment

The basic concept of VirtUE (Virtual University for Europe) was developed within EuroPACE, a network of about 60 traditional and open universities, industrial and professional organisations, regional university networks and public authorities. The actual organisation EuroPACE (called "EuroPACE 2000" between 1993 and 2000) has roots in two former organisations: the original EuroPACE (a joint venture of universities and major IT-companies, aiming at continuing education of engineers through satellite transmissions) and EUROSTEP (the educational users organisation of the former European Olympus satellite), as well as in the K.U.LEUVEN "MEDIATEK" project (Comett II) on networked training and education in Flanders, Netherlands and the north of France. It has been hosted by K.U.Leuven (University Leuven) since its launch in 1993, and has been involved in many European projects, as well as in collaboration through these projects with other European university networks such as Coimbra Group, CRE, EADTU, EDEN. Its central staff counts 8 people, and its main resources are found in grants from the Flemish Government, in European Commission funding (through the projects where it is involved in), in funds from Companies, in member fees, and in the income of services and products. The yearly turn over is approximately 800.000 Euro.

The VirtUE concept was refined during the VirtUE project, which was a feasibility study on the creation of a Networked Virtual University in Europe that was funded by Ten Telecom (DG XIII) and ran from 1996-1998. Partners in this project were EuroPACE (Coordinator), Coimbra Group, Consorzio NET.T.UN.O., Fernuniversität Hagen, and the IT companies Alcatel Bell, Telecom Italia, Helsinki Telephone Company, IBM-Europe.

A historical view of education in the organisation

Opposite to the organisations wherein it found its roots, EuroPACE aims at cooperation between member organisations in all fields (disciplines) and at all levels of university education (initial, graduate, postgraduate, ph.d. education, continuing education and training). From the original organisations, it took over the idea of technology supported education, but extended the media-use to all ICT, and focuses explicitly on media that support distributed (joint) design, production, delivery and user support.

Three models were further explored and refined for this purpose:

- virtual classes and campus, mainly for on campus learners with emphasis on virtual student and staff mobility;

- open and flexible learning, mainly for off campus learners ("open university" learners);

- on demand learning, mainly for continuing education of individuals or organisations.

A representation of these models can be depicted as follows:
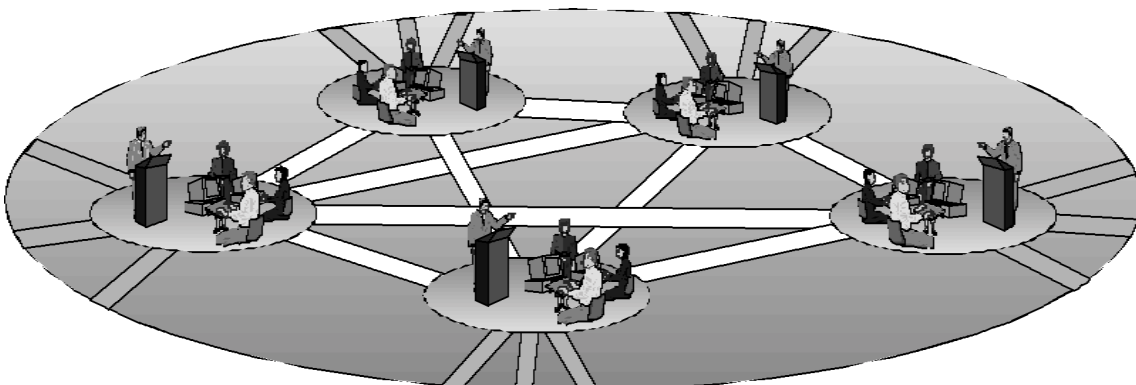
Virtual class and campus

The Virtual Class and campus model emphasise the *networking between universities, aiming primarily at their on campus students*. Within the concept of a virtual university the Virtual Campus function stands for all activity that a physical university undertakes: the administration and management to run a university (technical management, personnel and student administration, financing and accounting, marketing, etc.), the organisation of its teaching on the various levels of undergraduate, graduate, postgraduate and continuing education (curriculum development, the process of course design, development, production and delivery, student support, examination and crediting, etc.), the organisation of research (including interuniversity research cooperation and communication, contract research, etc.) and service to the society at large, including industry and governmental bodies (knowledge and technology transfer, science communication, etc.).

As a function, this Virtual Class creates within the overall Virtual Campus a series of *Thematic clusters* of universities that set up together virtual classes (the subject may very from a large discipline to the very narrow field of a superspecialised topic). Typical examples within this function are

- joint virtual seminars and courses
- virtual mobility (eventually as a complement to physical exchange programmes as Erasmus, Lingua)
- research communication and co-operation.

In this model a number of universities are connected by ICT links to support joint activities. Within the overall network, each university is connected to all others. Universities and/or individuals from outside the network can only participate to the network activities through connection with a network member.

More concretely, the basic elements of virtual class (programme, course, or seminar) consist of transmitted lectures which usually are taught to a life audience that is present in remote classrooms during transmission time. The course will mostly be composed of a number of modules, each taught by one professor - eventually in physical presence of a group of students - and followed by all (remote) classrooms in the network. Each module is typically taught by a different professor (working at a different participating university), and by choosing the best content expert for the each module, the students will receive an outstanding course although each professor has only to provide one module in exchange for the full course.

Some variants of this basic model will use partly prerecorded lectures or/and demonstrations as part of the lecture, others provide modules that are taught simultaneously by various professors residing each in a different university at teaching time. However, the model of virtual class implies always that the students can communicate with the teacher and with their fellow students during the class and in between classes.

To enhance (synchronous) communication during the lectures, the basic technology that is used for the virtual class is multipoint videoconferencing (through ATM, ISDN, IP, interactive cable, V-SAT, …).

The technologies that are used within this model as well as the embedded life teaching activities force to focus on on-campus students. Off-campus students may participate in activities of Virtual Class and Campus (e.g. by linking up with a participating university) but will normally find a more appropriate setting to fulfil their educational needs in the Flexible Open and Distance Learning model.

Flexible open and distance learning

This model is closely connected to activities that are developed by the traditional "open universities": offering education to individual (or small groups of) home learners with eventual support from study centres or to individual (small groups of) professionals with eventual support of training centres within their companies.

The function of Open and Flexible Distance Education may become more and more important for universities in the future: forecasts expect that continuous education for professional updating and upgrading as well as first diploma studies will increasingly be followed by the non traditional audiences of mature students (adults).

This function may again bring, though not necessarily, universities together in subject bound "thematic clusters", but also in regionally based "regional clusters". It emphasises *the role of each participating university in offering flexible learning possibilities*. Because of desired quality, efficiency and cost-effectiveness, the network between universities is likely to be set up in such a way that universities complement as much as possible each other as centres of expertise/excellence. Each university that develops courses offers within a given discipline the courses and accompanying study materials in which it gained expertise. All courses and study materials are offered to the network to create a pool of expertise. Each participating university can take up programmes, courses or modules from this pool to create an education offer which

satisfies best the own and regional needs (graduate and post-graduate courses, continuous education).

Unlike the former model in which synchronous communication had a central position, the Flexible Open and Distance Learning concentrates on asynchronous communication, both for course delivery and student support. Courses are offered as a mix of multimedia information delivered through various technologies (Internet, CD-rom, the traditional media of textbooks, video and audio tapes, even satellite - including v-sat - and cable TV). Courses are prepared by and followed up through internet and computer conferencing for tutorial support, eventually complemented with multipoint or even point-to-point video conferencing between study centres or individuals (students, tutors) of participating universities.

On demand learning

On demand learning needs are most typically found in industry, which wants to skill in a timely way its workforce; though also individual professionals may bring in individual needs for updating, upgrading and reskilling. In contrast with the Flexible Open and Distance Learning model, which is primarily focussing on diploma oriented education, the On Demand Learning model provides custom made training.

This model emphasises the *networking between centres of knowledge* for getting a quick and adequate reply to each incoming request for training. Whatever the learning needs, there will always be some place(s) in a trans-European network of universities where the necessary knowledge and abilities are available to meet these needs. The challenge for the network is to develop methods, techniques and tools to find and retrieve the appropriate knowledge and to transfer it to the demanding persons.

These three models served as basic input for the original concept of VirtUE as a network based, distributed virtual institution, in which it was hoped that a small starting number of active universities (a core group of about 10) would attract a larger number of up to 100 universities participating in a more receptive way. The overall picture of this virtual university concept was represented as follows:

Two major parts could be distinguished. First there is the "joint academic network", which constitutes the academic activity with its three described functions, and wherein the universities can be regarded as both providers as well as users of the provided contents. The second part provides the services that are needed to make the first one operational. In this service part, the providers will normally be technology providers (for the technology services), university networks and (eventually) universities for non-technology services (management, administration, pedagogy, etc.). Like the joint academic network, also the service provision network is considered to be a distributed one.

This original concept turned out to be somewhat unrealistic: active participating universities have to invest considerably in technology infrastructure (both equipment, software and staff), and consequently need to adopt an ICT policy as a strategic issue in further university development. This could not be realised within the VirtUE consortium, in EuroPACE as a network, nor in other networks of European universities. It needed on the contrary a new collaboration environment of dedicated universities. This became the start of EUNITE, which is preparing for launch and will count about 8-10 universities out of the EuroPACE, Coimbra Group and CRE members. K.U.Leuven and University Twente are leading this operation; with as actual members the University Lund, University Aalborg, University Granada, Helsinki University of Technology, Fernuniversität Hagen and Bologna University. EUNITE aims at the implementation of a distributed European Virtual Campus within the participating universities for joint programme and course development, sharing and exchange of programmes, courses and

learning and teaching materials, and the creation of learning on demand. It consequently concentrates on the "joint academic network" part of the VirtUE model, whereas the technology services will be purchased externally (EuroPACE, other university networks, technology providers, occasionally also universities) when and as far as needed.

The institutional context and the place for the Virtual Campus experiment

The institutional context for EUNITE is still under discussion. All participating universities will remain independent in their own activities (including the possibility to engage into networking or alliances with other universities outside the EUNITE group), but accept the EUNITE network as a preferential environment for collaboration with respect to the creation and operation of a European Virtual Campus (EVC). A formal structure only will be set up after one year of operation and as far as an evaluation would suggest that such formal structure provides an added value. Only the light structure of a Steering Committee, a number of workgroups (Taskforces) and a Secretariat is installed. Each participating university covers the own costs in the cooperation, and it is investigated whether the universities of Twente (Chair) and Leuven (Secretariat) will have substantial additional costs, in which case these extra costs will be distributed over all universities.

The start-up phase: Who initiated the idea that the organisation should set up a Virtual Campus? When did this happen? Which was the motivation/the needs expressed? Which were the initial goals? Which was the economic investment/budget allocated?

Without naming it a Virtual University or Campus, the initial idea was put forward by EuroPACE back in 1994, and published as an article under the name "A pan European telematics network" in *University and Industry*[1]. The name Virtual University for Europe shows up in 1996, while preparing the VirtUE-application.

With this concept of a European telematics network, EuroPACE wanted to respond to the growing needs for lifelong learning and stated that this response was a responsibility of universities, considering that the university's responsibility for education does not end with the awarding of a (first) diploma. Universities have to provide needs driven education and training to enable their alumni and society at large to keep up with changing requirements and challenges of the knowledge/information society in which we live.

---

[1] Van der Perre, G., Van Heddegem, J. & Van den Branden, J. (1994). A pan European tlematics network animated by universities and their partners in learning: EuroPACE. University and Industry,

It was argued that such response(s) can not be provided by a single institution in a cost-effective way (while specific expertise is lacking or for reasons of economy of scale), and that consequently a European network of universities, connected by IC-technologies, is a feasible solution. This consideration was the start of the VirtUE application, which had a total budget of 1.366 Mecu (for the two years feasibility study, including the development of a number of pilots within each of the above mentioned models).

Due to the funding programme (Ten Telecom) Virtue focussed mainly on Euro-ISDN – technologies - specifically ISDN-videoconferencing - for the development and delivery of teaching as well as for communication. Internet (and more precisely web based learning) and multimedia were used, but rather in a complementary way. An important outcome of this feasibility study has been the conclusion that web based learning need to get a central place in the future of virtual instruction, with other technologies as (important) complements, to correct deficiencies of the Internet (e.g. lack of guaranteed bandwidth for certain applications).

EUNITE, as the new "structure", will therefore use digital learning platforms, that integrate internet and other digital media and technologies.

The actual start-up phase of EUNITE prepares the concrete operations of a European Virtual Campus, that responds to the "joint academic network" that was described above. In a Memorandum of Understanding, the common agreement between the participating universities in preparation and launch of the operations, it is stated that in the start up phase emphasis will be put on joint development of programmes rather than on courses and on the exchange of learning and teaching materials that are reusable within the institutional context of the participating universities. Moreover, to demonstrate the added value of this collaboration and motivate the actual and future partners for participation, focus will primarily be oriented towards postgraduate (including ph.d.) and continuing education, as it is expected that missing expertise and problems with economies of scale are likely to be encountered more frequently at these levels.

This preparatory/start up phase is specifically dedicated on study and piloting through a number of taskforces that have started their activities. Five taskforces have been installed:

- digital learning platforms;

- elaboration of the European Virtual Campus concept (including organisational, managerial and financial aspects);

- Pilot programmes and courses;

- EUNITE website implementation;

- R & D review.

2   DESCRIPTION OF THE VIRTUAL CAMPUS

Design principles: what are the policy objectives, which is/are the target group/s, etc.

EUNITE's European Virtual Campus is fundamentally a distributed one. Each participating university maintains full control over its own education, but agrees to share resources (programmes, courses, teaching and learning materials) and to engage in joint production of learning and training. The aim is to give on an exchange basis access within each participating university to programmes, courses, materials and expertise that are unavailable in the own university but present in the network; and to combine the potential of the participating universities for the development of high quality materials in both content and methodology. Although connected problems and precise details have still to be filled in by the EVC taskforce, some basic principles have already been agreed. They have to do with:

- the scope of lifelong learning in the definition of the target audience;

- emphasis on programmes on the one side and on teaching and learning materials as building blocks on the other;

- development of a demand driven (and within this for certain target groups a learning on demand oriented) education and training;

- language management ;

- the adoption of (mutual) accreditation, with respect for the specific habits and regulations within each participating university;

- a liberal internal system of intellectual property rights and copyrights;

- the acceptance of existing digital platforms for development and/or delivery of education within each participating university, but at the same time the creation of a common digital platform as an umbrella for the virtual campus.

How formally/explicitly is the notion of Virtual Campus articulated? Is there a formal statement/declaration? Are all actors aware of its existence?

As can be read between the lines of the above, it is the intention to cope with formal and explicit agreements on the European Virtual Campus, and to do this before the official launch. A formal declaration in which the Rectors of the participating universities commit their institutions to EUNITE and its EVC will be signed on the 20 October 2000. By that time it was hoped that the universities' commitment is not subscribed by the Rectors and the collaborators to the various taskforces alone, but that the majority of actors (staff, students) in the participating universities share the commitment. An intensive information and internal dissemination campaign is therefore initiated as part of the preparations. However, not in all member universities, this initial phase will have succeeded in gaining attention of all actors by the time of formal launch; neither can be expected that information alone will succeed in raising support of most university staff. Demonstration of the potential of collaboration through pilots in which colleagues are participating is mostly more convincing that the arguments of an information campaign. Therefore it is expected that not only the information transfer shall need to be continued during the first years of operation, but that in this information sufficient place should be foreseen for the ongoing pilot activities (combined with an open invitation to participate in ongoing activities or to initiate new ones).

Which infrastructure has been set up?

As a distributed initiative, EUNITE will make extensively use of the existing infrastructure of the participating universities. Maybe it will turn out to be efficient to set up a dedicated infrastructure at the level of a common platform (e.g. for a central web site, a central pool of learning and teaching materials, a common database for on demand learning materials, etc.) and/or to overcome (in-)compatibility problems with available infrastructure of the partners. Even then this infrastructure should remain subsidiary to what the partner universities can bring in.

Requirements and guidelines are being prepared by the "Taskforce on digital platforms and campus" for infrastructure (both in hardware, software and courseware – including pedagogy - terms) that will be used within EUNITE activities, to secure that newly purchased infrastructure would be compatible.

Which software is being used?

Partner universities can maintain the software that is already in use. An in depth review of the "Taskforce on digital platforms and campus" will identify and should also propose solutions for common use of the courseware that is produced with these tools.

How is the Virtual Campus structured?

The Virtual Campus is structured as a distributed digital campus, in which programmes and courses are virtually attended in other universities than the own one, in a transparent way (by enrolling in the own university, getting support from the own university , and when applicable being credited for courses and programmes by the own university). Materials (both for teaching and learning) are jointly developed by staff of (subsets of) the EUNITE universities. For this development, the teams may be complemented with leading experts from universities outside the network. The materials, ranging from small elements to full programmes are developed in English, but can be translated in the mother tongue of students (e.g. for initial years of undergraduate education). Once developed, the materials are stored in a large database for retrieval and use. Under conditions that are still to be defined, partner and non partner universities can use these materials (units/courses/programmes) within there own universities (eventually after translation). For the first years of operation, internal use in the network will be free of charge; to maintain quality, uptake in the database will be subject to a previous screening by an editorial board with the necessary qualifications.

Which actors are involved in the initiative ? (level/position, number of actors out of total)

In this preparatory phase, at least one representative of each participating university is member of a Steering Committee that co-ordinates the preparations and monitors the work in the taskforces. The Steering Committee members are directly nominated by each university's Rector and are either professors or high ranking managers with responsibility in the international relations or in the implementation of IT in their university. Each participating institution takes also part in at least three taskforces, with a varying number of people (compare e.g. the pilots taskforce, which prepares a number of pilots in courses exchange and joint development, with the R&D review taskforce). Taskforce members are nominated by the university management for their expertise within their universities in the subject of their taskforce. The University Twente is chair of the Steering Committee, University Leuven fulfils the secretariat function.

How is communication managed and delivered?

Not yet decided with respect to the course development and delivery. However, this will be normally a combination of communication through the joint web site of EUNITE, through which joint courses are delivered, or will be covered by the own university in which the student is enrolled, or by the guest university in which the student acts as a virtual mobility student.

How are classes taught? What subjects are taught?

In principle, classes will be taught through the web; the offer is by definition not excluding any subject. Through the pilots of the first year(s), more concrete information is to be gathered to work gradually out these elements.

What kind of materials are available? How are materials delivered?

A survey is being made by the Taskforce on pilots. A first overview is expected for the end of 2000.

Are any innovative learning methods applied (group work, project work, problem solving etc.)

It is deliberately the intention to focus on innovative learning methods. The precise mix will be defined later and will probably vary with subject and level. However, the composition of the EUNITE membership includes experiences and expertise in about all innovative learning methods; and part of the mission of EUNITE is the exchange of this expertise between partners.

How is the Virtual Campus managed, i.e. what mechanism exists for co-ordinating the initiative organisation-wide? Which actors are involved?

In the first year(s) of operation, the Virtual Campus will be managed by the Steering Committee, the Taskforces and the Working groups within the taskforces. Although it is accepted that on a longer term a formal "governance" structure will be needed, it has not been maintained for the start up period. This will avoid that within partner universities some people fear loss of autonomy, get the time to become accustomed to the changes which will bring the EVC, and can eventually find the necessary financial means to cope with the supplementary costs that are connected in a transition period to the establishment of the Virtual Campus.

3. LEARNERS SERVICES AND IMPLICATION

3.1 Which services have been set up for learners (administrative, technological help etc)?

The Taskforce on digital learning platforms and campus is currently identifying the various services which will be needed, as well as investigating in how far these services are available in the network (as alternative for a provision outside the network).

3.2 How are learners tutored and guided? How many students are followed by each tutor?

In the start up period, only pilots will be run. This will come down to a limited number of courses, learners and consequently also tutors. It is however projected that within about five years the operation will come to a steady state. In the meantime, it remains unpredictable what the needs for tutoring will be.

3.3 How is their work assessed?

In principle, assessment will be done either by their own university, according to regulations that are in use there, or through a ECTS (-like) system.

4.4 What accreditation mechanisms have been established?

It is the intention to follow the ECTS rules. It remains possible that at length a "European" degree/credit (with value in the full partnership) is added as well, or that accreditation is double (European and "local/national" degree or credit). Accreditation of new universities (admission to the network as full partner) will be granted by the Steering Committee.

4.   EVALUATION SYSTEM

4.1   Which evaluation approach has been adopted: which are the objectives of evaluation? which are the objects? which actors are involved? what criteria, methods and tools are being used to monitor/evaluate the progress/success of the initiative?

Evaluation is either done within the home university (when students enrol for courses which were jointly developed, but offered in the home university of the learner), of will follow the lines of ECTS.

4.2   Are evaluation results available? What has changed for the target group(s) ever since the Virtual Campus initiative was started? In what way did they benefit from the initiative? What kind of new knowledge was gained by the initiators (maybe the plan did not work the way they wanted it to work; what did they change during the process?)

As the Virtual Campus is still in its launching phase, no data can be provided on this topic.

4.3   What were the innovative aspects of the learning activities that can be applied again? What other side effects did the initiative have so far (other organisations carry out initiatives with the same concept/approach/method etc.) Are there any future plans for continuing/expanding the initiative?

Ibidem.

- ## **Virtual University of Bavaria, Germany**

1. THE CONTEXT

1.1 The originating organisation (e.g. University) and its socio-economic environment

All over the world, universities are increasingly using telematics and the internet for teaching. The State of Bavaria has always set high standards for the quality of its universities and technical colleges. Similarly, Bavaria is seeking a leading position in the field of virtual education.

The 'Virtual University of Bavaria' ('vhb') constitutes an online network of all the Bavarian universities. It is designed to provide new opportunities in the fields of initial studies and continuing education. The 'vhb' will start with an exploratory programme set to begin in the summer of 2000. The 'vhb' will initially receive funding from the government. After the end of the exploratory phase – projected for three years -, the 'vhb' will have to rely on its users for financing.

The cooperation within the vhb will allow the Bavarian universities to create the necessary basis in order to collaborate with the universities of the other German states. As the Bavarian universities are joining forces, the educational system will have an additional chance to prevail in the beginning global competition.

1.2 A historical view of education in the organisation

Although the 'vhb' is an entirely new organisation, it continues the long tradition of teaching at the Bavarian universities. As continuing education becomes increasingly important, the 'vhb' is meant to pool together the combined know-how of the Bavarian educational system. Its organisation as a network helps to promote co-operation between different universities in Bavaria, nationwide and globally.

The 'Virtual University of Bavaria' benefits greatly from experience gained in traditional teaching and education within the Bavarian university system. Yet the requirements of the digital Age require drastic changes to be made in the development of educational training programmes.
In recent years, the Bavarian universities developed more than 350 projects and initiatives in the field of virtual education which now provide some basic structure for the 'vhb' (e.g. project MEILE – Multimedia Applications in Teaching – which was developed for 'Bayern Online'. Initially, the'vhb' will start with five 'schools'. At a later stage, the programme will be upgraded to

include all subjects representing the Bavarian university and technical college education. In the has become common knowledge that the only resource that is readily available in a country poor in resources like Germany is the human mind, which is the sum of the combined knowledge and education of its citizens. Bavaria considers the fast development and timely availability of innovative university training an important investment into its future. It will thus support resolutely the establishment of the 'vhb' within the scope of the 'High Tech Development Plan for Bavaria' with funds from privatization profits.

In order to maintain their international position the Bavarian universities have to accept changes in their own internal development more quickly than in the past. Focussing on priorities, increased cooperation and independent decision making turn out to be the most important research instruments. The further development of university teaching and of university structures should profit from the use of these instruments in a comparable way. The 'vhb' as a network of all the Bavarian universities will offer the appropriate platform.

1.3 The institutional context and the place for the Virtual Campus experiment

The 'vhb' will not become a new independent university. It is just a coordination centre that relays and concentrates the know-how of its partner universities, i.e. the universities and technical colleges of Bavaria. Each university will remain independent in its management and decision making. Traditional university education is not replaced by the 'vhb' but merely supplemented by an additional online component.

1.4 The start-up phase: Who initiated the idea that the organisation should set up a Virtual Campus? When did it happen? Which was the motivation/the needs expressed? Which were the initial goals? Which was the economic investment/budget allocated?

The 'vhb' is a project within the scope of the so-called 'High Tech development plan for Bavaria' of the Bavarian government. In its initial phase, it will receive funding from the Bavarian government, which redirects resources from privatization profits in order to finance the establishment of the 'vhb'. The creation of the 'vhb' was prompted by the increasing pressures of competition among educational institutions worldwide. It will help the Bavarian universities to stay at the cutting edge of university teaching. The founding of the 'vhb' was guided by the need to provide a platform for initial studies as well as for continuing education. In the near future, an initial university degree will only serve to provide base qualifications which have to be updated in a life-long learning process. Furthermore, the 'vhb' will offer programmes for regular full-time students who simply wish to extend the scope of their studies by accessing additional

information not available at their home university. The range of educational offers for students will be extended.

2. DESCRIPTION OF THE VIRTUAL CAMPUS

2.1 Design principles: what are the policy objectives, which is/are the target groups etc.

Nowadays the majority of the students at our universities are full-time students till the completion of their first academic degree. The teaching of the 'vhb' will offer a number of advantages including for this group of users:

- Programmes with local and temporary gaps and limitations
- Important additions, extensions and specialization opportunities for qualification profiles that better suit the personal strengths and preferences as well as the demands of the labour market
- The 'vhb' offers Programmes in basic research where the demand of many students in Bavaria can be concentrated; the aim is to make these programmes at the same time more adequate for learning, more elaborately presented and more interactive.

University programmes in these basic fields are in Bavaria free of charge by law. Accordingly in the initial phase these programmes can only be funded to a limited extent. Financial reallocations should enable the universities to provide permanent funding for these innovative programmes as soon as possible and to develop them further in line with demand. This still requires a lot of preparation:

- Traditional teaching methods must be partially replaced by virtual ones in order to realise real savings
- Training programmes must become more transparent in terms of a cost benefit analysis
- Universities must gain experience as to how virtual education can help setting priorities and establishing profiles
- The mutual crediting of tuition and exams needs to be developed significantly further

Therefore, an initial three year exploratory phase should set the conditions for large-scale implementation in the early stages of a student's career.

The life-long qualification certificate of the first university degree changed long ago to become a mere base qualification for a life-long learning process in terms of a continuous acquisition and updating of skills.

2.2 How formally/explicitly is the notion of Virtual Campus articulated? Is there a formal statement/declaration? Are all actors aware of its existence?

The 'vhb' is still in a phase of planning and preparation. The projected beginning of the exploratory phase is in summer 2000 when some of the virtual courses will be started. Up to the moment no formal statement or declaration has taken place.

2.3 Which infrastructure has been set up?

The 'vhb' largely relies on the infrastructure of the partner universities. The intention of the actors is to minimise centralised elements.The independent infrastructure of each university and college shall be maintained.

Only a network of all the Bavarian universities and technical colleges can offer quickly and at reasonable costs high quality virtual education, based on past experience and existing structures. All the Bavarian universities and technical colleges will thus participate in the decision-making process of the 'vhb'. The management of the 'vhb' and the coordination council of the technical colleges are headquartered in Hof, the coordination council of the universities is located in Bamberg.

Structure
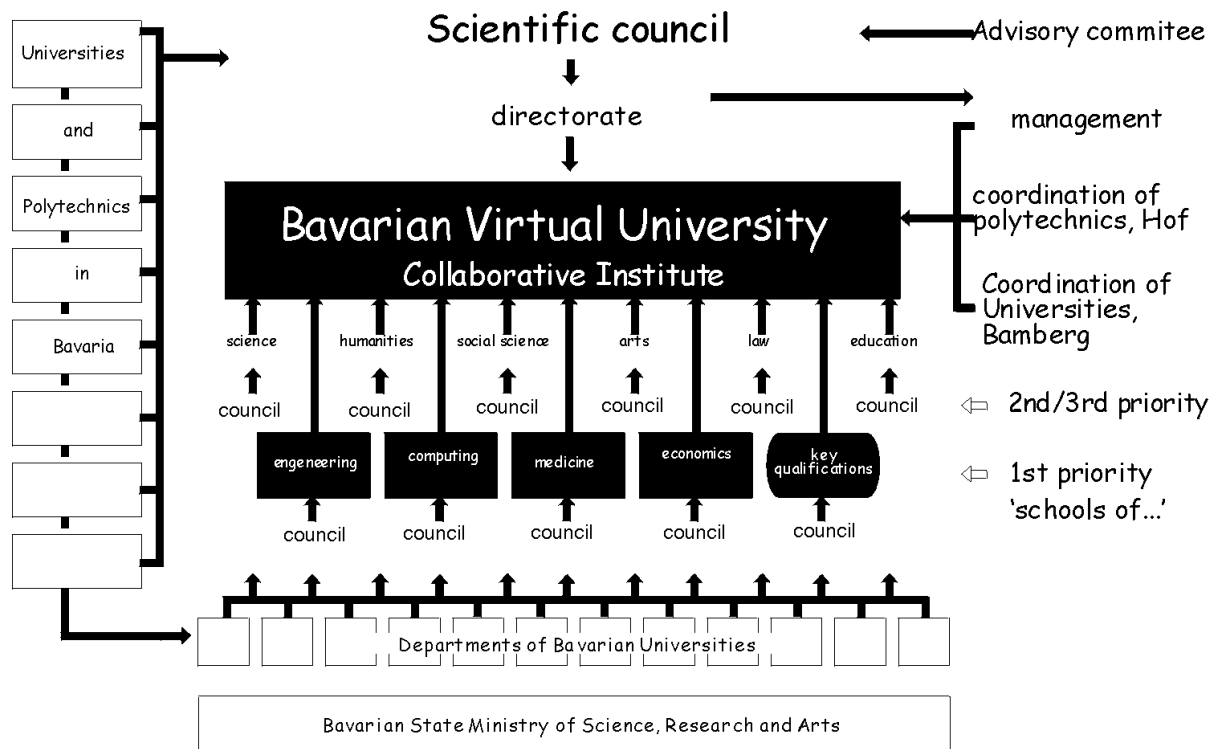
2.4 Which software is being used?

The software used depends on the content of the courses which are offered in the different schools. There is no unified software, but a consistent 'portal' for all of the projects offered is in development.

2.5 How is the Virtual Campus structured?

Initially, the 'vhb' will start off with the following schools: 'engineering', 'information technology', 'economics', 'medicine' and 'key qualifications' which have applications in the various different groups of experts. At a later stage, the programme will be upgraded to include the following: 'science', 'the humanities', 'social sciences', 'art, architecture, design' and finally 'law' and 'education'.

2.6   Which actors are involved in the initiative (level/position? Number of actors out of total)

First of all university professors are involved. Furthermore university staff is developing the contents of the projects and the didactical and technical solutions.

2.7   How is communication managed and delivered?

2.8   How are classes taught? What subjects are taught?

The subjects in the first phase are engineering, information technology, economics, medicine and key qualifications. At a later stage science, humanities, social sciences, art, architecture and design, law and education.

2.9   What kind of materials are available? How are materials delivered?

Most of the offers are still in a development phase, so detailed statements about the kind of materials can not yet be made.

2.10   Are any innovative learning methods applied (group work, project work, problem solving etc.)?

Group work and problem solving methods are included in most of the project offers.

2.11   **How is the Virtual Campus managed, i.e. what mechanism exists for co-ordinating the initiative organisation-wide? Which actors are involved?**

3.   LEARNERS SERVICES AND IMPLICATION

3.1   Which services have been set up for learners (administrative, technological help etc)?

Part of the services of the office of the Bavarian Virtual University physically located at Hof has the task to support learners in administrative and technological questions. For all questions concerning registration as a student of the Bavarian Virtual University in general and rulement into different learning offers are carried out via respective website, which aspect by an e-mail and telephone helpdesk. While the reaction time of the e-mail is defined as maximum 24 hours during the week, the telephone helpdesk is available at normal office hours.

Technical help facilities are splitted: Whenever the general portal and the access to the vhb is concerned (passwords etc.) again the office at Hof will be responsible. In the first pilot phase the developers of the administrational website located at the University of Bamberg and the Fachhochschule Hof to go over this task to get first hand information about difficulties and improvements necessary. During regular operation this task will be shifted to the office.

All technical questions and problems which are linked with specific software of the different decentralized offers are within the responsibility of the respective University Institute/Chair, which is maintaining and delivering the single learning offers. In practice there is a sliding and not very sharp distinction between those technical questions and content related questions, which mostly are answered by the same University personal.

3.2   How are learners tutored and guided? How many students are followed by each tutor?

Due to the decentralized responsibility the Bavarian Virtual University itself only sets a certain minimal framework and guidelines for learner support, while the respective decisions on the amount of support and on the time budget available for each learner is under the responsibility of those who offer the courses.

The departments and their decision bodies when selecting a new learning offer negotiate with the proposer and finally define for each learning offer the appropriate amount of time budget and personal qualification necessary for that offer.

The general framework and the guidelines define for the piloting phase the maximum number of participants in course as 25 which have to be supported by at least one tutor, but at least two tutors are highly recommended. Most of the responsibles allocate tutors to one learning offer with the flexible division of work and no fixed allocation of students to specific tutors. Nevertheless some professors prefer a fixed responsibility of a tutor for certain number of students, mostly between 10 and 15. This follows usual traditions in the respective publics where e.g. in medicine a strict allocation of a tutor to a small group is more familiar than e.g. in economics.

The key quality management mechanism to guarantee quality in student support is the duty of every tutor active in the Bavarian Virtual University to undergo a specialised training course (derived from the European training programme MULTIPALIO) and get certified. This compothory?? training includes all state of the art rules and procedures for virtual students support.

3.3 How is their work assessed?

The tutors work like all work carried out in the delivery of a course is assessed and reported in a regular teaching assessment report, which is prepared by the responsibles for learning offer after the end of each term and submitted to the department, which reviews in the light of this report the pre-running quality management steps of selecting offers, monitoring the projects process, accreditation of the course before the first use and accreditation of the course before the first use ?doppelt?. Based on this performance report the decision is taken whether the course can be repeated unchanged ore with specific improvements or is not suitable to need the quality goals of the vhb.

The inputs into this performance report are:
- the parts of the evaluation questionnaires to the students concerning tutoring and student support,
- an analysis of the support dialogues via e-mail or in the newsgroups for most
perspective of professionalism of support measures (also discussed within a tutors permanent quality management network, where professional supervision and mutual support is provided),
- an analysis of learning results with the responsibles hypothesis on influences of the support system,
- a self assessment of the tutors of their work in highlighting specifically all proposals for the improvement of the work.

3.4   What accreditation mechanisms have been established?

First part of the accreditation mechanism is the procedure to submit new learning offers as a project proposal to the departments board. This board regularly uses the help of external experts to prepare their decisions. Experts and the departments boards members both use the same quality quit which under their quality dimension 'valorisation' ('Nutzen') explicitly has to judge, whether this learning offer can be easily accepted by other Universities.

Secondly each proposer has to ensure, the new offer is at least accredited by two different Bavarian Universities.

A complex mechanism is set up to ensure representation of all Bavarian Universities and of all departments in the different boards of the virtual Bavarian University by a series of selection processes (für Ordnung zum Verbundinstitut virtuelle Hochschule Bayern; Wissenschaftlicher Rat; Sachräte, Direktorium).

This mechanisms of representing all Universities and subjects together with the undoubted reputation of the departments board members and the external experts will create a high probability for an offer to be accredited by all other Bavarian Universities.

A third element is a high degree of transparency of learning offers not known in traditional studies. So every department of a Bavarian University by a certain type of access and password will have access to all contents of respective learning offers of the Bavarian Virtual University. So it is simple to create a known opinion on the profile and quality of that course.

Given these support mechanisms it is planned, accreditation and recognition of Bavarian Virtual courses and credit points is assumed automatically for all Bavarian Universities and their departments. If a department disagrees, it has the duty to explain in writing, why they feel unable to recognize the respective studying credit. It is expected, this turn around of the duty to prove deficits, which will not allow recognition, will in practical terms ensure a near to 100% accreditation at least for all Bavarian Universities and most probably for all the whole of German speaking academic recognition.

4. EVALUATION SYSTEM

4.1 Which evaluation approach has been adopted: which are the objectives of evaluation? which are the objects? which actors are involved? what criteria, methods and tools are being used to monitor/evaluate the progress/success of the initiative?

By quality the „VHB" understands high standards for each of its projects in all aspects which are important for the user. The students are its benchmark, all their judgements will be used to evaluate and improve the projects continously. Famous experts will judge the quality of the scientific contents and their adequate methodical-didactical presentation on the basis of a well-founded survey of the worldwide available offers. This is valid for the „quality of the used material"; „the quality of the support as far as the contents is concerned"; the „quality of the organisation and technique", „the quality of the use as far as the contents is concerned".

Examples for the demands on the „material":

- Quality of the scientific contents (correctness, accordance to the latest developments in the research, adequate selection and determination of priorities, proved scientific competence of the authors);
- Selection of adequate media (exact and economic assignment to clear didactical functions)
- media-appropriate design (concerning texts e.g. style, comprehensibility, consistent terminology; concerning hypertext e.g. quality of the links; concerning graphics e.g. clearness, transparency of symbols, clear perceptibility of essential elements, appropriate design; concerning computer-aided presentations e.g. appropriate layout, simple possibilities of navigation, clear orientation concerning the position within the learning field);
- appropriate interactivity (exercices with self-control and control by others, questions, simulations, adequate intervention possibilities for the learner, useful and quick feedback, the placing of interactive opportunities within all important parts of the learning process);
- adequate quality management in order to improve the material (monitoring, documentation of all problems and feedback of the students, guaranteed putting into practice of the improvements).

Examples for demands on „support":

- Qualification of the tutors (special knowledge according to the function, the guaranteed going back to external special knowledge if necessary, qualification and progress attendant support for online lecture);

- adequate time budget per student for the tutor (evidence of this for the different groups of tutors);
- adequate maximum time for replies (concerning tutorial support in general within 24 hours at the maximum, concerning replies from special experts within 48 – 72 hours);
- appropriate opportunities of contact and communication with other students
- appropriate quality management concerning the tutorship (Monitoring, supervision by colleagues, help with problems, defined ways of improvement);

Examples for demands on „organisation & technique":

- Clear structures (reachability of the persons responsible for technology and organisation for the students, one contact person each at the maximum for organizational and technical decisions within one project);
- unmistakable and uncontradictory information for the learner about all organizational regulations;
- active supervision of the organizational procedures, regulated reaction to difficulties;
- documented technical conformity of the media and communication components (guaranteed functioning of standard configurations, error-tolerant user's assistant, if necessary help assistants);
- appropriate solutions by hot-lines
- appropriate quality management concerning the technique (survey and analysis of procedures and errors, clear responsabilities and reaction times for the elimination of errors).

Examples for demands on „usability":

- Quality of the support to the learner when selecting and drawing up the personal way of learning;
- Quality of the relevance in its contents (clear description of the aims and the conformity to study regulations, profession profiles, requests of the job market);
- guarantee of the usability (understandable description of the essential advantages of the project over other comparable offers)
- Quality of the expenditure efficiency (to proof that a comparable profit will not be obtained with less expense – of money or time – or that with equal efforts one will profit demonstrably more, e.g. a qualitative learning success);
- Quality of the usability (guaranteed recognition within the education or professional usability, conformity to legal regulations).

All projects have to be tested by independant technical experts and should compete at least througout Bavaria before they will be incorporated into the offer of the „VHB".

The basis is a conception of total-quality-management as a continuing improvement process. For this reason judgments will not be given once a time, but there will be developed adequate controllable survey and improvement systems for all aspects. The learning progress, emerging problems, impulses and judgments of the students will continuosly be recorded and put into practice in all fields through a continuing improvement process with clearly defined responsabilities.

The open accessibility to all used materials, support services and technical and organizational opportunities will make possible an equal cooperation of all participants at the current improvement process at an extent that soon will be taken as an example for quality improvement even for traditional university lecture.

4.2   Are evaluation results available? What has changed for the target group(s) ever since the Virtual Campus initiative was started? In what way did they benefit from the initiative? What kind of new knowledge was gained by the initiators (maybe the plan did not work the way they wanted it to work; what did they change during the process?)

Since the "VHB" has just started, there are no evaluation results available.

4.3   What were the innovative aspects of the learning activities that can be applied again?

 What other side effects did the initiative have so far (other organisations carry out initiatives with the same concept/approach/method etc.) Are there any future plans for continuing/expanding the initiative?

The "VHB" will create a well-coordinated net of existing reliable institutions equiped with possibilities that go beyond those of every single member university. By this an unnecessary bureaucracy will be avoided, flexibility for adjustments to changing demands in the future will be achieved.

The "VHB" will promote a regular competition between the Bavarian universities concerning the best lecture regarding the contents and learner's usability and thereby apply a basic principle of the research to the lecture. This internal competition will reinforce the Bavarian position within the worldwide competition of virtual universities.

In the field of further training projects virtual universities will also be compared to offers of other subjects which are similar concerning the contents. The "Virtual Campus of Bavaria" will be the open market place for such comparisons. The learners will decide according to their demands and wishes whether they prefer virtual offer at university level or other forms of projects, e.g. more practice-oriented offers of chambers or trade and industry. The market place on the "Virtual Campus of Bavaria" as it is planned by the Free State of Bavaria will open a new quality of decision concerning the individually adequate form of learning to the students in our country.