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Recommended Citation

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<http://aisel.aisnet.org/ecis2000/140>

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A Completely Virtual Distance Education Program Based on the Internet – Case and Agenda of the International MBI Program

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ABSTRACT

The Internet as a medium for communication and information distribution has opened up new opportunities for distance education programs. Not only is the scope of a program, in terms of potential target groups, by default a global one because the Internet is global. Moreover, commonly available multimedia technologies for the World Wide Web provide effective means for bringing courses to students all over the world and to interact with them by electronic means. The newly available Internet technologies are infrastructural components of a distance education program described in this paper. The program leads to the degree of an "International Master of Business Informatics (MBI)". The rationale underlying the program is "virtuality". All courses are Internet based, making use of various online and offline network and multimedia features. Students study at home, in their home countries and they communicate via Internet. The courses are held in a virtual School of Business Informatics. The faculty is a network of professors from many European universities.

1. BACKGROUND

Information technology (IT) is one of the drivers for success in today's global economy. The demand for IT specialists is very high and still growing. However, the traditional system of higher education does not produce sufficient numbers of graduates in the relevant fields. While the diversity of reasons for this state of affairs is beyond the scope of this paper, one limiting factor is quite obvious: Educational programs usually require the physical presence of the students at the location of the institution providing the program. This is a barrier for various types of potential students, for example people who work in a job, people in the third world for whom the cost of living in an industrialized country and the travelling expenses are prohibitive, handicapped persons, and many others.

Distance education has been tried for many years as an approach to overcome some of these problems. Although there are successful programs and institutions, major drawbacks have always been the media used for instruction, the communication channels and the way teachers and students interact. In recent years, postal communi-

cation and paper as instructional medium have been substituted by remote online presentation and communication forms. Many of those approaches, however, required expensive installations like videoconferencing rooms or special studios and networking equipment (e.g. [1]). Some lived only as long as public or private funding was provided.

Today, Internet based technologies have become widely available. They have matured to a degree that distance education can be put on a new foundation. In contrast to the aforementioned multimedia projects, commonly available Internet services and tools nowadays provide useful features which are very attractive for the creation of distance education programs.

In the subject area the program discussed in this paper belongs to – i.e. Business Informatics – there is one more favorable factor facilitating an Internet based educational program. Since computers and networks are probably within the sphere of interest of the target group, it is not unlikely that prospective students already have a PC and Internet access at their disposition. Thus no additional expenses for the basic infrastructure will occur. The viewing and interaction tools are mostly free of charge, so there is virtually no additional cost for the student.

In this paper, an approach to distance education based on Internet technologies is described. This approach is currently being applied to the development of a master program in the field of Business Informatics. The rationale underlying the program is "virtuality". Courses are Internet based, making use of various online and offline network features. Students study at home, in their home countries and they communicate via Internet.

The same applies to the teachers. In the distance education approach outlined below, the persons delivering the courses are also distributed, i.e. residing at different physical locations. In this way, a worldwide community of students and teachers interacting in the World Wide Web will be formed.

In the subsequent sections, specific aspects of this case will be presented, in particular the types of courses that can be given in a virtual program, technical and organizational requirements, core subject areas, electives and ad-

vanced topics. Some formal problems will be discussed as well, in particular: How can a network-based program which is distributed not only on the students' but also on the teachers' part be installed within the legal framework of a traditional university system for higher education?

2. SUBJECT AREA OF THE PROGRAM: BUSINESS INFORMATICS

Although demand in the job market is often termed as demand for "IT" people, it is a well-known fact that information technology alone does not create business value, rather it is the synergy from IT and adequate management concepts that does. Therefore graduates possessing knowledge in both areas have had particularly good job opportunities for many years.

In the German speaking countries of Central Europe, this situation has stimulated the development of complete courses of studies leading to a university degree in *Business Informatics* ("Wirtschaftsinformatik"). Business Informatics is the field where *integration* of information technology and business approaches has been the guiding principle for more than three decades. Universities in Germany, Austria and Switzerland have a long tradition of research and education in this field. Excepting North America, there is hardly another part in the world where a comparable concentration of knowledge and experience in Business Informatics education can be found.

The term "Business Informatics" is not undisputed within the scientific community. There are good reasons to use the name "Information Systems" (IS) instead because this term is common in English speaking countries and other parts of the world. However, there are significant differences. In contrast to the Information Systems discipline, Business Informatics has a much stronger computer science component. Curricula exhibit significantly larger portions of computer science courses and in-depths studies than IS curricula. This is a consequence of the fact that the educational paradigms of Business Informatics and Information Systems differ to some extent. Business Informatics has a strong constructive element [2]. The focus is on *developing* solutions, i.e. how to employ computer science to solve business problems.

For these reasons, the master program discussed here is entitled a Business Informatics program. The degree awarded is "International Master of Business Informatics (MBI)".

3. VIRTUAL ENVIRONMENT

The MBI program is a joint effort of a network of Business Informatics professors who teach at well-known European universities. All participants are recognized experts in their respective fields. Although the teaching staff is distributed across many physical locations of Europe, the School of Business Informatics combines all teaching personnel under one "common roof", i.e. the external appearance of the school in the World Wide Web is that of one virtual institution.

The school is visualized in a Web browser as a three-dimensional building offering all services a student or a

teacher normally may expect in a real educational environment. For this purpose, the school has a Web portal with the relevant features. The virtual organization of the school is mapped to the interior of the building: Offices of the dean, the program officer, the administrative and clerical staff, etc. provide access to general school services. Offices of the lecturers allow interaction and communication related to courses, and lecture halls are the containers for course specific information.

The virtual lecture halls will be equipped with (virtual) video projection facilities for recorded courses, viewing facilities for slides (e.g. Powerpoint), audio players for recorded verbal explanations or full lectures, chat features for classroom discussions and seminars, and bulletin boards for announcements and feedback. For submission of exercises or other homework assignments, commonly used services like electronic mailboxes and messaging are provided.

4. INSTRUCTION AND EXAMINATION MODES

4.1 Types of Courses

Various modes of instruction have been applied in distance education programs over the years. In most cases, paper media are still the backbone of the program. In the Internet age, new modes have been created and already known modes (like videos) have become easily available for everyone. Making use of up-to-date technologies, the types of courses in the MBI program include the following ones:

4.1.1. Streaming video courses. The individual lectures of a course are provided as videos in a streaming format (e.g. RealVideo [3], ASF [4]). Plug-ins for downloading and playing streaming videos are easily available in the Internet. In this way, a video course can be given by the lecturer in a weekly rhythm, like a conventional classroom course. Videos are provided lecturewise. They may be accompanied, for example, by review questions and discussions at virtual meetings in an electronic chatroom.



Figure 1. Streaming video from a course

4.1.2. Web-supported textbook courses. Many textbooks comprise not only a written and printed text but also supportive features provided on the website of the author and/or the publisher. Nowadays the support goes far beyond additional exercises or examples not given in the book. Some books have a complete learning environment in the Web with review questions (and answers), multiple choice tests (including automatic evaluation), group projects, and multi-media features like interactive exercises, audio and video material. A good example is the Management Information Systems book by Laudon and Laudon [5]. In addition to the printed version, the book's website provides all the additional features mentioned above.

In a textbook course of this type, students read and reflect the text by themselves. Review questions and topics for discussion are given by the lecturer chapterwise. Answers are assessed. Electronic discussions make use of chatrooms, bulletin boards, e-mail, etc.

4.1.3. Practicals, exercises with software. Some courses in any IT related program will deal with development of software in one way or another. They have in common that knowledge and skills are acquired to a large degree by hands-on experience rather than theoretical reflection. Examples are courses in programming, office programs, website development, databases, but also other tasks where the outcome is an electronic document. In this type of course, exercises are provided for download by the lecturer. Students submit their solutions electronically. The necessary software will either be available for students anyway, like office programs, freeware or other inexpensive software. More advanced products are made available for students through client/server access to the school's website.

4.1.4. Seminars. In seminars, students are required to investigate a certain topic on their own and write an academic paper. While the process of research, reflection and writing is not so much different from a traditional seminar, there is one significant restriction: Students who study in a virtual program do not have the same opportunity to access literature like students at a "real" university who can easily go to a physical library on campus at any time.

This means for the lecturers that preferred topics for seminar papers are topics where the "literature" can be found in the Internet and is available electronically. Since more and more authors offer their research papers for download or viewing in the Internet, the importance of that limitation will probably decrease fast. The final result of the work, i.e. the paper written by the student, is submitted electronically. Discussions will be based on chatrooms, bulletin boards, e-mail, etc. like above.

4.1.5. On-campus courses. On-campus courses within a virtual program have two aspects. One is that if students are invited to spend one semester at a participating university, they can experience "live" courses there and get the "touch and feel" of a real university environment. However, since they have to continue with the "virtual"

part of the studies as well, the university will have to provide a PC workplace and Internet access so that the student can continue the studies.

4.1.6. Master's thesis. For the master's thesis, the same applies in principle as stated above for seminars. A thesis of normally 3 months will be written in a more or less "traditional" manner and submitted electronically.

4.2. Types of Exams

In accordance with the virtual character of the MBI program, examinations should, in principle, be virtual or at least not require the physical presence of the candidate at the location of the lecturer. Depending on the formal and legal restrictions imposed by state accreditation requirements (see section 7), three types of assessment are under consideration:

- Continuous assessment, i.e. student performance is continuously measured throughout a course, based on weekly exercises and assignments, for example.
- Semester examination at a place in or near the home country of the student, requiring the student to travel to that physical location.
- Final examination at one of the universities participating in the MBI program.

5. PROGRAM CONTENTS AND STRUCTURE

5.1. Subjects and Courses

The core courses of the MBI program focus on subject areas that reflect the understanding of Business Informatics of the initiators of the program. The selection is based, on the one hand, on formal recommendations and frameworks developed in previous years by the scientific Business Informatics community (e.g. [6]). On the other hand, it is influenced by teaching experience and current requirements from industry as observed by the initiators.

Electives and advanced topics are offered to give the students an opportunity to choose subjects according to their individual preferences and/or future professional plans.

Core Subject Areas

- Management information systems
- Enterprise resource planning, supply chain management
- Electronic commerce
- Information system development (systems analysis and design, software engineering)
- Web-site engineering (methods and tools: HTML, XML etc., Java, multimedia tools)
- Data management (enterprise data modeling, database systems, data warehouse, OLAP, etc.)
- Business intelligence (knowledge management, artificial intelligence, intelligent agents, softcomputing)
- Information management
- Internet technology (telecommunication, networking, protocols)

Electives and Advanced Topics

- IT-based management issues (one-to-one marketing, customer relationship management, mass customization, total quality management, etc.)
- Electronic finance, electronic banking
- Process engineering (business process modeling, workflow management)
- Information system architectures
- Information security (tapping, hackers, viruses, disasters, etc.)
- Legal matters (international software laws, privacy laws, etc.)
- Manufacturing automation

5.2. Program Structure

On the average five modules are taught per semester. The courses a student is required to take depend on the individual background. The program is intended to start with a "standard version" which addresses students with a business degree. Later an additional "business track" will be introduced and made compulsory for students without that background. Likewise, additional introductory computer science courses (including programming) are provided for students who are novices in that field.

The farther the student's background is away from the standard profile, the less choices of subjects he or she will have. While students with a business degree and some computer science knowledge have the widest choice of electives, students with neither one of those backgrounds are required to fill their module options with the business and computer science complements. Figure 2 gives an outline of the program structure.

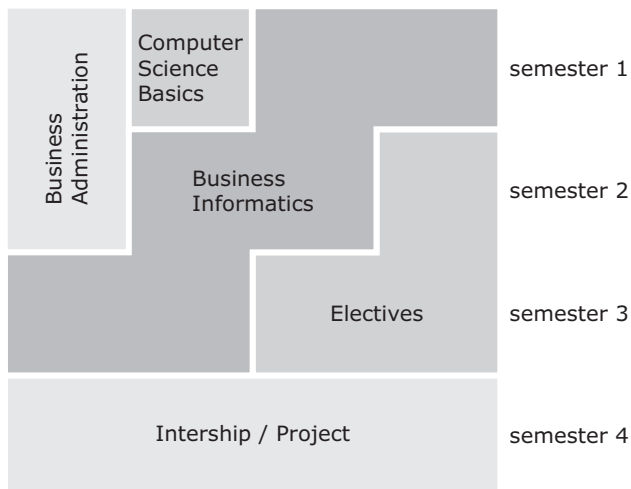


Figure 2. MBI program structure

The practical part consists of either an internship or a project of one semester. *Internships* will be provided by cooperation partners from industry, preferably global enterprises where students can work as part of a real or virtual team. *Projects* are typically "internal" development projects conducted by the professors who teach in the program (for an example, see [7]). The underlying prob-

lems are case studies or real-world problems provided by cooperating companies.

6. TECHNICAL REQUIREMENTS

Unlike former network and multimedia based teaching projects, the virtual MBI program does not rely on specialized computer hardware and networking equipment. Instead, the technical infrastructure is the "normal" Internet and its common services and technologies. This means that students do not need to buy additional hardware or software if they have a state-of-the-art PC with a fast modem, Internet access, browser and communication software, and standard software like the Microsoft Office programs.

More advanced software tools like audio and video players are either commonly available as plug-ins bundled with other software, or the plug-ins can be downloaded and installed free of charge.

On the lecturers' side, new tools have to be used to develop the course material, e.g. a video editor. Some of those tools are free of charge but for others, e.g. Adobe Premiere [8], Ulead Media Studio [9], Apple QuickTime [10], the developer has to pay a licence fee. Nevertheless, even in those cases the viewing tools are free of charge. In this way, a course developer may use a sophisticated multimedia tool like Macromedia Shockwave [11] and pay licence fees while his students can watch the Shockwave movies with a free plug-in that can be downloaded easily from the Internet.

Students access the lecturers' course materials in the first place through the Web portal of the School of Business Informatics. It is a question of performance and ease of administration whether the material is physically kept on the school's Web server or on decentral servers at the websites of the lecturers.

7. FORMAL REQUIREMENTS

Requirements for admission to the MBI program are comparable to those of other master programs. The default prerequisite is a Bachelor's degree. Equivalent degrees will be considered for students from countries like Germany or Switzerland who do not get a Bachelor but some other degree or certificate ("Diplom", "Lizentiat", "Fachhochschulabschluss", etc.). Admission is differentiated further depending on the type of the degree and the field it was awarded in. Requirements to take certain tracks are defined as discussed in section 5.

A severe problem is to bring the construction of a virtual school run by a network of professors from different states and countries in accordance with existing laws, rules, and regulations. The traditional view of an academic program, as it is reflected in today's ordinances, is that the program is within the responsibility of one institution – a faculty, a department, a university – or possibly it is a shared effort of two such institutions.

In the MBI case, the school is virtual and the persons responsible for teaching and holding exams are a network of professors belonging not only to different institutions

but even to different countries. Hence, some crucial questions the answers of which have to be mapped to existing laws are the following ones:

Which node of the network is responsible (and liable) that the program is executed correctly, that the courses are held as announced, and that appropriate quality is assured? What are the mechanisms for sanctions? To which university do the students belong in a legal sense, i.e. where do they enroll and how? How is the tuition collected and how will it flow back to the MBI program?

Further problems arise if not only one but several universities participating in the program award the master's degree. Then the respective ordinances have to be harmonized in addition.

8. OUTLOOK

The problems mentioned in the previous section are currently under discussion among the initiators of the program and on their way to formal solutions. According to the project schedule, the MBI program is intended to start operating in winter semester 2000/2001 with a test phase. At the time this paper is being written it is not decided yet whether the test phase will include the full program or just some selected courses.

For the full program, the first batch of students will probably enroll at just one university; this will be the university which establishes the formal and legal framework first.

While the MBI program will start with the "standard" version (see section 5), admissions and program tracks will be differentiated in the following years, taking into consideration evaluation results and experiences made so far. The number of electives will be extended gradually as the number of students in the School of Business Informatics increases. Later specializations of the MBI program (e.g. "MBI in Electronic Commerce", "MBI in Information Management") and additional programs from related fields will be considered.

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