

Virtual Learning Environment in the Age of Global Infonetworks

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Abstract

The paper is focused on educational process in the era of global infonetwork world. It addresses education as an important part of Electronic Commerce infrastructure and its content for digital media market. Changing universities' role and personalized education are examined in the context of IT multimedia tools and virtual organisation model. The second part describes some of the software applications being developed at the Institute of Informatics, Technical University of Brno, as a part of international EU projects. The concept is available on the Virtual Info Park site, <http://www.park.cz>, the WWW center for Internet strategies, E-commerce and virtual education.

Education in the network era

*In the information, as opposed to the agriculture or industrial, economy, ... people prosper less according to what they **have** in their hands or bank accounts, and more according to what they can **do** with their minds. ... Education is just about the most important job a community can do. (Esther Dyson, Release 2.0)*

In the last decade, the widespread introduction of personal computers led to their use in training. As computers became more powerful, sophisticated multimedia computer based training allowed learners the freedom to work on their own, much as they might with a traditional correspondence course. However, this form of training isolates students in that there are usually no support mechanisms in the form of an instructor or fellow students to turn to with questions or to discuss issues.

The training and education requirement today has changed radically from the past, in particular because of:

- Increasing training costs
- The need for continuous reskilling
- Shorter product life-cycles

Education is a broad term. We define it on the basis of three primary processes of an educational institution

1. *Teaching & Training & Coaching* - disseminating general knowledge and skills, one-way or two-ways communication with learners
2. *Consulting* - concrete problems solution, applying theoretical background into practice
3. *Publishing* - bringing new ideas, enriching the content, resp. know-how fund, communicating with other colleagues

E-education in the E-commerce context

If we think of E-commerce and network digital economy as trends that will affect almost every area of our work and life, consider education in this line too. In the world, where the king is information value, continuous learning and reskilling will be necessary. The classical way of attending classrooms will have to be replaced or combined with distance education. Let's look at several reasons why no business should forget the online form

- education is one of three basic presumption for a mass E-commerce market (with demonopolized telecom infrastructure and legal environment)
- education is also a new approach to current or potential customer support
- knowledge market will be led by those who succeed to explain the principles and benefits of their products and services and who succeed to teach their clients how to exploit their competitive advantage

Internet or generally public information network brings to the side of supply an effective tool for educating the customers and to the side of demand a chance to decide more by real information rather than by advertisement slogans. Moreover intranet or other form of corporate information system is a suitable tool for an organization to provide employees with cheap and efficient education and to maintain corporate know-how.

Changing universities' role

Schools have to prepare for a fundamental change of their society role. Regarding IT development they can not compete as encyclopedic information sources anymore. Their unsubstitutability is especially in performing as training and live communication centers, in providing space for such activities that can not be virtually. What the Czech educational system is missing on the way to information society is well described in Agenda 2000 by European Commission [3]:

- diversification of financing of higher education institutions
- diversification of higher education supply (private education, life-long learning, etc.)
- development of the non-university sector
- integration of research and education
- development of new curricula in key areas to increase awareness on EU issues (e.g. European Studies)
- accreditation and quality evaluation

What can E-education bring

- open access, improved quality and reduced costs
- shift the style from a didactic to a more project oriented work
- enabling new kinds of learning (Internet as an interactive media and as a new education tool)
- learning process individualization (approaching the ideal one-to-one teaching with individual studying plan)

Cost needed to start online courses usually include

- concept and concrete educational services forms (orgware, software, data)
- technology (hardware, software)
- content creation and maintenance (data)
- operational support - technical and communicative (people)

Next to advantages in operating online courses you need to take into account higher investment necessary for primary building a course and potential market size limited by the language barrier.

ACCEL model

The probability of effective learning outcomes can be improved by designing with the following ACCEL model that builds on learning principles and learner characteristics:

- *Active* - Learners participate in a learning program that requires thoughtful and engaged activity
- *Collaborative* - Learners engage in discussions, activities and projects with fellow students
- *Customized and accessible* - The learning program is designed to fit the needs and requirements of students in terms of time, career goals, levels of preparation, and learning styles
- *Excellent quality*. Courses are designed with a learner focus, enabling learners to achieve desired goals and objectives. This learning generally includes communication with faculty members and other students, and it includes quick and easy access to high-quality instructional resources.
- *Lifestyle-fitted*. Interactive distance learning accommodates the lives of students, affording cost-effective educational opportunities anywhere, anytime, and at a reasonable speed

Czech Internet Commerce market overview

The Czech Republic offers an emerging market accessible effectively also through Internet infrastructure. Although Internet penetration can be hardly compared to Scandinavian or US figures it is becoming seriously considered media reaching the attractive part of the population. The number of Internet nodes (DNS servers) in CZ domain has exceeded 80,000. The recent GfK representative survey is showing a figure of 7,3% Internet users in our population (over 700,000 people). The Net advertising market is estimated to 35M CZK (about 1M USD) annually (that is about 0.15 % of the total advertising market). In May 1998 Expandia Banka started to provide a complete Internet banking in the Czech Republic. Nowadays it is the major force to push forward E-commerce in the country - see also eCity (www.ecity.cz), the unique Internet game helping to build Net shopping attitudes (with more than 25,000 users).

Country	IP addresses (5.1.1999)	IP addresses per 1000 inhabitants	Order in Europe
<i>Iceland</i>	24 794	93,2	1
<i>Finnland</i>	459 568	90,7	2
<i>Norway</i>	318 993	73,9	3
Germany	1 449 915	17,9	13
Ireland	55 859	15,8	14
Czech Republic	86 482	8,3	19
Italy	386 632	6,7	22
Bulgary	10 250	1,2	30

Source: RIPE

A lack of Internet user demographics in the Central Europe is one of the major barriers slowing investment into Internet and preventing further development of on-line business and electronic commerce. In 1996 DirectNet Consulting and the Institute of Informatics, Technical University of Brno, started to conduct the Internet users survey in the Czech Republic and Slovakia. The goal was to define users of Internet services in the Czech Republic and Slovakia and their demographic profile to find out reasons, ways and preferences in Internet usage

to clarify attitudes for online marketing and business transactions on WWW. So far four survey rounds were conducted, each of them took about 5 months with the total number over 6,300 participants.

A typical Internet user can be described as a young man with strong right wing political preferences who is finishing/has just finished college/university with a technical orientation. He usually works in a large urban area and in organisations dealing with IT or general/trade services. He uses Internet 1-2 hours a day (especially WWW and E-mail) - mostly at his workplace. The major motivation is retrieving information for both personal and work needs, further education and communication. He prefers access speed and up-to-date information provided on WWW. He is interested in entertainment (including culture and sport), professional information from his field and online news. Experience with buying online is still rare (but continuing to increase), but results show a significant interest in trying it. The major barrier in buying online is often absence of payment cards and fear of transaction fraud by merchants. He is especially prepared to buy online travel/admission tickets, books, software and video/audio products.

Virtual Education Environment

A virtual course is in our concept (developed by Institute of Informatics, TU of Brno) represented by the following services:

- Hypermedia content divided into modules (consisting of WWW pages with standardised navigation scheme) based on an incremental opening access to them
- *Online tests* (questionnaire based)
- Mailing list or Newsgroup serving as a forum (a commercial product can be used)
- *Personalised E-newsletter*
- Educational event calendar (could be also a part of Brokering service with the only type "Supply" and with the only class "Educational event", see <http://vip.fce.vutbr.cz/kalendar>)
- Virtual Consulting Center (expert system basis)

In general, the content may be served using combination of different media types: text, images, sound, video. Three kinds of interaction may occur: user-to-content, user-to-user and user-to-teacher in two communication modes: asynchronous and synchronous. The simplest form that a course may take, is a series of statically web pages, organized in a common navigational structure. The course content is mostly delivered as a combination of text and images. Basic asynchronous communication tool like web-board may be supplied.

The more sophisticated course may include one or more online sessions, in which the teacher synchronously presents lecture materials using some form of whiteboard, coupled with audio and/or video streams. In addition the process of the course delivery involves other issues including user and group management, performing and evaluating tests, etc. In the both cases, the capabilities of the web browser can satisfy the user interface requirements. In the more complicated situations, browser functionality should be extended in a standard way using plug-ins, external helper applications or Java applets.

Online tests

An application serving databases of questions and possible choices generates a form where subscribers fill (usually tag) their answers. The total result is shown and stored in the database. Questions can be selected randomly by given topic and difficulty in the way they are different for each of students.

This kind of test is not supposed to be used for examination purposes. The test provides a user with feedback about his/her knowledge level (if he/she is ready to do another task). Moreover the course leaders receive information on which questions are more difficult than others (that affects the Web course material).

This application could be used also for the help navigation facilities. Clients feedback enables us to redesign the system. A high potential can be also seen in developing an analytical tool providing data mining and knowledge management in the future as more research oriented work.

E-newsletter publishing

Another service is a personalised E-newsletter accompanying Web publishing and using data from other virtual education services. E-newsletter communicating specific market and providing a platform to develop a community represents always an effective way to deliver a value on the Net.

The solution is based on the database of E-mail addresses and a mailing list like application. In the personalised version it is necessary to respect preferences in terms of the content and the character set. The application should also handle unsuccessful attempts to deliver messages in order to reduce the number of addresses not valid anymore. The application can also support building teachers's own E-newsletter with their own content defined in advance.

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