How to organize continuing studies at an academic institution?

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Abstract: - The aim of this paper is to explore possibilities of using resources of institutions of higher education to support processes of life-long learning of its students, graduates and academic teachers. In the first part we will analyze needs and possibilities of organizing continuing studies. In the second part we will describe the features to be added to a standard LMS system in order to achieve a system supporting continuous, lifelong learning. Our examples refer to the studies in Information Technology at PJIIT and to the LMS system called Edu supporting them.

Key-Words: - lifelong learning, online learning, distance learning, blended learning, Learning Management System, platform EDU, e-portfolio.

1 Introduction
The importance of lifelong learning and the necessity of organizing studies supporting education of adults who want to update their knowledge and skills is considered to be of the highest priority to smooth the advancement of civilization [1]. In particular, the significance of lifelong learning was stressed many times by politicians. Among others, in the OECD report from the year 1996 [6] we read: “Success in realizing lifelong learning - from early childhood education to active learning retirement - will be an important factor in promoting employment, economic development, democracy and social cohesion in the years ahead.”

The main driving forces of changes in the contemporary world are scientific and technological discoveries leading to the widespread use of computers and information technology in all types of human activities. The modern computers have become cheaper, smaller, faster and reliable. A computer connected to the Net has become an extension of an individual person, of a company and of a society. Because of fast changes taking place the individual’s future has become less predictable, requiring taking frequent decisions how to act and what to do with one’s own life. The individual feels frequently the sense of risk, insecurity and uncertainty. The remedy lies in adapting oneself to fast changes especially on the job market by adopting an open attitude based on education including self-education, assertiveness and readiness for problem solving. The individuals start appreciating the use of a computer as an ally in their quest of adapting to fast pace of changes of civilization.
Consumption motives are becoming as important as professional (production) motives when individuals take a decision to acquire new skills. Access to knowledge is enabled through many channels of knowledge transfer such as Internet, TV, stationary and online courses and trainings, games, virtual reality. Acquiring knowledge becomes enjoyable.

Nobody doubts about the role which is played by parents and front-end organized education system in forming an educated person. An important addition to their role is preparing a young individual to the processes of education that take place after leaving school and starting adult life. Higher education offers studies towards degrees such as Engineer, Bachelor, Master, Ph.D., studies towards a postgraduate diploma and open studies towards certificates of completing specific courses. Repeating such studies is a recognized model of continuing studies at academic institutions.

In this paper we propose a new model of continuing studies at an academic institution, called continuous studies, based on building an e-learning community of practice consisting of students, graduates and academic teachers.

2 Continuing education, lifelong learning
The lifelong learning is the process of constant renewing, improving and building up general and vocational qualifications of the person during the whole life. The main reasons for undertaking learning by adults are:
1. the need of renewing qualifications or education level – acquiring knowledge, skills and often confirmation in the form of formal degree or certificate,
2. the need of changing qualifications or changing a job,
3. developing a hobby such as taking pictures, gardening, collecting paintings,
4. willingness of participation in social activities,
5. curiosity of the world, wish to understand the surrounding reality.

The essential element of the basic front-end education should be preparation of students to lifelong learning, making them aware that lifelong learning is both necessary due to the fast pace of changes around us and open for everybody regardless of the level of education.

The continuing education organized at an academic institution should be directed towards preserving possibility of getting employment on the job market i.e. employability and not just getting a specific employment as is the case of training for employment.

There are various forms of getting knowledge and improving qualifications such as training on the company premises including training on the job, undertaking graduate or postgraduate program of courses at an academic institution, participation in learning communities of practice, learning at home, informal learning through work and contacts with mentors, visiting theatres, concert halls, art galleries.

3 Learning using IT methods and tools

IT methods and tools can support education by making it more attractive, by enabling fast transfer of information and by establishing additional channels of synchronous and asynchronous communication between students and teachers. New IT technologies are appropriate especially for young learners, motivating them to study.

IT methods and tools caused a breakthrough in distance education. Distance education enables individualized-learning: a place chosen by the learner, at time chosen by the learner and at the rate chosen by the learner. It consists in extraction of local education structures and transferring them into the global context of space and time using various IT technologies [1]. The academic institution provides educational materials in electronic form and an online system supporting student learning. The evolution of education over the Internet is geared towards greater virtualization of educational processes, but it is interesting to note that face-to-face contacts taking place from time to time are considered fruitful, enriching basically distance education.

IT methods and tools support self-education, offer a chance of getting information by searching over the Internet, support solving both vocational and everyday life problems, in particular by using the help of Internet communities.

IT methods and tools enable forming various types of knowledge bases, both general such as the whole Internet or the Wikipedia, and subject-specific such as knowledge bases built by academic teachers or knowledge bases built in companies in order to support both optimization of business processes and training of employees.

Summing up, the computer has become indispensable tool supporting work of a student and a teacher, opening them access to didactic materials all over the world, enabling students to collaborate interactively with the teacher and other students, enabling running complex projects and experiments on distance, enabling forming small and big communities in the Net based on common interests and problems.

Recently, new social software has appeared whose aim is to support building and operating Internet communities especially in the area of joint learning and solving problems. The new tools include wiki, blogs, tools for sharing media, e-portfolio. The tool of e-portfolio is of special importance for supporting processes of lifelong learning. It enables documenting and integrating in one place progress achieved by the person in different environments: personal, at work and at school. The person can evaluate the achieved progress in learning and become aware of valuable goals which he or she may decide to strive to attain. E-portfolio introduces individualization to general trend of community learning.

4 The need for continuing studies at an academic institution

We say that a person is employable if he or she can find job on the current job market according to his or her specialization. To be employable a person should possess:

1) general knowledge consisting of:
   a. knowledge on the level of secondary school;
   b. knowledge in the academic discipline containing given specialization;

2) deep enough knowledge and skills within the given specialization – such knowledge and skills should be guaranteed by completing an academic degree program in the given specialization;

3) vocational experience – in most cases students achieve their professional experience during their studies working half-time or even full-time, and consequently extending their studies.

In the case of PJII, IT graduates are employable on the current job market at least during some time after earning their degree. In the case of post-graduate studies, whose students are usually not IT graduates, completing the postgraduate studies in addition to current, IT-oriented vocational experience also provides employability on the current job market. Technological knowledge is changing so fast that after 5 to 8 years the person may lose employability status. To preserve
employability there is a need for permanent, additional education during the whole life.

In order to continue working in a company, one usually needs to repeat on-site training (formal or informal) or even carry out self-education in the scope of methods and technologies used in the company. In the case of looking for employment in another company, a broader view and specialization knowledge update is required. In the case of changing specialization additional studies at a higher level are required. In-company training usually concerns technologies and problem solving which are of importance in the given company. Summing up, working and on-site training may not guarantee employability on the current job market.

In the case of discipline of Information Technology, exponential growth of technologies requires continuous updating of one’s own knowledge to be able to remain employable on the current job market. There is a question, whether existing post-graduate studies whose aim is to show how current, essential IT problems can be solved using current technology, are sufficient. Such studies are directed both to graduates of other disciplines who have encountered IT problems during their work, and to IT graduates who completed their studies some time ago and whose knowledge and skills need updating. It seems that there is a need to repeat postgraduate IT studies every 5-8 years to be able to remain employable on the current job market.

5 Continuous Studies

Instead of repeating postgraduate studies every 5 to 8 years as a means of preserving employability on the current job market, we shall consider an alternative method, namely continuous studies.

The concept of continuous studies consists in enabling graduates to remain a student associated with the academic institution during the whole life starting upon completing their B.Sc., M.Sc. or postgraduate studies. Thanks to advancements of Internet technology the place where a student resides is not important, as long as he or she is willing to participate in studies. The possession of the current knowledge and skills will be confirmed by a certificate of fulfilling the requirements of continuous studies at PJIIT.

Continuous studies should guarantee permanent employability and a sense of security on the job market. Participants of continuous studies maintain the highest qualifications required on the job market. Continuous studies include also academic teachers who teach courses in the given specialization. It should raise academic standards in the given specialization. Constant updating of the state of knowledge and skills in the given specialization has become a common goal of academic teachers, students and graduates. Consequently, a specific community of learning is being formed around the specialization taught and pursued at the academic institution. In particular, each participant of continuous studies maintains their own e-portfolio which shows their achievements and provides the basis for granting a diploma of continuous studies by the school.

Participants of continuous studies:
1) keep in touch with the knowledge taught at the school – also when the knowledge changes due to the introduction of new technologies or new specializations; the contact is maintained mainly through the Internet – the face-to-face meetings at the school’s premises are possible, but not required;
2) keep in touch with leading IT companies which collaborate with the school, the participants themselves may initiate contacts between the school and IT companies they are employed in;
3) keep in touch with other participants of continuous studies employed in various companies getting the overall view of the job market;
4) keep in touch with students, having a chance to interest students with work or other types of collaboration;
5) can start working on Ph.D thesis or take part in research projects conducted at the school;
6) can teach or help teaching classes and participate in seminars at the school;
7) can create and update their e-portfolio, including the part intended for potential employer;
8) can be awarded consecutive diploma of continuous studies based on their achievements documented in the e-portfolio i.e. publications, participations in projects, presentations, trainings.

There is a need to prepare graduates for the continuous studies before they graduate. To achieve this aim teaching should be based on projects, which are the basic form of work in IT companies – when there is a need of solving problems, creating models, designing applications, searching for information, reaching existing knowledge sources such as business papers or technological manuals (e.g. of consecutive operating system or database server releases). The second recommended form of education is working on papers and diploma theses. Students within the specialization are added to continuous studies and get assignments to be accomplished simultaneously in the framework of their ordinary studies and continuous studies.

Beside research activities academic teachers are obliged to update their knowledge and skills permanently within the environment of changing technologies. The leading technological companies (in the case of PJIIT such companies as IBM, Microsoft, Oracle, SAP) have an important role to play in
updating the knowledge base at the academic institution by providing new software, educational material, training courses both for academic teachers and students and vocational practices for students. Because of introducing new high-tech methods and tools supporting education in the academic institution, the academic teachers also have to learn them. Continuous studies provide great opportunity also for academic teachers by participating in the development of a learning community of practice in the given specialization.

At PJIIT in the current semester we have started continuous studies in the specialization of Databases. All students having their majors in Databases take part in the studies. After completing their studies towards their degrees they will have an option of continuing their relationship with the school by being admitted as continuous students.

It is important to notice that there are many persons who have high qualifications without possessing respective certificates and degrees. Such persons should be able to get such certificates from the school, possibly after taking some additional open courses and after passing required exams (e.g. postgraduate exams) and tests (as for example in [5]). Such persons could also be admitted as continuous students. At PJIIT we plan to implement this idea in the future.

6 Problem Formulation

Online learning environment supporting continuous studies should be based on knowledge repository equipped with a search engine over keywords (tags) and words appearing in repository documents. Each participant should have their own subsystem enabling defining different views on repository documents authored by the participant. For example:
1) to view and comment by all participants of continuous studies,
2) to view, comment and grade by an academic teacher,
3) to view and evaluate by a prospective employer,
4) to view and evaluate by an admission commission,
5) to view and evaluate by an awarding degree commission.

The online education platform Edu used currently at the PJIIT is not accommodated to new needs (which correspond to the obvious necessity of extending functionality of a standard LMS system to new features present in the Web 2.0 postulates). In particular, Edu requires the following additions:
1) extending two-level repository structure to multi-level structure,
2) Wiki documents (group shared WWW documents),
3) blogs (besides existing threaded Forum),
4) possibility of assigning comments to places in existing repository documents,
5) search engine over all repository documents,
6) two horizontal structures grouping repository documents either with respect to courses or with respect to participants. The participant should be able to grant access to their documents on a user-by-user basis. In this way the participants should be able to define various e-portfolios intended for various readers/evaluators e.g. prospective employer, academic teacher, commission, the same project members.

The required system supporting continuous studies should constitute a combination of the three systems: traditional LMS, learning community portal (see [7]) and system supporting personal development.

<table>
<thead>
<tr>
<th>Learning Management</th>
<th>Learning Community</th>
<th>Personal Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course, academic teacher, student, homework assignment, comment</td>
<td>Chat</td>
<td>Blog (private, public), entry</td>
</tr>
<tr>
<td>Test</td>
<td>Forum, message, blog (public, entry)</td>
<td>E-portfolio (access restricted)</td>
</tr>
<tr>
<td>Chat, Forum, message</td>
<td>Shared wiki (version)</td>
<td>Link to another element</td>
</tr>
<tr>
<td>Grade</td>
<td>Publish/Subscribe subsystem (feed)</td>
<td>Link/info to external achievements e.g. awarded certificate, prize</td>
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<tr>
<td>Message, announcement</td>
<td>Message, announcement</td>
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<tr>
<td>Project, game, virtual reality</td>
<td>Project, game, virtual reality</td>
<td>Project, game, virtual reality</td>
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<td>Lectures, syllabus, comment, keyword, annotation, program-med lesson</td>
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</table>

Table 1. Specific activities in the three kinds of learning systems.

Knowledge repository

The whole repository is the union of all individual repositories, e.g. repositories of students, graduates and academic teachers. The search is enabled over the repository including keywords (tags) and individual
words appearing in documents. The search regards documents to which the person has been given access. Each repository document has its owner (usually author) who can grant access to it to others. The privileges are: to view (including search), to comment, to make a version. The participants can define different subsets of their documents called e-portfolios and grant access to these to selected persons. The participant can assign a comment to a place in a document – provided he or she is granted a privilege to comment on that document. The participant can submit to the repository:

1) documents e.g. materials, papers, solutions to problems and assignments, manuals, project documentations, handbooks, diploma theses,
2) comments to places in documents,
3) blogs,
4) links to external documents (with assigned keywords and annotation),
5) announcements about interesting events and opportunities.

E-portfolio

E-portfolio is a view of a subset of all documents owned by a specific participant. Using e-portfolio the privileged persons can only read it and assign comments to places in it without possibility to change it. One participant can have many e-portfolios.

Extension to the Edu System

We will show how to extend the existing learning management system Edu [2] (see also [3] and [4] for the full presentation) to the complete system satisfying the specifications above - of the system supporting continuous studies. We shall start with the description of the current state of the system.

The basic notions of Edu are: course, participant, module and document. Each course has one or more participants with the status of course owners (called lecturers in Edu). Moreover, there is a list of participants having the status of students. The course consists of the following kinds of document-related modules:

1) Lectures – consists of one, usually big document, which has its own hierarchical structure e.g. Course Home Page, Syllabus, consecutive lectures from 1 to 15, exercises and small tests within lectures. Lectures can only be uploaded by course owners.
2) Materials – consists of a list of documents, each having its own name. Documents can be uploaded only by course owners.
3) Lessons (programmed lessons) – consists of a list of documents called lessons, each having its own name. Each lesson consists of pages. Lessons can be designed and edited (within the Edu System) only by course owners.
4) Working Folder - consists of a list of documents, each having its own name. Documents can be uploaded both by course owners and students.
5) Tasks consists of documents called tasks (assignments). Tasks can be specified only by course owners.
6) Tasks folder – consists of folders, each folder consists of documents called student files. Folders are defined by course owners. Student files are uploaded by course students.
7) Announcements – consists of list of documents called announcements. Announcements can be published only by course owners.
8) Calendar - consists of a list of documents called events. Events can be announced only by course owners.
9) Notes – consists of a list of documents called notes. Notes are written by participants and are private - visible only to the participant that has written them.
10) WWW – consists of a list of links to WWW pages. Links can be entered by all participants authorized to view a course.
11) FAQ – consisting of a list of documents called FAQ-entries. FAQ-entries can be written only by course owners.
12) Wiki – consists of a list of WWW documents. All authorized participants can create Wiki documents and versions of them.
13) Forum – consists of threads, each thread consisting of one or more messages. Each message can be treated as a document. All authorized participants can create and view threads and messages in them.

Moreover, the Edu system includes other modules, which are not document-related, such as Chat, Tests, Grades, Register (it is also possible to use customized and external modules, we will not cover this topic here).

Fig. 1. The course view of the Edu System. The modules are visible in the left hand-side vertical menu. On the right hand side the contents of Announcements module is displayed.
The primary aim of extending the Edu system is to add a more thorough management of documents. Each document belongs to exactly one course. Each participant is assigned a course named “Private space” with owner’s privileges. Academic teachers own courses taught by them. The owner of a course owns all documents of that course and can add annotations, keywords and comments for them. Each participant can define e-portfolios out of documents owned by them. Each participant can grant privileges to other participants:
1) regarding a course (in the role of a student or lecturer),
2) regarding a document (to read, to assign comments, to make versions),
3) regarding e-portfolio (to read, to assign comments).

The extended Edu System has the same two kinds of views on courses as the old Edu system and two new regarding documents:
1) student view of a course,
2) lecturer view of a course,
3) the view consisting of all repository documents accessible to the specific participant,
4) defined repository views called e-portfolios on selected repository documents owned by the specific participant.

There are the following additional kinds of objects in the extended Edu System:
1) Blog – a kind of Forum in which all threads are owned by the course owner;
2) Keyword (tag) – assigned to a document by its owner;
3) Annotation - assigned to a document as the whole by its owner;
4) Comment - assigned to a place in a document by an authorized participant;
5) Feed – subscription of short documents from blogs, forum, announcements, course calendar and external sources (Web feeds).

It is expected that the extension of the Edu System will be built during this calendar year. At the moment we have started continuous studies in the area of “Databases” using the current version of the Edu System.

7 Conclusion
In the paper, we have considered needs and opportunities for education that are provided by new IT technologies, especially to implement different models of lifelong learning.

We have proposed new model of continuing studies called continuous studies consisting in building learning community around knowledge base maintained by academic teachers and students. Graduates, instead of breaking ties with their school, can remain its students and take part in activities (mainly of online type) around the knowledge base such as:
1) updating repository documents of the knowledge base due to changes in technology;
2) building their e-portfolios – being ready to study new topics, get new qualifications or apply for a new job;
3) finding collaborators to their work from among students;
4) being an intermediary between the academic institution and companies;
5) teaching courses or taking part in research projects;
6) preparing oneself for getting their next degree e.g. Ph.D;
7) publishing papers in a journal e.g. “Advances in Information Technology” associated with PJIIT or books e.g. in PJIIT Publishing Unit.

References: