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From the editor..

Welcome to the October 2005 issue of Learning Technology.

This issue contains special section on the East European Perspective on Information Technologies in Education, guest edited by Prof. Samvel Shoukourian, Head, Department of Algorithmic Languages, Yerevan State University, Armenia. Prof. Shoukourian is also an Academician of National Academy of Sciences of Republic of Armenia. The articles in this issue are based on the International Workshop on Information Technologies in Education, that took place in Yerevan, Armenia during 13-17 June 2005.

Preparations for The IEEE International Conference on Advanced Learning Technologies (ICALT2006) are now on the track. The ICALT2006 will take place in Kerkrade, The Netherlands during July 5-7, 2006. Please visit the website of the conference for further details:
http://lttf.ieee.org/icalt2006/
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http://www.ask.iti.gr/icalt/2006/

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Besides, if you are involved in research and/or implementation of any aspect of advanced learning technologies, I invite you to contribute your own work in progress, project reports, case studies, and events announcements in this newsletter. For more details, please refer author guidelines at http://lttf.ieee.org/learn_tech/authors.html.

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Guest Editorial: Information Technologies in Education – An East European Perspective

Distance learning has become a key technology for many disciplines during the past several years. It has evolved remarkably during the same time, but its utility is still lacking in many respects in comparison with traditional learning. Due to likely stagnation in the increase of traditional learning activities and, meantime, emergence of totally new education related concepts like continuous/life-long education, distance learning seems to become a necessity for building ever smarter advanced learning technologies in the future.

In the late 90's, integrated computerized frameworks supporting traditional learning reached maturity and became the commodity on the market. The variety of applications and environments such as e-content development automation, desktop publishing, data visualization, office and management automation became widely available and impressively easy to use. On the other hand, distance learning nowadays already offered a variety of infrastructural/architectural concepts, each requiring complex computerized frameworks. Thorough performance studies of these concepts are difficult and rare and, therefore, the understanding of delivered performance is poor. As a consequence, framework development is platform dependent and expensive, and just few vendors currently offer applications and problem solving environments for distance learning systems.

At this moment, there is a great deal of confusion and uncertainty about the future of distance learning. The essential increase of framework prices in the distance learning market has engaged a lot of criticism which often ignores the achievements of distance learning research over the last years. There is a real danger of the "bandwagon effect" of making mistakes in managing distance learning technology. According to it, a large propagandistic effort was made to show the need and support for this technology in order to get further public acceptance and budgets. The bandwagon's four flat tires are caused by the lack of: frameworks software, skilled developers, guideposts (heuristics about design and use), and applications which can be softly moved on the distance learning track. We share the view that the evolution of scalable distance learning systems will be defined and limited by one factor, the ease of development and use. The ease of development and use is a consequence of using a high-level developer and user languages which should not resemble the architectural properties of the underlying platforms.

Almost half of software in systems being developed today and thirty-seven to fifty percent of efforts throughout the software life cycle are related to the system's user interface. The same seems to be here in framework's user interface.

For this reason issues and methods from the field of user-framework interaction (UFI) affect the overall process of framework development (FD) tremendously. Yet despite strong motivation amongst organizations to practice and apply effective FD and UFI methods there still exist major gaps of understanding both between suggested practice, and how framework is actually developed, and between the best practices of each of the fields. There are major gaps of communication between the UFI and FD fields: the methods and vocabulary being used in each community are often foreign to the other community. As a result, product quality is not as high as it could be, and (avoidable) rework is often necessary. In addition, FD methods and techniques are often perceived by UFI specialists as tools that are only re-served to computer scientists and of little or no relevance to UFI. And vice versa: UFI contents are often perceived by framework developers as after-thoughts or side-tools that do not necessarily affect the quality of framework.

This is the reason we tried to gather in one conference-room developers of SAKAI framework, users of educational CEENet network and developers of distance learning courses from Yerevan State University and other Armenian educational and research institutions as well.

The theme of this first workshop sponsored by Yerevan State University, OSI East-East Program and OSI-Armenian Foundation is to attempt to enumerate and understand these gaps of understanding and communication, with an eventual goal of proposing ways to bridge these gaps.

The bridge should be built from two sites simultaneously. For instance, FD frequently employs requirements elicitation techniques that involve framework goals, procedures, and operators. UFI typically uses task modeling involving task, sub-tasks, and temporal operators between. While these two techniques are different in purpose, they are surprising close to each other and this feeling arises during the common work.

This workshop can improve framework development and UFI education and practice by raising awareness of UFI concerns among FD researchers, educators, and practitioners, and vice-versa. It can also show the places where an attention to concerns from one field can inform the other field's processes, and showing how methods and tools can be augmented to address both FD and UFI concerns.

We hope that will have an opportunity to make the workshop regular.

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Armenian Reading Equipment with Voice (AREV): A System of Information Communication for Persons with Impaired Vision

1. Introduction

Integration of blinds into society is one of major goals of any civilized country. In Information Age there is a possibility to achieve this goal by using Text-to-Speech (TTS) Synthesizers, systems and special equipment. Absence of an Armenian TTS and high cost of existing foreign language TTS licenses virtually leaves out of reach such technologies for blind Armenians. There are 4000 blinds and much more persons with poor eyesight which are excluded from processes of Information Society.

YCRDI has developed a system for persons with impaired vision in Armenian. The system was developed, tested and implemented in some specialized organizations in Armenia and proved extremely useful. Approaches adopted in the design process, achieved results and system implementation are an example of possibility to solve the problem using computer systems for Blinds (CSB).

Text-to-Speech (TTS) synthesizers are essential part of any CSB, but operations carried out by a blind person to read any text, to enter data, to edit them etc, are something which should be developed and made accessible for a blind person.

One of such widely known systems is JAWS developed by Henter Joyce. The major restriction of this system is the high cost, English language and Windows knowledge as a must. These factors makes its usage for Armenian blinds unacceptable and until now there are no known examples of its usage in Armenia.

2. Principles of AREV development

Some basic principles were used during AREV development, which are considered essential for a success of such systems.

1. The system should not depend on age and education level of persons with impaired vision.
2. The system should be able to work in stand-alone, group or distant modes of operation.
3. The cost of a system should be affordable for blind persons, which usually have limited financial resources. Technical and software means ought to be off-the-shelf.
4. The system should be open for incorporating new functions and should not depend on progress of technology.
5. The system should be user friendly bearing in mind the limitations of blind persons.
6. After short initial training a blind should be able to perform all functions without assistance.
7. The system should be developed by phases according to priorities of functions (on the principle: the most important function – first).

Investigations carried out by YCRDI specialists in boarding school for children with impaired vision and with Association of Blinds of Armenia showed great interest and expectations with such development.

Based on these principles, TTS synthesizer for Armenian language was developed and tested on several groups of blinds and its quality was considered corresponding to the internationally achieved results for other languages.

In AREV system operations are performed by a specially designed software package. Here a user needs to press a certain key to perform the necessary function. The function is automatically performed by the existing software without further user intervention. This principle called “any program from AREV command set without intervention” proved very effective. The package, being open, if necessary, may include new functions.

The keyboard training which is an essential part of the system, is working in self-training mode making the training process independent of abilities, education and age of the trainee.

The system is expandable and new functions are included as soon as such demand arises. Thus, possibilities of Russian and English languages inclusion, writing and playing music, playing chess, etc were investigated and became part of the system.

3. AREV main functions

The system fulfills the following functions:

- Keyboard self training
- Creation of textual, graphic and voice personal libraries
- Forming of documents and textual materials. All known edit functions are possible (Font, Style, Size, Copy, Paste, Find, Select, etc)
- Carrying out scanning and archiving of documents, books and texts in personal library. As a package for OCR Fine Reader 5.0 Arm is used
- Reading texts with a selected speed, voice (man, woman) and screen magnification
- Navigating in arbitrary Web sites, reading page content and, if necessary, to store it in user's personal library
- Search of necessary information in Internet
- Send/get textual, voice and graphic information via e-mail
- Input/Output textual information by Floppy and Flash devices
- Write down music and print out notes
- Making records, inputting, outputting voice on CD
- Enter graphic images by scanners
- Print texts and graphic images
- Carry out calculations
- Chess player
- General library (school subjects, Fiction Omnibus, Laws of RoA, Holy Bible etc).
- Diary (calendar, clock, e-secretary, planner etc)

AREV system may work in several modes of operation. It may be installed on a separate computer and used at home or in office. In group mode several computers share the same printer and scanner via LAN. In distant mode they are tied-up to the YCRDI center.

All functions described above are available in Armenian, English and Russian. To read texts in Russian it is necessary to have Digalo TTS package. For entry of English and Russian documents by scanner it is necessary to have Fine Reader 6.0 package.

For AREV implementation off-the-shelf personal computer, scanner and AREV software package are needed.

4. AREV implementation

Testing and implementation of AREV system was carried out in parallel with enhancements of the system. More than 40 blinds were trained. Some of them have acquired necessary equipment and now work at home or at office using the system. A class of AREV based computers was created at boarding school N14 of children with visual impairments and groups of children were trained. In the Palace of Culture of Union of Blinds AREV center was opened and the first group of blinds trained.

Experience shows that because the self-training and user-friendly approach no variations of training abilities were observed and 40 hours for basic package and 60 hours for a full package are enough for mastering the system at YCRDI training center. A master plan for widespread use of the system is developed with assistance of Committee for Disabled of National Assembly of Armenia and a number of proposals are aimed to assist the blinds is moving to this new Information technology application.

Acknowledgements

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Social Pre-requisites of Establishing Information Society in Armenia

Armenia being a country in transition has many social problems. On our way to a modern information society Armenia needs adequate economical, political, social and cultural resources. The paper refers to the social sphere considering the situation in economical and political spheres as determined. Attempt is made to define obstacles. As economical and political conditions are not enough for the establishment of information society the absence of adequate social conditions can hinder its advance. There are the following social pre-requisites needed for the establishment of information society:

1. Social technical basis
1.1. Availability of computer technologies
1.2. The level of computer technologies
2. Information resources
2.1. Availability of computer specialists
2.2. Computer literacy of Yerevan citizens
3. Subjective pre-requisites of establishment of information society
3.1. Attitude of citizens to the process of being informed
3.2. Expectations of citizens
3.3. Demands of citizens

There were the following hypotheses:

1. There is a significant correlation between the attitude towards the process of being informed and social-demographic descriptions of citizens
2. The young generation is an information resource itself
3. Usage of computer technologies is more connected with the organization of free time than with a professional progress.

To reveal the correspondence of the population to the requirements of information society a survey was organized in Yerevan. It was carried out only in Yerevan because of restricted resources. However, Yerevan containing about half of the population of Armenia provides enough data about social conditions and pre-requisites that can be extended to all Armenia. 140 participants, 66 men and 74 women, took part in the survey.

One of the results of the survey is the availability of computer technologies. Only 39% respondents have individual computers. If a household doesn't have a computer its members are trying to find alternative ways of access to computers and Internet. They use their workplaces, internet clubs, friends' or relatives' computers, educational institutions.

Only 2% of respondents were IT professionals. It demonstrated the fact that there is no need to be IT professional to actively use computers. 15% of respondents know necessary application programs, 11% were using computer as a means of communication, 7% were using computers for entertainment, 6% have knowledge to work on a computer as operators and the major part of respondents were using computers without having a deep knowledge in the field. We call them users and they form 30% of respondents. 2% of respondents have enough technical background for repairing computers

Availability of information resources and computer literacy are necessary conditions for developing the IT and education is the best way to train specialists. It is also very important to provide enough computer literacy among the society.

Data from IT companies shows that there are 5-7 thousand specialists in IT field. As all spheres of human activity are interconnected they must be developing simultaneously. It means that more specialists should be trained to respond to the increasing demand. The major problem is the quality of education and not the number of graduates. After graduating from the university a person should have the possibility to continue education as the educational system of Armenia doesn't provide knowledge corresponding to the international standards.

As the profession of a programmer has a good reputation and considered very attractive in Armenian families there is an opinion that the profession provides good prospects for young people. Other surveyed specialties are designers and economists. The survey showed that 10 % of respondents are economists and 57% of them have computer knowledge although the computer literacy is not at the proper level. Another conclusion from the survey is that there is no direct link between education and IT sphere.

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Realm of Online Teaching - Challenges and Strategies, Technologies and Applications, Faculty and Courseware Development

Preamble

While in 1998 cutting-edge universities were only at the very beginning of their online delivery offering nowadays about 90 percent of universities in the United States offer web components and online teaching elements in their curriculum.

Web-based technologies are widely deployed throughout learning communities worldwide becoming an indispensable mean for the quality education, especially in engineering and technological fields.

Challenges, Constraints, Prerequisites

Online teaching is a complex venture related to multifaceted activities such as creation of IT communication infrastructure, development of appropriate instrumental tools, building of technical capabilities, as well as faculty training, courseware development, and coherent administration.

Online teaching deployment constraints are mainly related to the shortage and inadequacy of financial and human resources.

Along with that there are some experience helping the online teaching venture – such as IT literate faculty trained in IT basics at the Faculty Development Courses, experience in distance courses got from running the Cisco Networking Academy distance learning courses, capacities to develop virtual labs based on Mat lab and Lab View instrumental tools studied by faculty, as well as broadening international partnerships and cooperation.

Basic principles

Deployment of online teaching is based on the following approaches:

- Online teaching is considered as stepwise venture with activities driving its further expansion and broadening.

- Online teaching is not considered a substitute to the traditional classroom education. Rather, at its current initial stage, it is an addition to the traditional educational services.

- Courseware available on the Web is assumed to be free of charge. Such a model, which prototypes MIT venture, will help to lead to fundamental changes in existing educational services and provide free access to users.

- Online teaching is supposed to be developed with the maximal usage of SEUA's infrastructural, technological, and human resources as well as broadening cooperation with international institutions and organizations.

Foremost activities

At the current initial stage of online teaching venture the necessary instrumental tools, appropriate teaching materials and basic facilities were identified.

Instrumental tools

To introduce elements of online teaching an electronic library, a repository of teaching material case-packages, a repository of virtual labs, and electronic assessment system were developed. These applications provide access to storages of electronic textbooks, courseware, programs and tutorials of virtual labs, sets of knowledge assessment quizzes as well as their maintenance and functionality.

Denoted instrumental tools are coherent in design, functionally transparent, user-friendly and flexible enough to accommodate different types of teaching and learning demands. Case-packages include such components as syllabus, lecture notes, assignments and power-point presentation. A glossary helps independent learning, support in classroom offerings and increase of the teaching efficiency. Virtual labs are built with the usage of Mat Lab and Lab View tools, provide the possibility of virtual experiments, and enable the virtual performance of technologically complex laboratory experiments. Electronic assessment system provides knowledge assessment through sets of test quizzes according to any grading system – Letter Grading (A-F), 5 Point Grading Scale, 100 Point Grading Scale, and Satisfactory/Unsatisfactory (S/U) threshold assessment.

Applications are designed as three-tier structures providing end-users, instructors/authors, and administrators a corresponding access to courseware, its maintenance, and a comprehensive control of the system.

Search capabilities of the applications help users locate materials by discipline and subject areas, type of materials, name of the author, and type of instruction.

Online teaching instrumental tools are developed by the usage of such instrumental tools as MySQL server database management system, PHP programming language, HTML technology and Linux operating system.

Courseware for online teaching instructors / authors

Textbooks on online pedagogy and distance learning technology, tutorials on web-based assessment issues, and articles on active learning, and materials of seminars and papers on online teaching are developed and offered to learners.

Online teaching facilities

Special classrooms to enable online teaching equipped with computers, LCD projectors with access to the Internet and SEUA online teaching server are under construction.

Faculty training

A number of special courses to train faculty online and develop online courseware are designed and offered. Among such courses are online teachings for engineer-researchers, online teaching courseware development, efficient teaching in technologically enhanced educational environments, and online teaching for faculty instructing subjects in English language.

Web Portal

A special “New Educational Technologies” portal incorporating online teaching instrumental tools, courseware, and methodological materials is placed at the SEUA web site (www.seua.am) and used for online teaching.

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New Method of Teaching Ecological Disciplines in Institutions of Higher Education of Armenia

Teaching of ecological and geoecological disciplines (ecological expertise, environmental problems, ecology, geomorphology, geography, etc.) are out-of-date in institutions of higher education of Armenia and needs to be modernized. This paper presents a new method of teaching ecological disciplines in those institutions.

One of the aims of the proposed methods is the involvement of students and trainees in the process of solving scientific problems with the use of new technologies, particularly, a small-scale receiver of satellite images "Cosmos-M1" developed in Federal center of science and high technology in VNII GO ChS, Russian Federation. It is more like a scientific problem solving since students are taught to work with images of earth surface area.

The methods imply the individualization of a learning process. Students feel themselves as starting naturalists. During the study process students develop creative thinking. They are tasked to analyze and select initial conditions for assessing the obtained results, develop hypothesis and forecasts. The usage and processing of empirical data allows introducing the idea of spatial and timing changeability of the environment. Along with the development of creative activities a global thinking is being shaped. It helps to analyze natural processes and phenomena that occurs in the world and separate regions and reveals interrelations between components of the nature and anthropogenic activities.

Students educating process is considered as a response to tasks presented by the teacher. With teacher's help students learn traditional methods of working with geographic sources – books, maps, tables and graphs. In order to stimulate the learning process students are offered to use remotely sensed data as an alternative learning method.

Data obtained from satellites provide clear image of earth surface and describe processes occurring in oceans and in the atmosphere. Students have a chance to watch qualitative changes in geodynamic processes occurring in the environment of the region where they live. For instance, to monitor dynamics of landslides the water level changes of Lake Sevan, avalanches, glaciers and clouds, stone falls, cyclones and anticyclones, determination of scales deforestation, oil contamination of territories, etc are considered.

A schedule of practice exercises has been developed. During those exercises the teacher has to explain to students basic methods of learning, i.e. the activity schedule. Different types of exercises have been included for practice (new publications in this area were used). There are traditional questions like "what kind of information can we get from the satellite image?" and tasks that require combination of imagination and knowledge (e.g. "What was the reason of weather change in Yerevan in the last few days?")

Purpose and main functions of the program attachment to "Cosmos-M1"

The attachment is intended for viewing, initial assessment and fragmentation of images, received from meteorological satellites of earth.

The attachment has been developed in MS Windows environment and has the following functions:

- viewing the images on a display in color, defining its scale and size,
- geographic link, application of a grid layer and geographic map,
- selection of an image fragment and saving it as a file,
- printing the image with application of geographic link.

Practice exercise 1. A geographical binding of a satellite image on a map.

The purpose is:

to execute a binding of a satellite image,
to familiarize with features of the image of a district on a satellite image.

• A work with satellite images begins with their "binding", i.e. the identification of the territory represented on an image. A binding of images is carried out by direct comparison of the image of a district on a satellite image and on a map.

• To compare the image with a map it is necessary to find general reference points. Coastal lines of seas, lakes, a river network and roads usually serve as such reference points.

• After binding a scale of the image is calculated by measuring the length of the same piece on the image and on the map. Calculations are carried out by the formula:

$$Mc = \frac{Lk}{Lc} M_{к},$$

where Mc and Mк – are denominators of a scale on the image and the map; Lc and Lk - length of a piece the image and on the map. For obtaining the average value of scale of the image it is recommended to choose two, three pieces in different parts of the image.

The order of work:

1. Identify on a map a territory marked on the satellite image
2. Identify and put borders of the image on the map
3. Determine with the help of the map the average scale of the image

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iEARN In Armenia

iEARN (International Education and Resource Network) [1] is a non-profit educational telecommunication network created to assist youth to engage in collaborative projects that explore their humanity, identify common values in cross-cultural milieu, recognize the interdependence of their lives and lifestyle. School projects are designed by teachers and students to be action-oriented, community-service projects on the learning gains through the telecommunication initiatives and local inquiry.

iEARN is the largest and most experienced educational telecommunication network for structured program in the world, having trained educators in more than 100 countries on how to effectively use the Internet to support online collaborative projects that promote active learning. iEARN further the formation of networks of schools and youth service organizations through conferences, training programs as well as on-going collaboration on educational and humanitarian projects.

The dynamic combination of iEARN`s educators and students exchanges, online projects, local and regional workshops, international conferences and training workshops has produced and proven to be a durable and scalable model for educators worldwide The use of new telecommunications technology is increasingly recognized as a deepening and broadening factor in the learning process.

iEARN was established in Armenia in 1999 when in National Children's library of Armenia after Khnko-Aper an attempt was made to involve a group of schools into this program. Now there are about 30 schools from Yerevan, all regions of Armenia and some regional libraries involved into the iEARN-Armenia program.

Participating in these program Armenian students together with their teachers gained a wonderful opportunity to communicate with colleagues from other countries, to become familiar with different cultures, customs and traditions of both far and close countries not only from books, but also by using modern means of telecommunication during the educational process.

Till recent time the interests and individual passions were the main criteria on choosing the projects that teachers and students were working on. There was no goal to connect the accomplished projects with curriculum, to integrate them into classroom. But now a new important significance of iEARN projects is that they are extremely useful in teaching a subject as they can make the school curriculum more interesting and understandable.

Project-based education is not a new concept. In the article "The Project Method" [2] William Kilpatrick describes the idea of building curriculum around a project. Project-based education organizes the learning instead of, or in addition to, textbook, reading, lectures etc.

Project-based education in general and diverse iEARN projects in particular:

- engages students in complex, real-world issues and problems; where possible, the students select and define issues or problems that are meaningful to them.
- requires students to use inquiry, research, planning skills, critical thinking, and problem-solving skills as they complete the project
- requires students to learn and apply content-specific skills and knowledge in a variety of contexts as they work on the project
- gives students experience in using modern telecommunication means, particularly, interactive e-forums, e-mail, newsgroups and others
- includes expectations regarding accomplishments or learning outcomes of iEARN project
- gives students a practice in using the array of skills needed for their adult lives and careers (e.g. how to allocate their time and resources; individual responsibility; interpersonal skills; learning through experience etc)
- ends with a presentation or a product that demonstrates learning and outcomes

The main and integral part of iEARN-projects implementation is the assessment. Assessment provides information about what students are learning, doing and demonstrating; gives the teacher critical information about how to modify an iEARN project or when to give coaching and directed assistance; ties the concrete iEARN project activity directly to the intended learning outcomes. Very often the criteria of assessment could be decided upon by the students

The easiest way for teachers to get started on iEARN projects-based education is to be involved in workshops or training. Training allows teachers to understand the philosophy, value and basic components of iEARN project-based learning. Undoubtedly such kind of education requires several fundamental changes in the roles of teachers and students.

For effective integration of iEARN collaborative projects into the classroom the professional development of iEARN online courses on social studies have been organized for 24 teachers from Yerevan and all regions of Armenia. For the first time such online courses have been conducted in Armenian language and facilitated by Armenian specialists. Within the frame of this online course each teacher has chosen one of the iEARN projects [3] and during two months planned, implemented and assessed it with a group of students.

In contrast to traditional classroom instructions, iEARN projects give students substantial input in the learning process by encouraging them to negotiate with teachers and coevals not only from their own school but all over the world.

It is also very important, that working with iEARN projects teachers find themselves surrounded with the peaceful atmosphere of a kind family, have a chance to develop professionally, broaden their students' worldview and particularly participate in the discussions of such global issues as peace, environmental protection, social problems, natural and industrial disasters, wars, hunger, incurable diseases, etc.

Interactive forums, e-mail, online courses, newsgroups, etc. serve as the main tools of communication in the iEARN program. At the same time meetings, face to face discussions, workshops and, of course, iEARN annual international conferences are significantly important

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iEARN ensures that Armenian educators and students find tools they seek to participate in rapidly evolving Armenia. iEARN`s content-based training workshops and ongoing assistance will enable a "community of learners" of Armenia to emerge and to engage in vibrant dialogue with other countries all over the world.

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Information Technologies for Psychological Services

It is obvious that the modern education needs psychological assistance. The article reviews the ways of using information technologies for educational psychological services.

A psychologist is using information technologies for:
- Organizing psychologist's work place
- Professional activity for servicing clients.

With a computer at a work place a psychologist usually use it for information search, filling forms, processing and analysis of results, information exchange and professional contacts. While working with clients a psychologist is using diagnostic, correcting and development as well as remote psychological assistance software.

Computerized work place is widely used by psychologists as there is no need for special software. Standard text processors, databases and Internet browsers are used for routine jobs.

Information technologies are less used for servicing clients but with the advance of e-learning they are becoming more important and promising. Currently there are many computerized psychological diagnostic systems but only some of them can be used as professional tools as the majority is just popular scientific or entertaining software. As for correcting and development as well as distant psychological assistance they are very important but insufficiently developed.

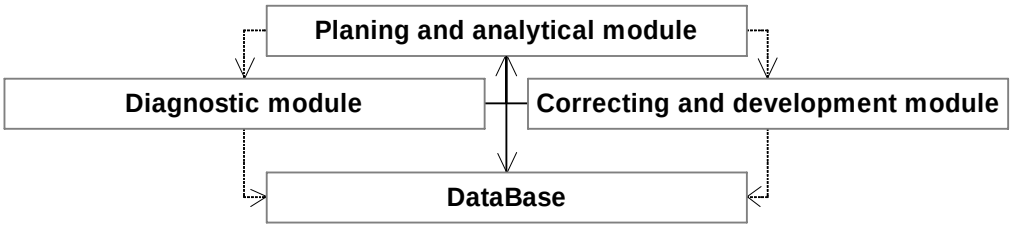
This paper is focused on using the information technologies for psychologists' work with correction and development. Currently we have only separate uncoordinated programs but haven't got any specialized software packages.

We finished the analysis of the existent correction and development techniques and the ways of using them in a direct work with children. It confirms that specialized software packages could be used for correctional and developmental cognitive processes, especially attention. The latter is because that activity needs to be performed every day (10-15 minutes 5-6 day per week). Taking into account a specific of a correctional psychological work there is a need for software packages that a psychologist could work with (not fully automated exercises). It is also necessary to include a diagnostic module in the software package since the correctional work requires a constant feedback. Hence the structure of the software package for correctional and developmental cognitive processes was developed.

Diagnostic module consists of tests for evaluation of the level of developmental cognitive processes. Every client starts and finishes the work with the software package with Diagnostic module. Diagnostic module is also used from time to time when a psychologist plans diagnostics.

Correction module consists of programs for correctional cognitive processes and also can be used for developing a normal level of cognitive processes. These two modules are used by clients according to the individual program developed by the psychologist.

Picture 2. *Structure of the software package for correctional and development cognitive processes*



The database saves information about clients' work (from diagnostic and correcting modules).

Planning and analytical module is another tool. Each week a psychologist can analyze data from the database and compile individual plan of correctional and development work. Subprogram from both correction and diagnostic modules could be included in the plan. Also a psychologist can control implementation of the individual plan and correct it if necessary using this module.

The software package is under development now and is planned for work on a PC as well as local network and Internet.

Currently the analysis of psychological theories and techniques as well as means of IT for psychological practice is finished. The same concerns the modeling of the system and developing scenarios for subprograms of modules. The programming of the system is now started with plans to finish the work within the next two years if there is enough financial assistance.

Optimal results can be achieved when using a professional software, when clients are ready to use PC, and all processes are conducted under the supervision of a psychologist. In this case using PC and IT by a psychologist can improve psychological assistance by:

- Giving a client an individual psychological correction
- Developing additional motivation for clients, especially children
- Providing clients with distant psychological assistance.

IT is very valuable and effective tools for psychologists and we plan to continue and expand our work in this direction.

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Information Technologies in Education

Why use Information Technology in education? For many of us, the potential is self-evident, such that it wouldn't occur to even ask the question. But it should be asked, especially with so many false starts over the years.

For example, how effective was it really to teach seven year-old students keyboarding skills, using an input device that was designed originally to make typing harder, not easier! Or instructing teachers how to program in BASIC, presuming that they would then write their own classroom applications, on machines that could barely manage word processing and simple databases? Both of these were at one time well intentioned but perhaps misdirected trends in the U.S.

IT in education can be effective if used well. The hardware is better, the interfaces are improving, and the software is more robust, such that administering students and managing course content are fairly routine exercises. The systems are now good enough (not perfect) that they can begin to deliver on some of the vision put forth decades ago. We can experiment with various pedagogical models for the use of technology to deliver curricula, and really interesting innovations with adaptive, reactive, self-paced learning are tantalizingly feasible.

It seems clear that IT has become an important element of education; the challenge is how to effectively and efficiently integrate IT so as to automate what is tedious and mechanical in the administration of educational systems, reinforce and complement the best of the student-teacher relationship, and explore ways to key the students engaged and challenged. In ways that we have yet to fully implement or appreciate, technology is changing the way we conduct teaching and evaluate learning.

The use of on-line learning environments has become quite common at the university level. The content of an on-line course can be readily refined, extended, and corrected, evolving much faster than a textbook, with much richer and deeper resources such as hyperlinked text, audio, video. Further, the environment can provide a substantially greater set of educational tools, such as chat rooms for technical support and on-line office hours, electronic drop-boxes, "collaboration spaces", and faster assessment cycles of student work. The best tools are interesting, useful, and pedagogically sound.

Students have come to expect the existence of a course web page as something of a default. While it is possible for individual teachers to create their own course web pages, it leads to tremendous variation in quality, content, features, and navigation.

The advantages to using a packaged system for the development and management of on-line courses is that such a system provides standard methods for course creation, it requires less technical skill to create courses, and the courses will have a reasonably consistent look-and-feel.

The utility of commercial on-line courseware has led to a substantial installed base, with enormous numbers of courses and users. However, the results have not been universally heralded as an unqualified success. By this, I mean that heavy users are aware of the limitations of the systems, are discouraged by the relatively sluggish pace of system development, and are often uncomfortable that such a big part of their enterprise is essentially out of their hands.

In commercial systems, new features emerge based upon the capabilities of the vendor and its business plan, not so much on the individual (and varying) priorities of the clients. Given the proprietary nature of commercial systems, the clients are left with little recourse – wait for the desired feature(s) or build from scratch.

A further consideration is the licensing costs associated with using a commercial system: even for US universities the cost is non-trivial, while for developing countries, where the use of such systems can provide tremendous benefits in the modernization of curricula, the packaging of the curricula, the improved quality of educational resources, and the geographic range over which they can be delivered, the cost is, relatively, much greater and can result in a full dead-stop for related initiatives.

Given the sizable amount of money spent on university IT applications, the similarity of requirements, the long experience with "home-grown" systems, and the remarkable talent pool available, the university environment seems uniquely well-suited for the design and development of an open-source, open-standard platform for on-line learning.

Rather than build many variations of essentially the same systems, at enormous cost to develop and maintain, it would be useful for the most experienced to work together to generate a broadly based and widely supported system. The participants must first establish the requirements, choose the protocols, design a core, and provide a framework for the elaboration of ancillary tools.

Upon establishing the initial foundation and tools framework, the system can emerge rapidly and more robustly than the commercial version, through collaboration and competition. Collaboration is beneficial, as it is no longer necessary for each participant to write the same code, individually; contributors can coordinate and focus their development efforts. And, as shown in the early example of Linux, competition will result in a much stronger and more resilient system over time. If a feature is missing, someone who needs it will write it. If it doesn't work well, someone else will write a better one. In this way, the system constantly improves through (dare I say it) a Darwinian survival-of-the-fittest model where the weak code is replaced by better implementations.

An acknowledged problem of open-source solutions is that technical support can be weak if there is no financial incentive to provide support – who do you turn to when things go wrong? The higher education community is better situated than most, as the members have a long history of working together, often have dedicated teams of professionals working on similar problems, and have a mutual and generally non-antagonistic interest in seeing the problems solved.

The remarkable potential of open source in higher education was recognized several years ago, and this insight accounts for the emergence of the Sakai Collaboration and Learning Environment. Sakai (www.sakaiproject.org) began as an experiment, with initial funding support from the Mellon and Hewlett Foundations, and is becoming an autonomous open-source alternative to the commercial systems.

I teach at New York University, in the Department of Computer Science. NYU happens to be one of the biggest users of the Blackboard system for on-line course management, with in excess of 3,000 courses supported in the system, and over 30,000 student users. Yet NYU is also a formal member of Sakai. Why? As one of the largest private universities in the country, there are few systems with which NYU is not familiar, having reviewed or used virtually every commercial system as well as a couple of its own original course authoring environments.

Working with the NYU Department of Information Technology Services, we are piloting a small test project with Sakai (release 2.0), installing the systems software, designing interfaces, and mounting courses in order to gain experience with the system.

But the more interesting element of our current use of Sakai is in the context of the Armenia University Consortium project, exploring the use of the system as a means to establish long-distance collaborative workspaces.

The University Consortium (UC) of Armenia represents an unprecedented collaboration of the leading universities in the country: Yerevan State University (YSU), Yerevan State Institute of Economy (YSIE) and the State Engineering University of Armenia (SEUA). The consortium was established in 2001 with the support of the United States Agency for International Development (USAID). The consortium was created to facilitate innovation and entrepreneurial activity using Information Technology in the emerging private sector of Armenian society.

The initial work of the UC began in 2001 with the installation of Computer Learning Centers (CLCs) at each of the participating universities. The CLC stage of the project was completed in 2003; the labs are now used extensively in the education and technical training of university students at each of the three universities.

The second stage of the UC program was to organize activities within its mandate for the development of programs in graduate education, continuing education, professional certification, and executive training. The first example was the new Master's of Science in Information Systems, which combines the study of business and technology. Based upon the model of New York University, the program was approved by the government as a formal educational "specialization" in the summer of 2004, its first students were matriculated in September of 2004, and will successfully complete the program cycle with graduation in June of 2006.

The UC MSIS program is unique in the Armenian experience in that it is the first such program that allows students to take courses at any of the participating institutions, thus serving as a pilot project for the educational reform transition to the "credit based" system.

Another major activity of the UC was the initiation of the executive training program. The inaugural event was conducted in June of 2005, on the topic of Global Sourcing. A second event is planned, on the topic of IT & Entrepreneurship, for 2006.

The new programs have been designed with a specific goal to establish links between the public and (emerging) private sectors, and help train a new generation of technology-savvy knowledge-economy workers who are also educated in the essentials of modern business issues and strategies.

The consortium is an open model, with a specific interest in establishing joint research and exchange programs with international partners. In this context, the presence of a framework for collaboration becomes essential. The utilization of Sakai in this regard facilitates a wide range of collaborative activities, such that students can take courses and conduct projects with partner schools and peers abroad. The prospect is appealing in an era where globalization is a reality, and "real" projects frequently span national boundaries.

The advantages from the Armenian perspective are substantial. They can use the Sakai source code directly, without potentially crippling licensing fees. The environment can be used throughout the country to deliver high-quality curricula. The system can be refined based upon local and national interests. However, just as interesting, the Armenian team can assist in the internationalization of the system, and have proposed a serious project pertaining to rigorous software testing and quality assurance.

Thus, Armenia becomes not just a user of the system, but a partner in its development.

And this is what brings us here, to the conference of the Central and Eastern European Networking Associations. With the support of the Open Society Institute of Armenia, who have sponsored this conference on Information Technologies in Education, and the United States Agency for International Development, who have sponsored a series of Sakai training workshops, we have come to share with you the work we have undertaken.

You will hear from several Sakai experts, each of whom has substantial experience in the development and use of IT in education. The goal is to review, initially, the motivation for Sakai, then its architecture, and, finally, conduct hands-on workshops to dissect and then rebuild tools in the Sakai framework.

We will each provide a general introduction to the topics, in the context of this conference, and then continue more detailed workshops sessions in the days following the conference, going further into the details with each day.

I have provided a context for the workshops; you will hear next from Jim Farmer, of the University of Michigan, who will discuss the organizational structure of Sakai, and some of thinking behind it. Peter Kharchenko will speak to the issue of authorization and authentication, in the context of portals in general and the uPortal software in particular. And Mark Norton, of MIT, will describe the Sakai architecture and the tools framework.

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Innovative Programs in the Education System of Secondary Schools of the Republic of Armenia

ABSTRACT

The goal of this sociological survey was revealing the attitude of Armenian students towards integration of Information Technologies (IT) into Education system in the Republic of Armenia (RA). This survey was conducted by Siranush Vardanyan (a post graduate student at the Institute of Philosophy and Law under the National Academy of Sciences of the Republic of Armenia) during May-August 2004 as a practical part of PhD dissertation titled "Innovative Programs in the Education System of Secondary Schools of the Republic of Armenia".

For conducting the sociological survey or the public opinion of 9-10th grade students a questionnaire was elaborated and distributed in 11 regions of Armenia, in one selected school in each region. Schools having Internet Computer Centers (ICC) established by Project Harmony Armenian Branch within the framework of the Armenia School Connectivity Program were selected as participants of the survey.

Main conclusions from the conducted survey are: first, the majority of students consider that the integration of Internet technologies into the education system develops a positive attitude, even though not all the respondents had used Internet at school before; second, about half of the respondents give priority to the usage of Internet as a huge information resource. It shows that schoolchildren are currently in an information vacuum, since school libraries are extremely old, while Internet if provided could satisfy their needs in information.

The schoolchildren of this age group strive to communicate with their peers while the chances of that are very limited in small environments like theirs. That's why children try to compensate the lack of communication with virtual interaction. Thanks to the Internet the schoolchildren have a chance to make acquaintances from all over the world and learn from other cultures.

The survey demonstrated that 27.2 percent of the questioned stressed the necessity for the improvement of the education level and computer literacy was considered a major factor for improving it. It should be mentioned that the current secondary education is far behind the international standards, and modern technologies provides an opportunity to improve the situation. It is not accidental that such a high percentage of the respondents stressed the importance of the improvement of the education system.

While the secondary education system provides basic education there is also a need for self-education. Information and Communications Technologies (ICT) give good chances for personal education. The overwhelming majority of respondents realize the importance of Internet technologies in the development of the education system. This proves that in future secondary schools the Internet will be extensively used for educational purposes. A special attention should be paid to exploring educational websites, taking part in online projects, as well as providing information about distance learning.

The survey demonstrated that the situation can be improved by increasing the number of computers in schools or upgrading the power of existing computers, by increasing the number of training hours and by improving the quality of Internet channel and access, as well as by adding the number of hours allocated for subjects, that can be taught in the computer centers. Adding of Armenian language resources for studying computers, organizing different online competitions and similar events should be considered for future effective work of computer centers.

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Developing e-Learning Environment

The abstract presents a toolset for supporting e-learning in national language (TeachArm system) developed in the Department of Algorithmic Languages of Yerevan State University. The teaching is organized as a scenario-driven process. TeachArm also supports learners' assessment with tests covering the material being learned.

E-learning becomes an inherent part of the education, and its effective organization requires both e-course development methods and the development of teaching supporting toolset. Of course, e-learning does not substitute a real teacher but helps them to organize teaching by using modern information technologies.

Users can interactively learn, test their knowledge via self-tests and be tested during the e-course. Different courses developed by subject specialist can be integrated within a course.

The following problems are solved during the development of TeachArm:

- identification of teaching scenarios;
- formatting of teaching material according to the pedagogical and methodological experience of the author of the course.
- creating a user friendly interface;
- taking into account the psychological researches related to the specific of working on the computer (for example, diminishing the amount of texts and increasing the number of animations);
- development of testing and certification methods of e-learning;
- creating multiple-mode testing system providing checking of student knowledge in given discipline ;
- quiz-making system development.

TeachArm system supports two modes (scenarios) of e-learning: slide show mode and slide-by-slide mode. In the slide-by-slide mode the learning of separate paragraphs are supported. A student can turn over the slides within the limit of one paragraph paying special attention to separate slides of the paragraph and listen to the media files. Students can go back to the beginning of the paragraph from any slide. The access to a paragraph is actualized by choosing a chapter from the contents and then a paragraph. In this way the chapter material can be learned consequently or by the choice of a paragraph. After learning the paragraph students are suggested quizzes for self-testing. Both learning modes are passive. Students can go back to course learning mode after answering all questions.

Testing and certification system provides testing by e-course and evaluating acquisition of learned material by a student. Testing by e-courses can be done in different modes characterized by the quantity of exam questions and the time for the answer. Students can choose the mode themselves. The quiz consists of multiple choice questions and tasks equally divided between paragraphs that are randomly chosen from the data base.

Before starting learning and testing the student is recommended to register in the TeachArm system via entering the name. The name is added to the registration file in which the results of the current testing are saved. In case of re-entering into the system the student is informed about the results of his/her last testing by choosing his/her registry name from the provided list. The student and/or the tutor can delete all the information about the student from that file. The registry file is updated during the current testing.

Help files of each course include index and navigation tools. The index contains the national (Armenian) alphabet, basic keywords of a discipline being learned and numbers of those paragraphs and slides in which the desired keywords are explained.

The TeachArm system is successfully used in secondary schools of Armenia.

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Distance Learning for Armenian Language

Information technologies provide greater opportunities in teaching languages, which is important for the development of the intercultural and interethnic communications.

There is some experience in Armenia in using technologies of distance learning of Armenian language (http://dlportal.iatp.irex.am/dlprograms/moodle/course/category.php?id=7). Under the IATP program (supported by the Bureau of Educational and Cultural Affairs (BECA) of US State Department, administered by American educational corporation IREX and its technical assistance) in 2005, February - May for the first time in Armenia distance-learning courses of Armenian language were organized.

An electronic multimedia manual "Self-taught of the Armenian language" (authors S. Iskandaryan, G. Vahanyan, http://www.iatp.am/eduarmenian/east) was used as a basis of courses. The course is functioning under the Moodle course management system.

For structuring lessons it was necessary first of all to provide students with corresponding teaching materials. Programs for calendaring and scheduling of lessons with definition of sequence and duration of lessons, goals pursued by students and skills possessed by them were developed.

Students perform their tasks and transfer results to the teacher by Internet. The latter checks written texts, analyzes them and draws attention of students to mistakes. The teacher supervises and estimates each step executed by students during training. In online mode (in real time) it is possible to estimate the oral skills too. "Chats", "forums", interactive teleconferences and videoconferences can serve that purpose when there is a direct dialogue between the teacher and students.

The results received from the teaching testify that remote teaching of Armenian language has a big future in Armenia and abroad. About 100 applications were presented for participation in courses in IREX only.

New functionalities are now added to the system (electronic libraries, online dictionaries, search subsystems, etc.). A uniform educational portal for remote teaching of East and West-Armenian languages is planned to be developed. As a basic teaching material on training of West-Armenian language the electronic multimedia manual "Hayeren Khosinq" of professors Hayr Levon Zekiyan (Italy) and Grigory Vaganyan (http://www.iatp.am/eduarmenian/west) is being considered.

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A Development on Control Problems in Online University

While the delivery of online instructional courses in higher education institutions is flourishing, students and educators in general recognize the advantages of the new technology. Problems and concerns about online education are touched in various articles and papers but limited researches were conducted to examine in depth the technical and social problems that accompany this new technology.

This study examines these problems and concerns regarding online distance education. Hopefully, the information that is provided here will update decision-makers of the current needs and concerns of online students and instructors so that an effective distance-learning program can be fostered in an All Armenian Internet University.

Because of the rapid development in recent years, the Internet and the World Wide Web is becoming a popular approach for information delivery. As an upcoming technology, it has the potential to strengthen and enhance learning and teaching in higher education. Now many universities and colleges are placing an emphasis on web-based distance education to seek innovative ways to provide flexible course offerings through new media. In fact, the use of Internet to create online learning opportunities for students at a distance has become extremely popular in higher educational institutions. Gubernick and Ebeling documented this trend towards an expanded role for higher education: "…55% of the U.S.' 2,215 four-year colleges and universities have courses available off-site. Over 1 million students are now plugged into the virtual college classroom, which compares with 13 million attending brick-and-mortar schools."

There are studies about the student and instructor incentives to go online. These studies reveal a commonality of advantages. The advantages cited most frequently in the literature include: convenience, flexibility increased interaction with instructor, less travel concerns, the ability to reach varied audiences, positive learning experience, single source for course and program materials and increased computer proficiency. The advantages and benefits of the use of this technology for distance education are obvious and multiple. There are many elaborate discussions in the literature. Hiltz (Hiltz, 1997) regarded online distance delivery not just as a "different" way of doing the same thing but a possible change in the nature and structure of higher education. If such change is about to take place, are there any problems? In fact application of Internet as an instruction media to reach the student at large is not an easy and simple task. There are concerns, barriers, and problems for both students and instructors.

In order to fully tap the potential of this new technology, an exploration into these obstacles is of great practical importance. The ideal of online distance education involves building learning environments that immerse students in the same learning situation across several network locations. To recognize such conceptions, networks should be made transparent to the learning situation. Problems arise whenever technology is not transparent. Lack of technical support, system failures and computer glitches are legitimate concerns in an online environment. Lack of technical support is experienced both by instructors and students.

For an instructor, the problem can arise from the use of software or a particular hardware. The sophistication and variation of multimedia and online delivery are such that it is unrealistic and unreasonable to require an instructor to be fully knowledgeable of the software chosen for the virtual environment. Faculty Time Commitment is necessarily increased in the development stage when the traditional course is transformed into an online course. Many people noticed the increase of workload at the development stage of a course preparation. McKenzie et al. (McKenzie, Mims, Bennett and Waugh, 2000) indicated 76% of online instructors felt they spent more time preparing and delivering WebCT courses compared to traditional face-to-face courses. Most of the online instructors come from the traditional face-to-face classroom environment without any additional pedagogical training.

What is the difference between online mode and traditional mode? What is the most effective method for an instructor to deliver a class over the Internet? Questions of this nature should be explored before an instructor goes into a virtual classroom to teach. In some ways, the need for careful instructional design is greater in web-based courses.

Intellectual Property

This ongoing issue relates to intellectual property: who owns the rights to the materials created for the online class by a professor? Intellectual ownership issues related to material ranging from journal articles to faculty member's course notes created barricades for remote users wanting online digital access to information and educational resources.

Logistical Support

There are concerns over logistical support to online distance education. Hiltz reported in a study that 52% of virtual students felt that it was easier to fall behind in online classes due to the ease of postponing or procrastinating.

Social Impact

These are other issues that are closely related to the nature of online distance education. These include what is the measurement of being successful in education. Humans are social beings. Social interaction is needed. The unprecedented development of personal computers and Internet technology was lead to the growth of online distance education. Because of the unique features of web-based courses, it is becoming part of the education delivery method as a supplement for the traditional education mode. The trend of putting courses online will continue to attract more institutions to join the effort of distance education. Nevertheless, concerns and problems, (some of which are becoming less prominent, as a result of technology advancement), need to be addressed so that it is utilized effectively for educational purposes.

This includes a cooperative effort from all technical, administrative, and educational professionals. Technical support is needed to guarantee the communication channel of instruction is effective. Administrative and logistical support is needed to provide incentive and regulatory measures. Instructional and pedagogical researches on the other hand are a constant process to find an appropriate, socially acceptable, and most effective pedagogy for the online distance education.

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e-Learning: Technical and Pedagogic Issues

ABSTRACT

E-learning becomes more and more popular in the world as well as in CIS-countries. It is also rapidly developing in Ukraine. The reason of the popularity is obvious: e-learning gives the opportunity to get a new knowledge at a convenient time, place and tempo for reasonable money.

Technologies of e-learning are technologies of active communication between students and tutors with the use of telecommunication and methodology of students' individual work with structured teacher's materials represented in electronic form. A part of teacher's materials can be provided as practical training, laboratory tasks, exams, etc. Different types of e-activity are very important for effective spreading of the knowledge. During e-training a student receives teacher's materials, fulfills tasks and takes tests. A student can ask questions and get an up-to-date guidance from his/her tutor. [1]

E-learning can be both an independent form of study and a part of internal form of education. Technologies of e-learning can be used in a traditional form of education, instruction by correspondence and external studies as well. Moreover they can be used in some subjects or blocks of subjects aimed to raise the level of professional skills and general educational level of separate groups of students.

E-learning has many advantages but also disadvantages, which concern two main pedagogical issues:
1. A dependence of tutors from a pedagogical conception they use in F2F lectures because many tutors are at the same time university lecturers. In case of usual F2F lectures a teacher has many possibilities and professional "tricks" helping him to keep up the interest of students during a lecture. Any lecturer knows how to encourage students and help them to get knowledge.
2. Students and tutors are in a virtual environment. Some students feel psychological inconvenience in being tête-à-tête with a PC because it differs from the study in a usual classroom with a professor and classmates who can help in case of necessity.

There is a difference between traditional and on-line studies. In the case of traditional education the main task of a student is to study the subject. But in the case of e-learning this task goes to the second place. The first task of a student is to adapt to an e-course environment. Many e-students need a special adaptation period and the task of a tutor is to help students in that. A tutor should be ready to be a little of a psychologist. He/she has to be aware of pedagogical peculiarity of e-teaching. That is why special trainings for tutors on the methodology of e-teaching are very important and useful. Participation in conferences and trainings allows tutors to exchange experience, get knowledge on both new pedagogic methods and modern computer technologies in e-learning.

E-training is possible in different fields of knowledge; humanitarian subjects, economics, technical sciences etc. However there is a difference in approaches to e-teaching of a technical subject and for example a humanitarian subject. The latter is more abstract while in case of studying a technical device or a process it is very important for a student to "touch" an object of learning. New computer technologies can help to develop an e-course with special technical means built-in into the e-course environment.

E-teaching is based on both pedagogical approaches and modern information technologies. An e-subject is an aggregate of knowledge representation and examination means. The process of creating of an electronic form of a subject includes several stages. They concern the development of a subject structure, creation of e-lectures, instructions, didactic materials, practical tasks and tests.

An e-course can include three main components:
1) Teacher's materials;
2) Tests;
3) Special technical means to support practice exercises.
   The third component is especially important in case of e-study of technical disciplines.

There are three categories of technical means for e-learning:

1) Platforms for technical support of e-learning

This category is necessary for representing teacher's materials and tests in electronic form and for supporting "electronic dean's office". There are many platforms; some of them are WebCT, BlackBoard and Lotus LearningSpace. Each has its own advantages and disadvantages.

2) Programming tools for providing interactive e-courses

Interactivity is very important for raising quality of e-study. From psychology it is known that a student remembers 25% of information given in audio form, 33% of video information, 50% information represented as both audio and video, and 75% of information got as a result of active interaction with a PC. Interactivity can be included in e-courses by using programming tools like ASP, PHP, JAVA, FLASH and so on. For instance the use of FLASH interactive animation helps to enliven e-materials and raise the quality of perception of knowledge by e-students.

3) Remote laboratories

This category is very important for e-study of physics, electronics, robotics and other technical disciplines. The use of a remove laboratory gives an e-student the opportunity to measure parameters of a process or an object, to study its behavior, to practice with it in reality. Such possibility raises understanding of theoretical computations and formulas in teacher's materials by students.

E-learning allows studying different technical subjects including modern computer technologies. Thus, in National Technical University of Ukraine "Kiev Polytechnic Institute" the basic training for future computer specialists includes the study of programming languages including Pascal, C++, Java, Prolog, Modula, etc. To support the study of Pascal an e-course with built-in interactive means has been developed [2] including:

1) Teacher's materials;
2) Tests;
3) JAVA-applets for emulation of program codes given in teacher's materials;
4) AlgoMaster and ProgramMaster (developed as JAVA-applets) for executing algorithms and programs.

A demo version of the course is given in [3].

To provide an e-student with high-quality education it is necessary to take into account both aspects of e-learning: pedagogical and technical. E-learning demands to renovate methods of teaching and use modern information technologies.

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Providing Access to All

The Armenia School Connectivity Program (ASCP) of the US Department of State Bureau of Education and Cultural Affairs implemented by Project Harmony (PH) undertook the task of spreading ICT literacy in Armenia. It has addressed a serious problem of social divide in Armenia in the use of information technologies in all eleven regions of Armenia. ASCP has covered 350 secondary schools throughout Armenia (239 urban, 91 rural), which makes up 25 % of all schools of the country. The way PH has applied technology in schools and community activities has made a remarkable contribution in promoting the values of civil society and democracy.

Armenia, a land-locked country, used to be one of the most technologically advanced counties of the former Soviet Union. During the last 10-15 years the old technologies became out-of-date and not corresponding to international standards.

Nowadays computers were introduced into secondary schools throughout the country; however, a few realized how they could serve the learning and teaching process. Project Harmony initiated educational projects which became a kickoff for the educational application of Internet technologies and methodologies. The projects have resulted in the creation of websites and continue to develop state curriculum-based resources. Some of the resources are listed below:

Teacher's Guide on Integration of Information and Communication Technologies in Secondary Schools - http://www.ascp.am/en/resources.html#t_guide

Student Guidebook to the Use of Computer Applications in the Learning Process This web page is created to enable middle school students to get acquainted with computer software and hardware, as well as principles and details of their functioning. http://projects.ascp.am/guidebook/.

Armenian Holidays Educational project: The web pages created by the 7th through 9th grade students within the scope of the "Armenian Holidays" educational project provide the origins, history, and traditions of Armenian holiday both secular and religious. They serve as online supplementary resources in teaching religion, history, arts, literature, etc. and target at different age groups. http://projects.ascp.am/holidays/

Civic Education Training Initiative Online Lesson Plans (in Armenian)
The site contains lesson plans created to supplement the state curriculum for 8th, 9th and 10th grade civics classes. http://www.ac2k.am/civic/; http://library.projectharmony.am

As a result of the Technology Curriculum Development Project (TCDP) implemented in collaboration with Kent State University, **a Teacher's Guide on Integration of Information and Communication Technologies in Secondary Schools** was created. The Armenian-language handbook elaborates on the philosophy, methodology, and standards of ICT application in the teaching process and provides practical tips and real examples for integrating technology into the teaching of various school subjects. Created by a team of Armenian educators, the teacher's guide is approved by the National Institute of Education of the Ministry of Education and Science as a handbook for secondary school teachers.
http://www.ascp.am/en/exchanges.html; http://www.ascp.am/en/resources.html#t_guide

Fun with English and Computers: A Resource Book for EFL Teachers

Project Harmony-Armenia created a multimedia educational resource for English teachers, "Fun with English and Computers: A Resource Book for EFL Teachers". Unlike many other resource books, this is a supplement to the English textbook for the 9th grade. All of the activities included here are opportunities to further explore the topics included in this textbook. The resource book has been recommended as a supplementary teaching material by the National Institute of Education.

Project Harmony-Armenia accomplished the **Student Assembly educational initiative** aimed at forming nationwide Student Parliament through local elections at schools. Setting the main goal of developing high school students' knowledge in the nuances and peculiarities of Republic of Armenia's Legislative body through their actual political participation, the project opened a wide opportunity for the participants to broaden their views on the workings of democracy through their political engagement. The private forum space developed and

facilitated by PH provided facilities for the young parliamentarians to discuss various youth/community-related issues during breakout as well as dwell upon the documents currently being under debate in the Armenian National Assembly/Parliament of Armenia. http://www.ascp.am/en/assembly.html

PH has conducted US-Armenian online collaborative projects which have brought teachers and students from across both countries - Armenia and the United States - together using an established curriculum. The partnerships between schools have enhanced informational exchange, innovative educational activities, technical skills building, and more. It contributed to the integration of ICT into teacher training, creating effective moderators and stimulating informal learning.

Project Harmony-Armenia has conducted international exchanges, both to Armenia and to the United States, enabling the participants to explore the education system differences and peculiarities of various countries, different cultures and people. http://www.ascp.am/en/exchanges.html.

The **mobile lab** project is a cutting-edge initiative designed as a pilot program to create one traveling computer lab to serve 20 remote schools in one of the regions of Armenia. The equipment is specifically installed taking into consideration the need to withstand the road wear of being in transport for a significant amount of time, the provision of Internet connectivity, the staffing of the traveling lab, and the key operational expenses.

The Mobile Lab project is not only the first of its kind in the Transcaucasus but also in the Republics of the Former Soviet Union and provides connectivity to schools, which either cannot receive Internet because of their remote location. For many of these remote communities, the Mobile Lab provides an expanded world view and exposure to information and communication and allows students from rural communities a connection never possible before.
Through the ASCP, PH has also brought information technologies to various segments of society by encouraging community involvement in the Internet centers. It has provided community members opportunities to access and share information, to engage in online collaborative projects, and to develop technical skills marketable in a digital world, reaching out to more than 200 diverse communities. Numerous projects for minorities, refugees, single mothers, and other vulnerable layers of the population have been and will continue to be implemented to ensure everyone's access to the kinds of learning opportunities they both want and need in the increasingly knowledge-dependent world in which we live. http://projects.ascp.am/community/ Project Harmony, through its Armenia School Connectivity Program, is providing access to all by Advancing Society and Connecting People.

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A "Moodle" Course Management Systems and a Web Presentation Tool

EXTENDED ABSTRACT

Moodle is a course management system (CMS) - a software package designed to help educators create quality online courses. Such e-learning systems are sometimes also called Learning Management Systems (LMS) or Virtual Learning Environments (Moodle Official Web Site, January 18, 2005). Moodle provides a framework for organizing courses by means of different modules (Dougimas, M., 2005).

Nowadays, more and more local educational institutions start employing means of e-learning. Wide functionality, free distribution, modular structure and a large community make the Moodle course management system more and more popular in Armenia. The paper is aimed to present to the functionality and the benefits of the Moodle Course Managements System and its prospects in Armenia. Introducing the functionality of the software this paper concentrate on the Web Presentation module, recently developed at the American University of Armenia as a Master's Project.

The project was directed to develop a user-friendly module for creating, editing, browsing and saving web presentations without additional software packages except for the Internet browser and Moodle content management system installed on a remote server. Usage of presentations in the system without additional software was the main goal to achieve. The idea was to make a presentation tool available for both teachers and students of Moodle CMS. The result of the project is a product - a ***web-based, web presentation*** tool which allows users to create a web presentation or modify an already existing one without worrying about acquiring necessary software licenses or dealing with platform dependency.

A web-based, web presentation tool is implemented and added to the system as a separate module. The presentation module provides the following functionality:

- fast slide creation/editing and browsing
- application and future addition of design templates
- insertion of graphics
- comfortable text editing
- full screen preview option
- saving web presentation files for transporting and detaching from the database

The flow of the Presentation Module development work is divided into the following phases:

Initial Phase
- Study and installation of platforms and Moodle CMS
- Research on web presentations, web presentation software comparison of existing tools (Microsoft Power Point, PPT2HTML converter)
- Setting objectives

Development Phase
- PPT2HTML converter research
- Use case design and initial planning
- Design and general structure of the module
- Relational Database Design

Implementation
- Creation of a simple presentation
- Application of design templates
- Implementation of the basic functionality
  - Add Presentation
  - Edit Presentation
  - Basic View
  - Save as HTML File
  - Full Screen Preview
- Conversion to PostgreSQL
- Enhancement of functionality

Testing and Documenting Phase
- General Testing and Refinement
- Bug Fixing
- Documenting the Work

During the implementation of the project several challenges were faced, however the biggest one was the inconvenience of the existing structure for creating multi-page modules such as Presentation Module. Indeed, the implementation of multi-dialog module can become problematic because the usage of the common function (course/mod.php) with its library makes it impossible to flow the process back to where it started. The continuation of the project first of all depended on finding a solution for the integration of a multi-dialog module into Moodle System according to the developers' guide. The solution used in the project has been found as the optimal one. Using proposed approach, the data is transformed to the core only when the user finishes his/her work on the presentation. At the same time the methods of adding labels to the required course sections are processed by the cores of the system. This means that system core is not changed and still does its basic actions.

The presentation module, developed in the context of Master's project, has been developed in several stages:

- Study of the Moodle structure
- Creation of the simple Presentation module (the core)
- Development of the database
- Development of additional functionality and user friendly interfaces
- Testing and documenting

Proceeding through all these steps made it possible to create a final product - ready to use in an educational process. The user can create web presentations similar to MS Power Point ones without the usage of commercial software.

Presentation module offers the functionality of presentation creation/editing and presentation show generation. It is especially comfortable for users of Moodle system as it is implemented in the general GUI of the Moodle system. Therefore, the introduction of the presentation module to the users can be done smoothly and without extensive training. However, the presentation module is supplied with documentation and additional help files which describe the functionality of the module.

The module is designed to be used under MySQL and PostgreSQL database systems. The system is fully tested on SFSU server (MySQL/PostgreSQL) which is extensively customized and on local machines at AUA and Lycos Armenia. AUA students and Lycos Armenia employees have participated in the testing of the module. The identified bugs are eliminated and documented.

The Presentation Module is compatible with most of the well known browsers and fully tested for MS Internet Explorer, Mozilla and Mozilla FireFox.

Currently the system offers a presentation module with basic functionality. However, to provide efficient presentations the usage of streaming video and audio could be necessary. For future enhancements of the system an addition of video/audio support could be considered as a major improvement of the module. Other enhancements to be considered are:

- improvement of user interface for providing better access to saving options
- addition of an option for copying/downloading resources from the server or archiving the files required for the presentation.

It is also worth mentioning the implementation of slide editing options right from the preview screen. Immediate slide editing and database update would make module usage more comfortable. However it will be reasonable to implement these features when Moodle users approve and recognize the need and advantages of using this module.

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Developing Tools in Sakai

The Sakai Collaboration and Learning Environment (CLE) seeks to provide a sound platform that supports portable tool development, promote data interoperability, create an integrated set of tools that are easy to use, and support learning, teaching, research and learning-related activities. Sakai (http://www.sakaiproject.org) is an open source, collaborative development project consisting of over 70 institutions worldwide. Initially funded by grants from the Mellon and Hewlett Foundations, it will become self-supported at the end of 2005.

To understand how to build tools for Sakai, it is first necessary to understand its architecture and framework. Sakai is based on a layered architecture in which tools are based on a shared set of application, educational, and common services. Tool user interfaces are described and rendered using a presentation service such as JavaServer Face (http://java.sun.com/j2ee/javaserverfaces/download.html).

Sakai is distributed as a bundle consisting of a kernel, standard shared services, default tools, administration, and presentation rendering. It can be customized at the functional and user interface level. It can be configured to use different databases and be hosted in several operating systems. It supports skinning, branding, and site customization.

Historically, Sakai has evolved from several predecessor course management systems. Evolution from earlier architectures is still in progress. Early versions of Sakai attempted to provide a common feature set. Recent versions have introduced a new kernel, portal, and common service set intended to provide the basis for more advanced features such as event history (back button), accessibility support, and user friendly URLs, hierarchical site organization, and enhanced enterprise integration capability. As a result, Sakai is currently delivered with both legacy and new common services.

The Sakai legacy services provide a security model that allows fine-grained authorization managed against lists of people and resources using tool-based functions. People have roles in the context of a worksite. Realms provide templates for authorization patterns. Authentication can be done against external services such as LDAP or Kerberos. Content Hosting provides basic repository capability. Many other legacy services support email notifications, event management, scheduling, etc.

The new Sakai Common services introduce a hierarchically defined security model in which people are organized into groups, functions can be clustered into permission sets, and resources can be hierarchically organized with inheritance of grants. Resource structuring supports random access and path-based addressing. High-level services, such as Course Management and Content Hosting will populate and depend on this structure.

Sakai is written in Java as a set of web applications that run in a container environment such as Tomcat (http://jakarta.apache.org/tomcat/). These web applications are configured to share code using two mechanisms: centralized JAR sharing (Tomcat's shared/lib directory) and a Sakai Component Manager. The Component Manager allows Java code resident in other web applications to be shared by all applications in the Sakai environment (server). The Component Manager also performs initialization, and handles dependency injection (inversion of control) utilizing the Spring Framework (http://www.springframework.org/).

Sakai provides a multi-level context support: Site, Tool, and User contexts. This allows services to exist as singletons and be multi-threaded. State can be preserved across HTTP requests.

A variety of XML configuration and description files are used define Sakai tools. Tomcat files (web.xml and component.xml) define web application names, define components to be injected, and set various request filters. A tool registration file causes a tool to be Sakai-visible and provides default parameter setting. Tools may have properties, resource bundles (including translated strings), and user interface descriptions (JSP, JSF, etc.).

The Maven tool (http://maven.apache.org/) manages site configuration. A set of project files define tool and service dependencies that are resolved by Maven and a special Sakai reactor plug-ins. Maven draws on both local and remote repositories for standard and locally compiled JARs and WARs. Maven is used to deploy these application bundles into Tomcat from a development or release bundle. Sakai is also available as an easy-to-install demo version.

Currently, Sakai includes a custom portal distributed with the release. Two kinds of portals are provided: Charon (legacy authentication, authorization, and worksites) and Mercury (a developer version that provides more information). A new portal called Astro is being built that will support hierarchical organization of sites. Support is also being added for uPortal and other WSRP based portals.

Tool development in Sakai uses several design patterns including user-centric UI design, layered services, coding to interfaces, presentation and application logic separation, JavaBeans, and ORM using Hibernate (http://www.hibernate.org/). Service injection is defined in the web.xml file and handled by the Component Manager. If JSF is being used, a faces-config.xml file defines pages, and event transition rules. Sakai tools may also be simple servlets or use another UI support system such as JSP or Struts. However, Sakai provides a set of custom JSF tags that implement the Sakai Style Guide. This the recommended approach.

Most schools, colleges, and universities are already using various support systems and services. Sakai provides a number of ways to integrate the framework and services to those services. Three basic approaches are supported: data push, providers, and service replacement. Data push happens above a service API and draws data from an external source and pushes it into the local Sakai database using the API. Providers are a special interface included in a service implementation that provides "another place to look" for requested data. Finally, service implementations may be replaced completely with new implementations that are tied to external enterprise sources. This picture is further complicated by the transition of internal architecture and inter-service dependencies.

Additional information is available on the Sakai developer and discussion sites (http://collab.sakaiproject.org).

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Swedish SPIDER Project: Life Long Learning Pilot Course for Armenian Specialists

Evaluation of the Armenian activity in the SPIDER project ICT4ICT

The Armenian activity within the Mid Sweden University SPIDER project ICT4ICT consists of creating and running a brief course in a Life Long Learning (LLL) setting. This means that the target groups are professionals who are already educated but may need specific professional skills to be added to their competency profiles.

Needs analysis in terms of the present ICT-development in Armenia

In the field of implementation of ICT in Armenia local authorities and experts are trying to coordinate activities in 3 directions:

- Connectivity;
- Competency;
- Content.

The resulting situation in the above-mentioned directions could be formulated in the following way:

Connectivity

Starting from 1997, Project Harmony, World Bank, IREX, OSI, Eurasia foundation, NATO, CRDF, UNDP, USAID have financed and successfully implemented projects on connecting Armenian schools, universities, public libraries to Internet, and equipping organizations with personal computers. Armenian research and educational network of academic institutions (ARENA) connects cultural and educational organizations to the world information space. UNDP has established a free Internet access center in Yerevan (http://www.freenet.am). In regional public libraries and village school libraries "Community centers" are established (financed by Open Society Institute) wherefrom community members can have Internet access. One mobile computer classroom (sponsored by Project Harmony) is functioning in Gegharkunik region.

Competency

During the last 10 years several local NGOs and donor organizations are actively involved in organizing and conducting training courses. Topics, covered during the training sessions could be divided into the following subjects:

1. System administrators;
2. Managers of regional telecenters;
3. Administrators of WebCT;
4. Basics of computer literacy (word-processing systems, spreadsheets, Internet, Windows, and Web design etc.) for:
   - School teachers;
   - Librarians, museum workers and archivists;
   - Municipal workers;
   - Students and pupils.

Since 1998, specialists from Armenia have started to participate in WireEd workshops organized by CEENet.

Content

Although the Competency and Connectivity aspects are being developed during a long period of time, the Content aspect is still in a stage of formation. One of the significant projects in Content creation is "Armenian Libraries Union Catalogue" - http://www.armunicat.am:4505/ALEPH (financed by Open Society Institute). Today the catalogue contains more than 1,000,000 records in Armenian, Cyrillic and Latin scripts. During discussions with local IT experts they mentioned the importance of the implementation of e-learning platforms,

creation of distance learning courses, and making them accessible to students, specialists and residents from rural regions.

According to the suggestions within ICT4ICT project the work was focused on 3 directions:

1. Creation a web-based course "ICT and Official Statistics for Development". WebCT has been selected for the course development.
2. Pilot testing of a course with the help of experts from National Assembly, Yerevan State University and National Institute of Education.
3. Advertising project results.

The structure of this evaluation and frame of reference

To be valuable this kind of project activity should create a useful sustainable product. Therefore, the evaluation basically will focus on these three concepts – usefulness, sustainability and replicability.

Usefulness

Since this project activity is aimed at creating a specific training course, the course must be *useful* for a specific target group for which the training is developed. So, the target group specification together with the needs for training in that target group compose the first item on the evaluation agenda. But to be useful the course has also to be *accessible* to the target group. This will be the second item. If the course has a useful content and is accessible to the target group, it was considered to fulfil the usefulness criteria. In the specific case of the course discussed here, accessibility has another aspect too. The course is about using official statistics, so these statistics must obviously be accessible.

Sustainability

The sustainability issues of an e-learning course are mainly on the institutional level. One such issue in this kind of enterprises is the question of *future delivery*.
Another issue is the *maintenance of the course*, which goes for both course environment and content.

Replicability

For a course as a product of a project to be replicable, it must be *reusable* without much extra work. Replicability is also about *lessons learnt* from experiences.

In the case of our pilot course participants were specialists from:
National Institute of Education – 7 participants;
National Assembly – 8 participants;
Yerevan State University – 2 participants;

Deliver organizational matter

The course content has been delivered in an understandable and easy-to-use way. After each example there was an exercise which was aimed at acquiring skills how to get, retrieve and analyze data, construct diagrams and tables, as well as draw relevant conclusion. Then, two assignments were provided with the deadlines of the first draft, peer feedback and final report. Participants were distributed within four subgroups, which made collaboration among participants more organized and productive. For individual questions e-mail was available for each participant. And for group-discussion questions and/or problems chat rooms were available. After submitting each assignment, all participants got comments on their works by tutors. By the end of the course participants were offered to evaluate the productivity of the course and make comments on further improvements. For this purpose, the tutors' team prepared an online questionnaire consisting of 45 questions, which were divided to the following subsections:

- Course content and design;
- Course delivery process;
- Course outcomes.

Conclusions

Life Long Learning courses are very useful, productive and valuable for specialists who want to broaden their scope of professional knowledge, obtain and develop new competences and skills parallel with occupational activities. The success of the developed course is evident from the results of the evaluation made by the participants of the target group.

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Ontology-based International Degree Recognition

ABSTRACT

Mutual recognition of courses and degrees is one of the main goals of EU universities according to the Bologna Declaration. International exchange of experience in the training of specialists is one of the most actual problems in the modern open society. None (even the best) of the European universities can provide students with an optimal set of courses. This especially concerns Ukrainian (and other post-USSR) universities because of poor financing of education, the lack of funds for new equipment and facilities, limited mobility of teachers and consequently impossibility to teach courses corresponding to the newest trends and achievements in science.

Nowadays the technology of obtaining the higher education with the best courses from different universities around the world is becoming customary. Following that scheme, a student composes an individual study plan including the most interesting and modern courses from different universities. He can obtain a diploma usually from one of those attended universities when he satisfies all demands for a degree in that university. Most of European universities demand to obtain a minimal amount of credits only. This method allows increasing the efficiency of higher education. This is the way the problem of a transfer of courses, diplomas and degrees is being solved in different foreign universities.

The European Credit Transfer System has been developed in order to facilitate the transfer of credits obtained in different European universities. Most of them successfully use the system. It was developed to solve the problem of recognition of obtained degrees in Europe because national standards and demands of each European country are constantly changing under economical and technological impacts. ECTS isn't a system providing an automatic transfer of courses and diplomas but just a tool for credit transfer. Such system should be developed taking into account the national specific of educational standards. Now the European Community has rather clear transfer methodology. Similarities in EU standards of education and ECTS make the process of recognition feasible and fast for EU students.

Substantial differences between Ukrainian (as well as other post-USSR) and EU standards in higher education make the recognition of courses and degrees a hard, time-demanding process involving valuable human resources. Ukrainian credits are mostly recognized only by those EU universities, which have a long-term cooperation with specific Ukrainian universities and the content of their curricula is well-known due to joint activities.

The main problems are "what can be recognised" and "how it can be transferred". For Ukraine the solution of the second problem – the credit transfer methodology – has been suggested by Kharkov National University of Radioelectronics (KNURE), Ukraine, in consortium of University of Jyväskylä, Finland and Athens University of Business and Finance, Greece, within the Tempus project UM_CP-20560-1999. But the huge problem of determining which courses and degrees can be recognised is still on the agenda.

Transferred courses/degrees should be determined not by the names (or few words annotation) but by the content. For this purpose it is necessary to develop a new technology providing automated determination of semantically similar courses/degrees.

The research is devoted to the development of an intelligent mechanism of management and integration of heterogeneous information based on standardized models of knowledge – ontologies. Modern information systems (including educational) raise essential questions related to the management of information resources and tasks of knowledge accumulation. As statistical methods do not provide the possibility of contextual information processing, tasks of search and analysis in information sources are considerably complicated. The solution of these problems completely depends on the possibility to carry out semantic analysis.

The proposed solution is the methodology and technology for semantic description of different educational information resources (degree standards, curricular, course descriptions, etc.) according to Semantic Web standards of W3C Consortium (http://www.w3.org). The proposed solution is universal in the meaning that it can be used for presentation of educational resources for every university in the world. The main phase of study recognition is the understanding of the content of the study concerned. The automated recognition (and automatic "understanding") can be ensured only by analysing the entire detailed semantic description (ontology) of the study domain, which is shared by administrators of both home and host universities.

The core element of the new information technology is the methodology for ontology-based comparison of higher educational standards. It includes the general framework for integration of higher educational standards (according to the international knowledge management standards of ontology-based management of electronic documents and resources on the Web) and the models of upper ontologies and pilot ontologies to support standardization of educational resources. The models of ontologies are in line with international educational standards and tools being currently established to ensure a higher-level interoperability. This technology will include:

- ontology-based descriptions of topics, courses and degrees;
- methodology of creation and comparison of ontology-based information resources in higher education;
- pilot tool for ontology-based international degree recognition and individual study plan generation;

It's planned to develop a web service that will provide an ontology-based automatic comparison of educational documents using semantic descriptions and determine similarities and differences between them. For instance a web service can provide a student planning to continue the education in a European University with a list of courses eligible to transfer and a list of differences, i.e. the courses which are necessary to learn.

The offered technology will provide:converting of national educational documents to those by European standards; automatic recognition of courses and degrees of different universities; generation of individual study plans for international mobility students; semantic annotation of national information resources in education; evaluation of correspondence of the educational content to the EU standards.

The development of Semantic Web technology is caused by "Information burst" in Internet and necessity of automated data and knowledge processing in the Web. The solution of these problems is the standardization of knowledge-sharing technology and using intelligent tools for human knowledge processing. Semantic Web is the idea of having data on the web defined and linked in a way that can be used by machines not just for display purposes, but for automation, integration and reuse of data across various applications. Following the Semantic Web ideas, all web resources should be semantically annotated by formal machine-readable descriptions, which refer to shared ontologies: Web documents/services/databases as well as Web agents/Internet users and any external resources, especially educational information resources are the subject for semantic. Ontology is a complete formalized specification of a domain (description of objects, concepts, knowledge about them and links between them, inference rules, etc). The goal of educational ontology development is the possibility of total "understanding" of Ukrainian educational standards and documents either by foreign specialists or by programs for their automatic processing. The semantic description of courses, curricula and educational standards should be generated with ontology-based method for correct understanding and transferring in the universities of different countries. Using this approach the problem of intelligent search of the educational resources can be solved (in contrast with a search by keywords). The approach allows also a semantic integration of heterogeneous educational resources if necessary.

For instance, using an automatic procedure of semantic identification one can facilitate the task of internationalization of higher education by comparing semantically annotated international demands and standards with national educational standards. It is also possible to develop an automated system of degree recognition that will compare semantically annotated diplomas of two (or more) universities.

The management and internationalization of education are specific fields, in which advances of semantic web approach can bring essential effect. The work in that direction has been started a few years ago and is actively ongoing as research cooperation between Artificial Intelligence Department of Kharkov National University of Radioelectronics (Ukraine), Industrial Ontologies Group (http://www.cs.jyu.fi/ai/OntoGroup), and the University of Jyväskylä (Finland).

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New Information Technologies and Resources for e-Education and e-Democracy

Cognitive legal technologies and resources are the main part of systems named "Electronic democracy". The basic motivation of e-democracy is the expectations to make the government, legislative bodies, constitutional courts, educational and political processes more open for members of a society and thus give everyone chances and opportunities of active participation in governance and establishment the rule of law. If the system does not provide information about its activities, it is difficult to expect from the society and its citizens the openness, activeness and reference to the system.

Therefore the best way to guarantee on-line training and involving of citizens in decision-making processes consists in introducing dialogue tools to work with official e-democracy sites and thus to provide citizens with a regular and full access to the legal public information, especially about constitutional laws and human rights documents. The constitutional information space includes the following: on-line dialogue, uniform information access to experts and citizens, services of the electronic constitutional court.

Services of Electronic Constitutional Court

These services include: Internet, e-mail and other tools for greater efficiency, speed and improved access to professional information. An example of such service is an on-line access to decisions of the Constitutional Court of Armenia (CC of RA) where the parties participating in the process have an opportunity of free access to decisions of similar or close cases. The information on the web site (http://www.concourt.am (since 1997)) is presented in three languages: Armenian, Russian and English and also displays the structure of court and the spheres of its activity. On the first page it is possible to see the sitemap with the main sections, "Constitution of RA", the Law "On the Constitutional Court", "Members", "Decisions", "Books (e-library)", "International Relations", and also projects developed by the CC of RA.

A number of e-books, monographs, cases, scientific magazines, clauses, "Constitutional Justice" bulletins and International Almanac “Constitutional Justice in the New Millennium” with the developed search system are presented on the web site. Since 1996 various documents of conferences are presented in the "Conference" section. Materials of annual republican "Constitution and Right" Olympiad for students are also presented there.

We consider for a society in transition the constitutional courts should become the center of new legal thinking and formation of new mentality, first of all for youth. The Constitutional Court of Armenia is acting through a public organization, the Center of the Constitutional Law, to organize the republican Olympiads for youth. Olympiads serve as a good example and the practical tool for youth on use of new information and web technologies. Pupils of schools and high schools, universities from various regions and cities of Armenia connected to Internet, visit the website of Olympiad, get acquainted with educational resources, rules and conditions of participating in Olympiad, download virtual laws, test questions and get responses, become participants of Olympiad, send answers by e-mail. As a result the increasing quantity of schools, schoolchildren and teachers with great enthusiasm and activity are involved in Olympiads which become an instrument of training of youth for the culture of e-democracy.

The important tendency in development of e-democracy consists in growing use of web portals. Users are often dissatisfied with growing complexity and inconvenience of accessing the information and find portals as a response to their needs. An impressive example is the portal of the Constitutional Court of Armenia providing good means of search of the multilingual information using the opportunities of such search systems as Google, Yandex, etc.

Technologies of processing and the analysis of multilingual information resources in solving legal and education problems

A unique computer system for the constitutional comparative analysis "Voronum" has been created in the Constitutional court Armenia in 1998-2001. Its resource base contains 146 constitutions of the various countries of the world, and also the English-Russian-Armenian dictionary of the basic constitutional concepts (474 words

and expressions), the international documents of human rights and the English-Russian-Armenian dictionary of keywords of human rights (179 words).

Many international conferences on various problems of the constitutional justice were organized during the last years. Sometimes their efficiency was not so high (organizational or transport problems, loss of time). Today the possibilities of Internet permit to organize scientific e-discussions and e-workshops on different problems considered in the constitutional court. This new mechanism of electronic dialogue can be accessible to experts and other public organizations working on actual problems. It can also provide a feedback from citizens whose interests and rights should be protected.

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Basic Concepts of Creation of Virtual Chemical Laboratory

A Virtual Chemical Laboratory (VirtChemLab) was developed at the Department of Algorithmic Languages of Yerevan State University. The idea was very clear as the integral part of educational process are laboratory experiments and practice exercises in a discipline being learned. Laboratory exercises complete the interactive course and supplement electronic manuals providing deeper acquisition of the knowledge. There are two obvious advantages of virtual laboratories:

- Laboratory experiments and researches are supported by laboratory equipment and reagents that are often neither available nor complete;
- Even if the laboratory equipment is complete it is necessary and desirable to make the same experiment repeatedly with different substances in various proportions and by different sequence of actions;
- During laboratory experiments it's necessary to keep the precautionary measures while in virtual conditions the student has been given some freedom of actions.

VirtChemLab is a virtual environment that gives learners an opportunity to make traditional laboratory experiments in organic chemistry virtually. The created environment allows a learner to carry out some experiments in absence of a real laboratory, equipment and reagents and to observe results of experiments visually in a form of chemical formulas and animated molecules.

A special pedagogical agent was included in the system that can prevent attempts of dangerous actions sending warnings about undesired reactions and effects. Colorful didactic materials, illustrations and different multimedia animations for chemical experiments make study more interesting, easy and more accessible for acquisition. Observation of experiments results accompanied by visual effects, chemical formulas and animated molecules contributes to the study process.

The system can be used for addition of new experiments by specialists in chemistry and creation of virtual laboratories in other disciplines.

During the development of Virtual Chemical Laboratory for simulating chemical experiments it is necessary to identify basic concepts and elements, operations and actions of chemical experiment in real conditions, to establish and identify main concepts and methods of virtual laboratory study, to develop scenarios of virtual experiments.

In virtual environment actions can be performed in any order under the surveillance of pedagogical agent. Learners can

- familiarize themselves with scenarios and theoretical basis of chemical experiments;
- interactively carry out chemical experiments with various collection of substances typical for the experiment;
- visualize the results of experiments;
- perceive the experiment on molecular level;
- understand chemical reactions between substances in the experiment;
- recognize properties of suggested substances in the experiment;
- organize practical laboratory research wherever and whenever is needed;
- find a correct scenario of the experiment by a try-and-fail method;
- perform a laboratory research monitored by pedagogical agent.

VirtChemLab has a gallery of necessary chemical equipments, glassware, tools and chemical reagents. There is the brief information about each substance and its chemical properties in the gallery. There are also rules for exploring the system.

An experiment can be executed many times by different substances in different proportions to learn more about chemical reagents being learned. Over thirty experiments on organic chemistry are included in VirtChemLab.

In the process of development of the described systems some other approaches were elaborated. They can be useful for the development of other virtual laboratories.

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uPortal Framework

Abstract

Nearly ubiquitous access to the Web among students, faculty and staff of the higher education institutions has prompted numerous instructional and administrative services to be made available on-line. Many institutions are using web portals to deliver these services to the users in a coordinated fashion. uPortal (http://uportal.org) is an enterprise portal framework developed for that purpose by universities, colleges and companies that comprise Java Architectures Special Interest Group (JA-SIG) [1]. The framework has been designed to accommodate unique requirements of the higher education community, providing high degree of flexibility and support of open standards. uPortal is currently being used by several hundred institutions in US, Canada, UK, Sweden, France and a number of other countries. It has served as a base for development of several commercial products, including *Luminis* platform by Sungard SCT [2], and *Academus* Enterprise Portal Solution by Unicon Inc [3].

One of the major goals of the uPortal2 was to provide institutions with a straightforward way of customizing all aspects of the presentation design and navigation. To achieve that, uPortal2 presentation is generated from an abstract description of the content that is available to the user (user layout) by the means of two XSL transformations [4]. The first transformation is responsible for defining the navigational structure of the presentation, while the second transformation is tasked with rendering presentation in a desired markup language. Multiple stylesheet combinations can be configured concurrently on the same installation, and selected dynamically based on the user preferences or browser compatibility mapping. By modifying and adding framework stylesheets, institutions were able to implement a wide range of custom portal designs. The same approach can dynamically adapt portal rendering to match the accessibility preferences of the user, or capabilities of the client browser.

Educational institutions tend to maintain a wide variety of information systems that need to be supported and integrated with the portal installation. The efforts of many colleges and universities involved in the project have allowed uPortal to develop flexible capabilities for integration of various back-end services. uPortal framework incorporates Person Directory service, which is responsible for managing user-associated attributes, such as contact or affiliation information. The service can be configured to gather such information upon authentication from multiple back-end sources, such as LDAP servers and remote databases. The Groups service provides a general set of APIs, implementations and user interfaces for management of grouped entities. It is used for a variety of purposes, such as maintaining groups of users, or categories of channels available for subscription. The framework models relationships between groups as directed acyclic graphs, allowing representation of complex relationships typical to the academic environments. The Groups service is complemented by a flexible Permissions framework capable of resolving grouped entities, as well as a set of helper channels that can be leveraged by the framework or other channels to manage group membership and permissions. As in the case of the Person Directory service, Group service can incorporate and resolve group information obtained from multiple independent sources.

The content delivered to the user is initially described by user layout – an abstract structure of folders and channels. uPortal2 provides several strategies for managing user layouts. The Simple layout manager maintains separate layout structures for each user. The initial layout is based on a template chosen according to group affiliation, and can restrict user from modifying certain portions of the layout. Aggregated and Distributed layout managers assemble user layouts by combining predefined, published pieces of content, referred to as *layout fragments*. In an institutional environment, such fragments would be typically created and maintained by individual faculty members, department, library or school administration. Fragments can be either made available for subscription by the portal users, or automatically pushed into the layouts of specific user groups.

A wide selection of channels is available for the uPortal framework through JA-SIG Clearinghouse [5]. Generic purpose channels, such as CWebProxy, RSS viewer or CGenericXSTL allow for easy integration of existing content into the portal. For example CWebProxy channel, developed by Memorial University of Newfoundland, has been used to integrate dozens of existing information services in Cornell University portal, including library access and PeopleSoft administrative services. A number of specific application channels can be found at the Clearinghouse, including e-mail clients, channels for managing announcements, bookmarks and classifieds.

Portlet specifications released through Java Community Process (JSR168) in 2003 presented a standardized alternative to the uPortal channel interfaces [6]. The specification of the Web Services for Remote Portlets (WSRP) was also released the same year [7]. Support for JSR168 portlets in uPortal2 has been implemented

through an adapter channel, and ability to consume WSRP content was provided by using a portlet from the WSRP4J project of the Apache foundation.

While the development of the current uPortal 2.4 and 2.5 releases is being actively moved forward, efforts to create the next major version, uPortal3, have been underway with support of the joint SAKAI-uPortal grant from Andrew W. Mellon foundation. uPortal3 aims to provide improved functional flexibility and serve as a solid foundation for long-term development of the uPortal framework.

The architecture of uPortal3 uses Spring application framework [8] to create isolated components that can be organized using Dependency Injection strategy [9]. This approach provides significantly greater flexibility for individual installations, while at the same time, allowing independent modification and improvement of various parts of the framework. The design and granularity of individual framework components aims to provide solutions to many of the custom requirements, modifications and problems that have been identified throughout development and utilization of previous uPortal versions. Among these are detailed requirements of the SAKAI framework, such as those relating to navigational logic and URL syntax. While adding significant new features, uPortal 3.0 release will maintain backwards compatibility support for stylesheets and channels developed for uPortal2, providing institutions with an easier migration path to the next version of uPortal and adoption of SAKAI.

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