СЕВЕРО-КАЗАХСТАНСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ им. М. КОЗЫБАЕВА

INFORMATION TECHNOLOGIES IN EDUCATION

учебно-методическое пособие

Петропавловск
2013

УДК 378
ББК 74.58
И 74

Издается по решению учебно-методического совета Северо-Казахстанского государственного университета им. М. Козыбаева (протокол №6 от 28.02.2013 г.)

Рецензенты:

директор филиала «Информационные технологии», кандидат экономических наук *Л. А. Горковенко;*

старший преподаватель кафедры «Иностранные языки» *Е. В. Самойлова*

И 74 Information Technologies in Education: учебно-методическое пособие. / А.В. Шпак, Е.В. Шевчук, И.Р. Касимов, Т.В. Амелина. - Петропавловск: СКГУ им. М. Козыбаева, 2013. – 102 с.

ISBN 978-601-272-492-9

Основная цель курса – расширение профессиональных знаний и развитие информационной компетентности будущих педагогов высшей школы на основе систематизации и обобщения информации использования ИКТ в высшем образовании.

Курс «Информационные технологии в образовании» может быть рассмотрен как единая система целей, содержания, методов, форм, средств обучения и управления образовательной деятельностью в высшей школе с использованием новейших информационных технологий.

УДК 378
ББК 74.58

© Шпак А.В, Шевчук Е.В,
Касимов И.Р., Амелина Т.В., 2013
© СКГУ им.М.Козыбаева, 2013

ISBN 978-601-272-492-9

Система менеджмента качества СКГУ им. М.Козыбаева сертифицирована на соответствие требованиям ISO 9001:2008

INTRODUCTION

The main aim of the given educational and methodological manual is broadening of professional knowledge and development of information competences of future teachers of high school on the basis of systematization and generalization of information of the use of Information and Communication Technologies (ICTs) in higher education.

The objectives of the manual are to develop:

- understanding of position and importance of information technologies in education;
- understanding of the principle of contents choice and ability to use them;
- competences of course study means manipulation, up-to-date teaching methods manipulation and management of students' mental activity;
- competences of various organizational lesson forms with the use of Information and Communication Technologies;
- understanding of position of information technologies in teaching of core disciplines of the specialty;
- competences of available information technologies use for development and presentation of scientific projects within work on Master's Thesis;
- competences of up-to-date information technologies use for management of educational activity in HEIs.

The educational and methodological manual «Contemporary tendencies of higher education» is for specialties: 6M010300 «Pedagogy and Psychology», 6M011800 «Russian Literature», 6M011900 «Foreign Language», 6M070300 «Information Systems», 6M020300 «History», 6M020500 «Philology», 6M030100 «Jurisprudence», 6M050600 «Economics», 6M051000 «State and Local Government», 6M060400 «Physics», 6M060600 «Chemistry», 6M060700 «Biology», 6M060800 «Ecology», 6M060900 «Geography», 6M061100 «Astronomy», 6M070100 «Biotechnology», 6M071200 «Mechanical Engineering», 6M071600 «Instrument Making», 6M071800 «Electric Power Engineering»,

6M071900 «Radio Engineering, Electronics and Telecommunications», and 6M073200 «Standardization and Certification».

Over the last years strong developments have taken place in the use of Information and Communication Technologies in higher education. However, what these developments actually include and what they will cause is not yet very clear. While the higher education press regularly reports on the start up of virtual universities, most traditional universities do not seem to have an institutional vision or strategy on the use of ICTs and their activities are limited to the grass-root level.

Despite the difference in viewpoints, there seems to be a broad consensus on the importance of ICT for higher education. But also here a contrast can be observed: the importance of ICTs is seen both in terms of opportunities and in terms of threats. Opportunities are in particular perceived in relation to enrichment and the enhancement of the efficiency and flexibility of learning processes. More flexibility, in terms of place and time for more independent learning, will not only better meet the needs of modern young students, but will also facilitate the development of new educational markets (e.g. for lifelong learning). These markets are not limited to age groups or to the national context. Threats are seen in the fact that ICTs enhance the international competition in higher education. Furthermore, as traditional higher education institutions no longer have the monopoly on academic and degree-awarding programs, competition from new corporate higher education providers is quickly emerging. These developments require higher education institutions to reconsider their roles, profiles, positions, and the alliances that they will need to make.

The use of ICTs in higher education can focus on:

- the dissemination of information and publications;
- communication between teachers and students and between students;
- collaboration: group discussions, joint project work, etc.;
- information and resource handling: search engines, access to multimedia databases, etc.;

- specific teaching and learning purposes: such as interactive tutorials, quizzes, simulations, videoconferencing for lecture participation.

The use of ICTs must reflect principles of good and effective education. These relate to an active involvement of students and interaction among students, a process orientation, and a student-centered approach. Besides questions of effectiveness, efficiency issues also play a role. First of all because of the students who want to complete their studies in an efficient way. Secondly, because of the instructors who have to perform their tasks having limited means and time. In many cases instructors show reluctance concerning the use of ICTs in higher education.

WWW-based course support sites and their underlying database systems are becoming a major form of ICT application for higher education. This appears to be because they have the most pedagogical potential among ICT applications because of the great variety of ways, particularly for communication and student activities, that they can support both pedagogical enhancement and pedagogical re-engineering.

When pedagogical enhancement occurs, it seems to be most often in terms of:

- integration of support for course components within a single WWW-based course-support site;
- faster, more efficient communication between instructor and students via e-mail;
- making the course syllabus, lecture notes and supplementary study materials available via the WWW;
- adding additional study materials and resources as links to the course WWW site, using the WWW to supplement the library when looking for resource materials;
- making the process of handing in and getting feedback to course assignments more efficient via use of the course WWW site;
- providing study-support materials, such as example questions, via a WWW site or via other forms of databanks;
- using videoconferencing to bring a lecture to students in remote locations.

When pedagogical re-engineering occurs, it seems to be most often in terms of:

- less reliance on lectures and more time spent on self-study and / or new forms of learning activities;
- more student participation, often via the practice of students entering new resources into the course WWW site or being involved in asynchronous discussions via computer conferencing or WWW boards;
- more group projects or collaborative activities, supported by groupware tools;
- new forms of learning activities, often involving international aspects;
- new forms of assessment activities, such as electronic portfolios and journals; also more opportunities for external and peer assessment;
- more time spent on student presentation of their work; work is made for and presented to an audience via the WWW site, and comments are given on the work by those in the audience.

Both pedagogical enhancement and pedagogical re-engineering can bring changes to the instructor's pedagogical practice. Pedagogical re-engineering requires the instructor not only to try new methods with unfamiliar technology but also that the previous rhythm and balance of activities in the course is also changed.

An instructor can be called a pioneer if he / she is a self-initiator of some form of ICTs use in her / his courses. Another form of pioneer is the instructor who participates in a special project of some sort, supported within its framework to experiment with a new form of ICTs use. Such projects are typically outside of the on-going activities and infrastructure for pedagogic ICTs use in the individual's own faculty or university. When the project is over, the ICTs use tends to stop. Pedagogic practices involving ICTs that are dependent on an individual or a short-term individual project can be described as the first stage of ICTs use. It can be called the pioneer / project stage, where the activities are not integrated with the general operating procedures of the individual's faculty or unit.

To move to the second stage, the institution in which the instructor works must become involved. In the second phase of ICTs use, an organization takes some steps to stimulate a certain type of use with the hope that this will lead to sustainable behavior. This stage could be called that of encouraged use; decisions are made at the unit level about some form of ICTs use in instructional practice that all instructors are encouraged to try. The intention is that after the tryout, the instructor will be convinced to go on with the use, in regular practice. The instructor is free to respond or not respond to the encouragement.

Systematic use of ICTs, the third stage, occurs when a decision is made at the unit level that all instructors will make use of some form of ICTs in their pedagogical practice in a way that becomes part of the operating strategy of the unit.

There is only very limited information about the cost-effectiveness of the use ICTs in general, and of the use in higher education in particular. The available studies generally refer to media and ICTs in distance education. In respect to the fast evolution of the possibilities of ICTs and the ever-changing prices of hard- and software and telecommunication, it is almost impossible to precisely investigate the cost-effectiveness of the newest ICT applications.

1. COURSE OF LECTURES

Lecture 1. Theme: Information Technologies in Education: Opportunities and Challenges

computer equipment – вычислительное оборудование
data collection – сбор данных
data compression – сжатие данных
data input – ввод данных
data output – вывод данных
data processing – обработка данных
data storage – хранение (накопление) данных
data warehouse – хранилище данных
education informatization – информатизация образования
global telecommunication network – глобальная телекоммуникационная сеть
instant messaging program – программа для общения в реальном режиме времени
learning efficiency – эффективность обучения
mailing list service – служба рассылок
remote access – удалённый доступ
self-check – самопроверка
self-training – самообучение

Information and communication technologies (ICTs) are penetrating into various spheres of educational activity more and more. Both external factors connected with global society informatization and need of appropriate specialists' training, and internal factors connected with increased use of up-to-date computer equipment and software in educational institutions, adoption of state and intergovernmental programs of education informatization, and necessary teachers' experience of informatization contribute to it. In most cases use of informatization means has a real positive influence on the intensification of teachers' work, and also on students' learning efficiency.

Information and communication technologies (ICTs) are the generalizing concept describing various methods, ways and algorithms of data collection, storage, processing, presentation and transfer.

The word "use" intentionally is not included in this definition. Use of information and telecommunication technologies allows us to speak about one more technology – technology of information and telecommunication technologies use in education, medicine, military science and many other spheres of human activity and it is the part of informatization technologies. Each of these spheres imposes the restrictions and peculiarities on informatization technology. As an example we can name Internet technology which is considered as information and telecommunication technology. And at the same time technology of Internet use in the students' teaching process is quite reasonable to consider not an information and telecommunication technology, but an education informatization technology.

It is important to understand that the concept of education informatization technology is much wider than only technology of information and telecommunication technologies use in education. This concept includes all complex of methods, ways and approaches providing achievement of education informatization aims.

So for example methods of information resources development and quality assessment and methods of teachers' training on how efficient to use information and communication technologies in their professional activity can be referred to education informatization technologies.

A personal computer (PC) equipped with peripheral devices is the basis of information and telecommunication technologies used in education.

With the advent of computer networks, students and teachers got a new possibility of quick information receiving from any spot on the globe. By means of the global telecommunication network Internet is possible instant access to the world's information resources (electronic libraries, databases, data warehouse, etc.). In

the most popular resource the Internet - World Wide Web – several milliards of multimedia documents are published.

On the telecommunication network Internet are also available many other widespread services allowing people to communicate and exchange necessary information including e-mail, ICQ, mailing list services, news, chat. Special communication software is developed and it includes instant messaging programs which allow transmitting texts, sounds and image. These programs allow providing remote access between different computers or users.

With the advent of new algorithms of data compression the sound quality transmitted on the network has essentially improved and is approximating to quality sound in usual telephone networks. As a result a rather new technology – Internet telephony – very actively began to develop. Special equipment and software enable people to use the Internet for audio- and videoconferencing.

To provide efficient data search on the computer networks are used data search technologies, their aim is to collect information resources data of the global computer network and to give the users an opportunity of quick information search. By means of search engines it is possible to search for documents, multimedia files and software, address information on organizations and people on the World Wide Web.

By means of network communication of ICTs it is possible to have wide access to educational and methodical and scientific information, to organize efficient counseling help, to model research activity, to provide virtual courses (seminars, lectures) in synchronous format.

In such case very often there is a question of practicability and need of various information and telecommunication technologies use. So, for example, if it is necessary to represent material in visual form and it is not possible to do it in printed form, the importance of video materials is obvious. If a videotape or a video demonstration organized by means of computer is only a lecture recording without any additional special illustrations, then the use of information technology can be reasonable, but not necessary.

Many training TV and radio programs are transmitted through satellite television. For example, the international organization INTELSAT, founded in 1971, allows broadcasting of training programs practically for the whole world, providing for this purpose all its 15 satellites. Satellite channels give also possibility to organize the communication ISDN networks which allow at the same time to transmit video, sound, text and copies of documents in a digital form.

Educational electronic editions both distributed on the computer networks, and recorded to special data storage devices: CD ROM, DVD, etc. are the powerful technology allowing to store and transmit the main volume of studied material. Students' independent and collective work with them can contribute to more profound material understanding. Being improved this technology allows to adapt existing training materials and tutorials for individual use, provides possibilities for self-training and self-check of the acquired knowledge.

Due to up-to-date ICTs, such as e-mail, teleconferences or ICQ communication between educational process participants can be distributed in space and in time. So, for example, teachers and students can communicate with each other, being in different countries, and at convenient for them time. Such dialogue can be stretched in time – the question can be asked today, and the answer can be received in some days. By means of such approaches is possible a data exchange (questions, advice, additional material, control tasks) and it allows students and teachers to analyze the received messages and to answer them at any convenient time.

ICTs used in education can be classified according to different criteria. So for example studying education informatization, it is convenient to consider the aim of method use and algorithm of information influence as a criterion. In this case it is possible to emphasis technologies of data storage, presentation, input, output, processing, and transmission.

There are many different ICTs. Every year new means and technologies important from the viewpoint of education informatization are developing. It is impossible to list or study all them. It is important to understand that many of these technologies

can have essential influence on improvement of students' teaching and education quality under certain conditions.

At the same time, any experienced teacher will confirm that except positive effect of information technologies implementation, in many cases the use of informatization means has no effect on improving teaching efficiency, and in some cases, such use has a negative effect. It is obvious that problems solution of appropriate and reasonable education informatization should be comprehensive and extensive. Contents of teachers' training in the sphere of educational informatization should include teaching to proper, reasonable and appropriate use of information and communication technologies.

Education informatization is an area of theoretical and practical human activity directed at the implementation of technologies and means of data collection, storage, processing, and dissemination and it makes possible to systematize the existing and develop new knowledge to achieve psychological and pedagogical teaching and education aims.

Education informatization means include computer hardware and software, as well as their substantive content, to achieve education informatization aims.

Using only education informatization means is not enough for complete implementation of information and communication technologies in education. In practice, such means must be supplemented with ideological base of education informatization, as well as by specialists' activities in various fields of knowledge and their participation is necessary for informatization aims achievement.

Education informatization, regardless of its implementation direction, is a broad, multi-faceted human activity that affects the functioning of the entire system of education, and without exaggeration the life of society as a whole.

Informatization of particular educational institution is a set of activities aimed at the application of information technologies to improve the efficiency of data processing in all without exception the activities of modern educational institutions.

Priority direction of education informatization teaching should be transition from teaching technical and technological aspects of computer devices use to teaching proper, substantial formation, selection and appropriate use of educational electronic publications and resources and to systematic education informatization. A modern teacher must not only have knowledge in the field of information and communication technologies which is included in the computer science course contents taught in pedagogical educational institutions, but also to be an expert on new technologies application in his or her professional work in educational institutions.

Lecture 2. Theme: Instructional systems. Training systems. Knowledge-based monitoring systems. Computer testing technologies

ability test – тест способностей
achievement test – тест достижений
broadcasting – радиовещание
computer automated test equipment – компьютерные средства автоматизации тестирования
electric phonograph – фонограф
graph plotter – графопостроитель
intelligence test – тест интеллекта
level-based classification of test material – уровневая классификация тестовых материалов
microfilm equipment – система микрофильмирования
mimeograph – ротапринт
non-computer device – некомпьютерное устройство
overhead projector – диапроектор
self-control –самопроверка
slide projector – диапроектор
technical training aids – технические средства обучения

Study of peculiarities of ICTs using should include familiarization with various aspects of information technologies penetration in education.

The first technical means of education informatization did not arise suddenly. Rapid development of various non-computer devices, usually called technical and audiovisual means of education, preceded the emergence of means of informatization based on the use of computer equipment. For many years various slide projectors and phonographs, overhead projectors and electric phonographs, film projectors and TV sets, tape recorders and CD players, and also specially developed didactic materials and teaching aids such as slide films, records, cassettes and compact discs have been considered as technical training aids. And at different stages of education system development these teaching aids have been the main instruments of efficiency increase of storage, processing, transfer and dissemination of educational information. For lack of computer equipment they played the role of means of information and communication technologies. At present there are the following technical training aids at educational institutions:

– means of sound recording and reproduction (electric phonographs, tape recorders, CD players),

– systems and means of telephone, telegraph and radio communications (telephone sets, fax machines, teletypes, telephone exchanges, radio communication systems),

– systems and means of television, broadcasting (television and radio receivers, educational television and radio, DVD players),

– optical and projective film and photographic equipment (cameras, movie cameras, slide projectors, film projectors, overhead projectors),

– printing, copying and other equipment intended for information documenting and copying (mimeographs, copiers, risographs, microfilm equipment),

– computer equipment providing with electronic representation, processing and information storage (computers, printers, scanners, graph plotters),

– telecommunication systems providing with information transfer on communication channels (modems, networks of wire, satellite, fiber-optical, radio waves and other types of communication channels intended for information transfer).

Technical equipment used in education can be classified. This classification can be based on different criteria. In particular all technical equipment can be divided into groups according to data type and principles which are the basis of their functioning.

Correct definition of ICTs and education informatization means is a significant problem. At first glance, it would be logical to consider any means and tools used in education which are connected with data processing and presentation as education informatization means. With this approach to education informatization means in addition to computers and software can be included an ordinary book, a tape recorder and a slide projector. Such definition of education informatization means has the right to exist.

Information and communication technologies means are more often used in educational institutions to automate the monitoring and measuring processes of students' learning efficiency. Teachers use both specially developed means aimed at pedagogical measurement using computer devices, and monitoring subsystems of educational electronic publications and resources used in educational institutions.

General interest in such knowledge evaluation method predetermined its positive sides:

– a high degree of testing procedure formalization and unification;

– the possibility of simultaneous testing on several computers;

– the possibility of remote testing organization by means of local network or via the global information network Internet.

Possible negative effects of pedagogical measurements informatization can be caused by the fact that:

– students' work speed with computer devices in many cases becomes an important factor influencing the results of educational measurements;

– process of student's work at computer cannot be saved in the dynamics for analysis and evaluation, only static result of his / her work can be saved and fixed;

– existing standards of education and academic programs do not denote the type of equipment and the list of software used in educational system. This entails the probability of incompatibility of

hardware and software used in teaching process, computers and computer programs used for educational measurement that would unreasonable influence the outcome:

– in many cases ICTs means can be a distraction which have an adverse effect on educational measurements objectivity.

As a rule, tests are used for control. In this case with their help it is possible to define knowledge quality of students who have finished studying subject of one or several training courses.

Besides, the use of tests is possible during educational process. In this case work with test materials is implemented in the form of practical independent students' work and allows implementing of training according to the principles "study through analogy" and "learn from one's own mistakes".

And, at last, test materials can be the tools used for diagnosis aims achievement. In this case, depending on testing results some substantial, methodological or organizational actions are undertaken which have a positive impact on the quality of educational process.

Besides, for tests grouping and efficient use of computer automated test equipment there is a level-based classification of test materials.

First Level Tests are intended for students' skills testing for activity implementing with clue words. These are tests for recognition (yes/no placement test); tests for differentiation (determination of correctness of each of several offered answers); tests for classification (task solution on compliance of elements of two sets).

Second Level Tests are intended for students' abilities detection to reproduce from memory and apply earlier acquired activity in an algorithmic form. These are replacement tests (students should fill in the missing controlled component; constructive tests (the tasks of such tests demand independent answers (actions) from the memory); tests - standard tasks (tasks can be solved by not transformed use of the acquired algorithms of activity).

Third Level Tests are intended for detection of readiness of students to productive actions of heuristic type, these are non-standard tasks and situations (in a task the purpose is known, but the

situation in which the purpose can be reached is not clear, independent prior transformation of the acquired standard action rules and their application for the decision in this, earlier unknown situation is required).

Fourth Level Tests are intended for detection of creative students' abilities – their research skills of new information. These are tests problems (tasks, the algorithms which decisions are unknown and cannot be directly received by means of transformation of earlier known techniques).

Besides during the informatization process can be considered as well the groups of test materials created according to their purpose. Such groups consist of:

– intelligence tests used for the analysis of the development level of cognitive processes and functions of students' thinking;

– ability tests intended for the assessment of opportunity in students' mastering different types of activity;

– achievement tests intended for the measurement of students' skills and knowledge learned in a given grade level, usually through planned instruction

– personality tests intended for the assessment of students' emotional and volitional qualities.

And the most numerous and widespread educational tests are achievement tests.

Test tasks which are the part of ICTs means have to be up to the specific requirements system including, first of all, requirements of subject content, definiteness, validity, simplicity, reliability, authenticity, objectivity, interactivity, impact, practicality, technological effectiveness and efficiency.

There are different types of validity. Among them are content and operational validity. If the items in the test constitute a representative sample of the total course content to be tested, the test can be said to have content validity. A test will have operational validity if the tasks required by the test are sufficient to evaluate the definite activities or qualities.

Simplicity means that the test should be written in a clear, correct and simple language, it is important to keep the method of

testing as simple as possible while still testing the skill you intend to test.

Objectivity means that if the test is marked by different people, the score will be the same. In other words, marking process should not be affected by the marking person's personality.

A test is considered reliable if it is taken again by the same students under the same circumstances and the score average is almost the constant, taking into consideration that the time between the test and the retest is of reasonable length. Reliability of a test refers to the degree of consistency with which it measures what it indented to measure.

There are many advantages of standardized testing:

- Standardized tests are practical, they're easy to administer and they consume less time to administer versus other assessments.

- Standardized testing results are quantifiable. By quantifying students' achievements, educators can identify proficiency levels and more easily identify students in need of remediation or advancement.

- Standardized tests are scored via computer, which frees up time for the educator.

- Since scoring is completed by computer, it is objective and not subject to educator bias or emotions.

- Standardized testing provides a longitudinal report of student progress. Over time, educators are able to see a trend of growth or decline and rapidly respond to the student's educational needs.

There are disadvantages of standardized testing. Critics cite the following disadvantages for the use of standardized testing:

- Standardized test items are not parallel with typical classroom skills and behaviors. Due to the fact that questions have to be generalizable to the entire population, most items assess general knowledge and understanding.

- Since general knowledge is assessed, educators cannot use standardized test results to inform their individual instruction methods. If recommendations are made, educators may begin to 'teach to the test' as opposed to teaching what is currently in the curriculum or based on the needs of their individual classroom.

- Standardized test items do not assess higher-level thinking skills.

- Standardized test scores are greatly influenced by non-academic factors, such as fatigue and attention.

For the successful implementation of pedagogical systems of learning effectiveness measurement it is important to solve three main problems. The first of these is the creation of such measurement systems, both on a substantial and a technological level.

These systems are according to the existing state education standards and they enable to determine student's level of achievement of knowledge, abilities and skills requirements defined in the standard. The second problem is the need for compulsory teachers' training and retraining to make efficient use of modern systems and pedagogical measurements means in teaching process of "their" discipline.

Finally, the third problem is the need for development of students' skills and appropriate attitude to control and self-control of teaching effectiveness.

Lecture 3. Theme: Innovative technologies of teaching and control in the conditions of education informatization

capabilities of computer equipment – возможности компьютерной техники
cognitive activity – познавательная деятельность
computer-based learning technology – технология компьютерного обучения
influence variability – неоднозначность влияния
information and methodological support of educational process – методическое и программное обеспечение образовательного процесса
information society – информационное общество
innovative educational technologies – инновационные образовательные технологии
unified information and learning environment – единая информационно-образовательная среда обучения

The need for new educational technologies and control. Increasing society demands for the development of critically thinking personality who is capable of continuous knowledge renewal, rapid retraining and application field replacement of his / her abilities require the creation of new conditions and teaching methods which are the basis of new educational technologies. The increasing role of self-study in the formation of highly qualified specialist should be also noted. Therefore the need for new forms of teaching material presentation, methodology of work with new teaching aids and methods of independent cognitive students' activity control is increasing. As you can see the need for new educational technologies is topical.

The use of computers in education develops not only cognitive activity, but also forms motivational, emotional, and communicative environment. Considering the value of the computer regarding individual aspect, influence variability of the latter on personality development should be noted. Psychologists note contradictory consequences of uncontrolled computer use on thinking and behavior development especially in school-age children.

According to the Doctor of Psychological Sciences O.K. Tikhomirov:

1) computerization promoting strengthening of logical thinking is accompanied by the suppression of intellectual beginning;

2) computerization can give new knowledge, and on the other hand gives strong incentive to develop extrinsic prestigious motivation;

3) computerization is the means of much more complete knowledge of the world and dissociation means from it.

It goes without saying that there are reasons to speak about the need of specific psychophysical analysis of possible negative effects following intensive use of computers practically in all spheres of human activity.

But can computers contribute to the development of creative thinking? According to the professor O.K Tikhomirov there is no doubt about it. But personality development is a very difficult process where influence of external factors is often profound,

therefore the use of such powerful "...external memory and thinking organ" has to be under continuous control in the organization of educational process. Now the problem of computer addiction, influence of computer technologies on emotional and moral and physical development of users of computer equipment and means of communication, first of all global Internet and mobile telephony as a version of information technologies is getting acute.

Technologies of computer teaching and control. The functional properties of up-to-date computer and communication technologies enable the educational process to implement the following operations:

- unlimited possibilities of various data collection, storage, transmission, transformation, analysis, and application;
- increasing access to education with the expansion of forms of getting the education;
- opportunity of continuous lifelong learning and raising the level of professional skills throughout active lifetime;
- development of student-centered learning, further and advanced education;
- significant expansion and improvement of organizational support of educational process (virtual school, laboratories, universities, etc.);
- increased subjects' activity in educational process organization;
- creation of unified information and learning environment not only for one region, but also for the country and the world, on the whole;
- educational process independence from study place and time;
- significant improvement of information and methodological support of educational process;
- opportunity of individual study trajectory choice;
- development of an independent creative personality;
- development of student's independent search activity;
- increasing learning motivation.

All these capabilities of computer equipment enable development of new learning technologies improving the quality of education.

I.V. Robert considers the computer's capabilities from the viewpoint of target approach to education. I.V. Robert points out the following *pedagogical objectives of the development of computer-based learning technology and use of computer equipment*:

1) the development of student's personality, individual's life preparedness in the conditions of information society;

2) the intensification of all levels of educational process;

3) the improvement of information and methodological support of pedagogical activity.

Development and adoption of computer teaching technologies can affect considerably the whole educational process in computer-based learning environments. According to the experience of a new educational technology adoption, positive results are yielded by the lessons organization on the basis of an efficient combination of individual, group (small groups) and collective forms of education; person-centered approach in education. Technologies of computer teaching and control are the bases of innovative educational technologies as far as allow implementing student's individual demands, contributing to personality development and increasing the availability of education and constant professional development.

Lecture 4. Theme: Computer control and computer-based testing

academic achievement level – уровень учебных достижений
amount of information – объем информации
computer-based communication teaching aid – средство компьютерной коммуникации
control procedure – процедура контроля
education in a computer-based environment – обучение в компьютерной среде
independent assessment – независимая оценка
knowledge-based computer control – компьютерный контроль знаний

Modernization of the control procedure in educational process can be possible on the basis of up-to-date computer equipment and

computer-based communication teaching aids. The implementation of students' knowledge-based computer control is the basis of an objective independent assessment of student's academic achievement level (knowledge, intellectual and practical skills).

Let's distinguish between computer control and computer-based testing.

By *computer control* we mean a procedure which enables assessment of mastering and understanding level of the material studied in order to manage the current learning process and support personalized education in a computer-based environment.

Computer-based testing is the procedure of assessment, establishment of compliance of personal knowledge model with required standardized model of knowledge.

As we can see from the definitions:

- *control* is the procedure of teaching process management, an integral part of teaching process irrespective of its form;

- *testing* is the procedure of statement of the fact if a student *knows* or *does not know*.

Computer control has several advantages over traditional forms of control:

For a teacher:

- possibility of efficient knowledge control of a large number of students on different themes and tasks fulfillment in the complex;

- release of a teacher from repetitive, time-taking and routine work on organization of mass control, time release for creative mastering of his / her professional activity;

- possibility of increasing individual work with students.

For a student:

- increase of objective control and exclusion of subjective factors (teacher's fatigue, his emotionality or bad mood, lack of time for personal contact, etc.);

- individual peculiarities of the control procedure;

- communication of efficient, reliable information on the knowledge acquired in learning process and on student's willingness to acquire new material;

- access to teaching process and control;

- student's choice of a particular work method in a computer-based environment appropriate to his / her initial readiness level, concentration skills, individual study and control trajectory choice and it will enable efficient time use in the system;

- appeal in case of disagreement with control results (possibility of his own answer to the question and together with the teacher consideration of the difference between his own and suggested answers);

- the timing of control and educational processes;

- possibility of tips and leading questions use in the study of the material and it enables the improvement of psychological atmosphere in a computer-based learning environment;

- possibility of student's material acquirement self-check in appropriate form (network access mode to control systems and measuring materials);

- accessibility and equality of all participants of control process;

- acquisition of complete and reliable information on the results of his/ her work at different learning stages;

- repeated reiteration of learning and control processes which enables the development of independent work skills, self-esteem and self-actualization.

Computer control (like learning process) has a number of disadvantages:

- exclusion of an oral speech component from the process of control / learning;

- decrease in student's need to select the chief in large amounts of information;

- and a number of other shortcomings.

Lecture 5. Theme: Theoretical bases of computer teaching and control technology

assessment – оценка, оценивание
automated / computer learning model – автоматизированная / компьютерная модель обучения

automated environment – автоматизированная среда
computer learning technology – компьютерная технология обучения
problem formulation – постановка задания
system analysis method – метод системного анализа

Theories of learning and self-study psychology have always preceded the development of new learning technologies. A new learning technology should have included other areas of science and engineering. Researchers and teachers who have a new teaching tool – a computer at their disposal had to turn to the field of science, which is associated with the management of processes in any automated environment. Considering the educational process as a kind of technological process which has purposefulness and action logic of educational process subjects, need for different types of control and correction of activity results, we can assume that it is necessary and reasonable to involve management theories for the development of a new computer learning technology.

It is known that learning process is a co-operative activity of a teacher and a student. Having analyzed teacher's activity, we can define main features in the implementation of traditional learning technology. The aim of the analysis is the denotation of teacher's activity component which can be formalized at the contemporary level of learning theory and can have a positive effect on the development of computer learning technology and organization.

Considering learning activity of V.P. Bespalko, N.F. Talyzina observes a number of specific stages:

1) setting learning objectives;

2) assessment of student's preparedness level on the given problem;

3) development of a specific structure and the principle of necessary set of actions management;

4) implementation of learning activity;

5) different types of control (stepwise, phased, and final);

6) development of correction activities for learning success achievement;

7) analysis and assessment of the result.

Analyzed in this aspect learning activity enables to define unified activities: *orientation*, *planning*, *implementation*, *control* and *correction*. It is easy to note that these activities in educational process organization are in specific states and have a well-defined sequence and orientation which are submitted to the laws of dynamic systems existence and therefore may be presented as an algorithm.

For the design and analysis of automated / computer learning model we'll apply system analysis method which makes it possible to describe any process my means of the formula: input - processing - output. In addition, the construction of a complex dynamic model of a process requires the availability of positive and negative feedback to analyze and manage running processes in the model. Educational activity has all the features of complex dynamic management model and makes it possible to use management theory for the development of learning process model which can be managed and corrected. The aim of any learning type, including automated / computer learning – is to bring system status (in this case – the availability of specific level of knowledge and appropriate student's skills to personal student's knowledge model) to the given status (prospected level of preparedness to the required model of knowledge).

Cognitive activity management by means of computer learning tools requires considerable research, search for optimal combination of traditional and computer learning technologies. The introduction of computer learning tools into learning process is to change not only specific themes and subjects teaching methods but also to transform the whole learning process.

The operational structure of actions which arise in *educational process organization* is generally the same and learning contents changes according to the subject and educational aim. In the given model are represented more important moments of learning process organization which should reflect both individual student's feature, and by means of a set of tasks and choice of appropriate exercises the expression possibility of individuality of specific material and subject teaching methods. Teacher's individuality and

professionalism are hidden in educational problems formulation. Problem formulation and prediction of its solution possible ways make it possible to foresee the ways of these solutions achievement, and most importantly to foresee potential error conditions which is important for the development of corrective actions.

Lecture 6. Theme: Multimedia technologies in education

applicability – применяемость, пригодность
data preparation – подготовка данных
efficiency – производительность
flexibility – гибкость; трансформируемость
hardware – техническое обеспечение; аппаратные средства
hypermedia technologies – многосредовая технология
microfilm projection – демонстрация, показ (микрофильма)
multiprogramming – мультипрограммирование, многозадачный режим
software – программное обеспечение
still image – видеокадр, фотоснимок
to display data – отображать данные
to transmit data – передавать данные

Multimedia is a modern computer information technology which enables text, audio, video, graphics and animation integration in a computer system. *Multimedia is the scope of technologies* which enable computers to input, process, store, transmit, and display (output) such data types as text, graphics, animation, digital still images, video, sound, and speech.

Multimedia technologies are the preparation method of electronic documents, including video and audio effects and multiprogramming of different situations under unified interactive software management (M. Kirmayer).

In our opinion, these two definitions of multimedia technologies are the most appropriate and reflect the essence of the concept – *multimedia (hypermedia) technologies* – emphasizing that

multimedia technology is, first of all, data preparation and display technology.

Multimedia technologies perfectly fit the concept of computer learning technology and it is emphasized in the first definition. Taking into account the aforesaid, we think the combination – *multimedia educational technologies* to be incorrect and it is often used in the context of a new educational technology. It should be emphasized that multimedia technologies have the same theoretical bases as computer learning technologies. It is more correct to consider multimedia computer learning technologies as modern stage of development of computer learning technologies using didactic capabilities of up-to-date computers, modern programming technologies and tool environments for the development of computer learning tools.

The concept of the Memex proposed in 1945 by American scientist Vannevar Bush is considered to be an ideological prerequisite of multimedia technology. Bush described the Memex as "a sort of mechanized private file and library" and as "a device in which an individual stores his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility." The Memex would store this information on microfilm, which would be kept in the user's desk. This desk was intended to have several microfilm projection positions to enable the user to compare different microfilms, in a manner very similar to the windows that became popular on personal computers more than forty years later.

Rich didactic capabilities of multimedia technologies are used to create electronic textbooks and other teaching aids, as we have already denoted as computer learning tools.

By *multimedia* is usually understood a combination of hardware and software, allowing the user to communicate with the computer using a variety of media: graphics, hypertexts, sound, animation and video.

How to use means of multimedia technologies in the process of the development of educational and methodological materials? Where and how can be applied various multimedia elements in

comparison with the usual text? What are the limits of multimedia elements applicability in the document which disorder can lead to decrease in students' working capacity and in work efficiency? Reasonable answers to these serious questions allow developing educational and methodological materials not only effective, but also efficient. All these questions have not been studied quite enough yet.

Lecture 7. Theme: Distance learning technologies

assessment software – программа тестирования
CASE-technology – кейс-технология
computer telecommunications – компьютерные телекоммуникации
computer-mediated communication – сетевое общение
computing resource – вычислительный ресурс
database – база данных
distance learning technology – технология дистанционного обучения
educational website – обучающий сайт
hyperlinked multimedia textbooks – гиперссылочный и мультимедийный учебник
LANs users – владельцы локальных компьютеров
networking technology – сетевая технология
self-education technology – технология самообразования

One of the important conditions for increasing the level of education is a well-organized management system and software of distance learning technology. Distance learning system enables continuing education improvement for anyone wherever he may be.

Computer learning technologies and the use of up-to-date information technologies based on CASE-technology of distance learning are not determinative. Educational process is based on special preparation techniques of teaching material and consultation. It does not except the inclusion of the case study student's audio and video materials as well as CD-ROM educational software.

Consideration of implementation questions of distance education technologies in school will require the same conditions considered earlier.

One of the important components of distance learning system is a well-organized software system of distance learning technology. Taking into account that distance learning technologies are developing rather actively in our country, there is a continuous search for new more efficient approaches in self-education technology, continuing professional development and retraining of specialists in different areas for different levels of educational institutions.

The second component of successful implementation of distance learning technologies is a computer-mediated communication. In spite of the fact that the Internet is becoming increasingly important for learning process, it has not reached a "critical mass" of users who wish to study by means of internet-based networking technologies. At present in the development of distance learning system the main emphasis on LANs users working in educational institutions and local computers owners (and users who have access to them at work, friends' home, and in the educational institutions).

Educational software of any educational technology should provide students and teachers a variety of possibilities:

1) student services via a computer network;

2) local computer training;

3) information on a particular student's learning process;

4) help functions support for teachers service;

5) access to various databases and electronic teaching and learning materials (educational websites, assessment software, hyperlinked multimedia textbooks, and virtual laboratories).

All the aforesaid gives us the reason to assert that the use of telecommunication means and the emergence of global telecommunication network Internet have provided with ample opportunities for distance learning development. Reliable high-speed computer networks are needed. Computer networks democratize the use of distributed educational resources. Even the smallest village

school has access to the following resources after Internet connection:

1) world's libraries catalogs; the technology of these catalogs' use on the Internet is developed enough, there are several ways of access path to these catalogs;

2) a database containing the results of real research, real data used in the work by scientists, engineers, economists; it is a very important technological solution which is inseparably linked with the idea of computer telecommunications and databases, there is no alternative to this solution taking into account the large amounts of information and its rate of change;

3) access to educational software and documentation of huge file archives;

4) it should be noted that all these services have access to huge information and computing resources, and in this respect there is no alternative to computer telecommunications.

Lecture 8. Theme: Didactic principles of the use of computer teaching aids

computer device – компьютерная техника
computer-based learning program – компьютерная обучающая программа
computer-based learning tool – компьютерное средство обучения
efficiency of the developed methodological materials – эффективность разработанных методических материалов
labor-intensive calculations –трудоемкие расчеты
modern learning technology – современная технология обучения
person-centered model – личностно-ориентированная модель
self-correction – самокоррекция
self-monitoring – самоконтроль
technical base – техническая база
the method of automated learning – метод автоматизированного обучения

The efficiency of any learning type depends on a number of components: technical base, efficiency of the developed methodological materials, learning technologies used in teaching process organization. Using these necessary components the method of automated learning has won its way. At present it is the method of computer-assisted learning or e-learning. Theoretical elaboration in the making of the method of automated learning can be used in the development of other learning methods based on computer devices including the use of didactic possibilities of modern development level of equipment and telecommunications. Computer-based learning programs and new information teaching aids fit in with modern learning technologies.

The following main didactic principles of the use of computer-based learning tools are:

- *the principle of compensatory approach* consists in learning process facilitation, reducing the time and effort learning to understand and study the material; minimization of student's time and effort for understanding and study of the material;

- *the principle of informativity* means the transmission of necessary and additional information for learning;

- *the principle of integrative approach* consists in consideration of the studied object in parts and as a whole;

- *the principle of reliability* means the possibility of high-quality teaching material preparation for unlimited number of audience;

- *the principle of visuality* consists in the use of up-to-date computers capabilities to show teaching or information material;

- *the principle of virtuality* means the opportunity to display modeled processes or events which cannot be represented in reality;

- *the principle of instrumental approach* consists in reasonable maintenance of certain types of student's and teacher's activities;

- *the principle of interactivity* consists in implementation of the principle of individualization of learning and compulsory student's activity;

- *the principle of mediated learning approach* means material learning management by means of the algorithms and teaching

material represented with computer learning tools. This principle has two aspects: positive - exclusion of teacher's subjectivity; negative - loss of speech component in learning process and a significant decrease in time for direct communication with the teacher;

- *the principle of independence* gives students an opportunity to use of computer learning tools at a convenient time and in a convenient place (using home computer, for example);

- *the principle of accessibility* gives a teacher an opportunity to teach and control an unlimited number of students who work in a computer-based environment according to person-centered model of a student;

- *the principle of adaptability* consists in the possibility of obtaining and statistical treatment of learning and control results, and their presentation at any time and in a form convenient for a student and teacher.

Organizing lessons, both in traditional form and with the use of computer-based learning tools, teacher must fulfill a number of *general teaching requirements*:

- Analysis of lesson aims, its contents and logic of studied material;

- Intensive student's training and preparation of control materials:

- Accurate statement of all definitions of the target subject field, emphasis on main ideas which should be studied by students (facts, hypotheses, laws, regularities), the development of necessary teaching material;

- Choice of necessary teaching tools in accordance with lesson aims;

- Development of application methods of the chosen teaching tools.

From the viewpoint of didactic principles the most significant methodological aims realized most effectively with the use of computers are:

- Individualization and differentiation regarding student's learning process;

- The possibility of stepwise student's advancement to the set aims of various degrees of difficulty;

- Control with feedback and error diagnosis;
- Self-monitoring and self-correction;
- Training in the process of teaching material study and student's self-study training;
- Study time release due to automated labor-intensive calculations;
- The rise of visual presentation of educational information, and if it is necessary to present in the development process, in the temporal and spatial movement, the graphic interpretation of the studied process patterns.

Lecture 9. Theme: Pedagogical communication technologies in the conditions of educational informatization

capabilities – возможности
communications adaptability – технологичность коммуникаций
computer-mediated communication mechanisms – компьютерные коммуникации
computer-mediated communication tools – компьютерные средства коммуникации
distributed data – распределенная информация
information educational environment – информационная образовательная среда
interdisciplinary connections – межпредметные связи
offline mode of operation – offline режим работы
online mode of operation – online режим работы

Computer-mediated communication mechanisms enabling data transmission are an integral part of all information technologies, when it comes to the use of local, regional and other computer networks. Computer-based communication aids define capabilities of information educational environment of both a particular educational institution, and the city, region and country.

A new impulse for educational informatization is connected with the implementation of information *telecommunications networks and technologies* in teaching process. Global network the

Internet provides access to a huge amount of distributed data stored in different parts of the world. Many experts consider *Internet* technologies as a revolutionary breakthrough.

In a computer-based learning environment communication process has a number of peculiarities in comparison with the traditional form of communication.

Let's consider these properties of teaching communication in the light of communication component:

- mediation – subjects of educational process communicate with each other by means of computer-based learning tools and interaction;

- efficiency – one of the advantages of any communication is its efficiency, well-timed answers to the given questions, receiving a required message, transfer of the work. In this aspect network communication technologies give subjects of educational and communication processes an opportunity to minimize time lost on communication and to communicate in online and offline modes of operation;

- individuality – choice of one's own interlocutor and learning / communication trajectory;

- corporate form – communication in the groups according to the interest, and possibly confidential;

- accessibility – communication in computer-based environments enables involvement of any unlimited number of students (interlocutors);

- availability – any open subject can be interesting and available for the discussion by any number of students;

- independence – of time and place - the main distinctive feature of modern means of communication in contrast to the traditional forms of communication;

- distribution – involvement of interlocutors from any place in the country and on the planet via the Internet;

- virtuality – creating a particular temporary communication environment to discuss both learning and interpersonal problems;

- aesthetics – formation of communication patterns, the ability to express one's own thoughts in a compact, correct and proper form;

- multiple aspects – teaching communication in a computer-based environment enables various problems discussion paying attention to interdisciplinary connections, involvement of information and interlocutors from other disciplines;

- versatility – it means communication of not only two subjects of educational process, but also the participation of all group in a live discussion (including communication, not only with the teacher, but also of students with each other, and with the ability to expand the audience due to the interest in the discussed question) and enables to make communication process active and more efficient;

- intercultural communication – a very important feature of modern communication in the conditions of computer-mediated communications – communication with interlocutors of other language environment and culture, access to other cultural and national environment. It is important to learn how to communicate with people of other views and beliefs. Computer-mediated communication tools allow teachers to develop tolerance and cultivate friendliness of all communication participants;

- adaptability – an important feature of pedagogical communication in the conditions of educational informatization is high-tech quality and variety of means which enable various forms of communication. The main condition of communications adaptability is computer network technologies (modern communication is impossible without them) and a variety of ready-made software which enable communication of different direction.

For the effective implementation of *computer-based communication mechanisms* teacher should in the first place be good at appropriate *software and it enables the interaction of educational process subjects.* A modern teacher should have a special communicative competence, i.e. skills set for effective interaction building in an electronic environment with other subjects who are directly involved in the educational process.

In much the same way, all students should be able to build their own communication with other members of educational process for teaching and self-learning aims. The acquirement and development of these skills are possible only in the course of active work

including various forms of computer-mediated communication. Computer-based communication mechanisms are especially important to computer specialists (technical staff).

Lecture 10. Theme: Ethical problems of communication and teaching in the computer-based environment

centralized forms of communication – централизованные формы коммуникации
computer and Internet addiction – компьютерная Internet-зависимость
computer-based environment – компьютерная среда
computer-based training aids – КСО
cooperative teaching methods – методы обучения в сотрудничестве
cyberspace – киберпространство
electronic environment – электронная среда
electronic seminar – электронный семинар
flexibility – гибкость
hacker syndrome – синдром хакера
network ethics – сетевая этика
technocratic thinking – технократическое мышление
virtual reality systems – системы виртуальной реальности

Educational society has already gained some experience in overcoming the challenges of computer-mediated communication in electronic environment. Network ethics research based on the development of rules of conduct which are specific for several people is included in such experience.

It should be noted that network code of ethics assumes and often provides mutually predicted and expected ways of behavior of people who are acquainted with them. As a result of reaction expectations of some Internet technologies users to the behavior of others, interpersonal interaction and interaction in small groups become organized and interconnected. So, a person sending the electronic letter assumes (or doesn't assume) to receive the answer to

it or confirmation of receiving during some period of time (for example, practically at once, during the day, weeks). But the addressee, who has not been informed about network etiquette, can skip this expected action (or confirm receipt of the letter, having added the short phrase to the received voluminous message and it will not be expected and correct).

Research and educational process in the field of communications are just emerging in the science and education of our country and are provoked by heightened interest of mainly social and human sciences. Computer-mediated communication research as an applied direction in communication shows that specific training standards are being formed where teacher's role and the organization and methodology of teaching and learning are changing.

Use of pedagogical communication assumes teacher's and student's readiness to build the effective computer-mediated communication among themselves and with other participants of educational process. Change of traditional roles and emergence of new positions in teacher-student and student-student interaction patterns are important. There are various efficient ways of interaction are used: *individual* (consultations, individual tasks, control of work done) and *centralized* forms of communication, *cooperative teaching methods* (projects, forums, electronic seminars). Rules of conduct specific for Internet users and also educational and business communities have impact on code of ethics in computer-based environment.

Ethical behavior can be displayed by some expected actions developed definitely by text messages (form of address, tone, structure and contents of the text, asked questions).

Computer-mediated communication has not only restrictions (nonverbal, emotional), but also a number of didactic advantages which do it attractive to use in practice of education.

These include *flexibility*, *speed*, *written form*, *combination of information and communication components*, *person-directed approach*, *cooperation opportunities* and they result in self-adjustment and self-improvement of the communicative component of e-learning environment (K.K. Kolin).

Influence of computer-based training aids on students depends, to a greater or lesser extent, on student's stability of character and correct organization of communication by the teacher. Use of computer slang often hides language illiteracy and shows aspiration to show off – as a way to be familiar. Computer and Internet addiction and hacker syndrome can have negative effects and indicate the change of personality mentality as a whole. It is necessary to note that psychologists, teachers, specialists in the field of information technologies have paid and pay much attention to research of informatization effects of different types of activity – game, educational, professional. However questions of personality changes have not been studied in full measure yet therefore participation of teachers and psychologists in examination of developed computer-based training aids is necessary. In this case there is an opportunity to reveal and take measures both for neutralization of negative effect of computer-based training aids on student's personality, and for the creation of conditions in which the advantages of these means application will be able to show their worth.

One of the most typical examples of positive influence of computer and modern means of communication is revival (sometimes in modified forms) of epistolary writing. E-mail, chats, teleconferences demanded skills of written communication which in many developed countries were almost forgotten thanks to a wide use of telecommunication. When communication technologies become available to students, there are natural conditions for emergence of their motivation for mastering the written language. *Internet* transfers interethnic communication to a new, public level, leads to updating of common cultural knowledge, creates motivation and conditions for intensive learning of foreign languages during correspondence.

Adoption of any high technologies in different spheres of activity often has human's moving away from routine operations and the creation of conditions for his / her development as its main object. And adoption of computer-based training aids is step-by-step changing some forms of activity and eliminates some skills.

However, not always these losses are acceptable. For example, no one would deny great features of spreadsheets allowing making not only the usual calculations, but also helping by getting rid of routine operations and analyzing the data. The biggest danger is here hidden in the fact that up-to-date computer-based training aids often provide the ease of obtaining different information. Therefore, teacher's task is to direct students' efforts to self-production of new *knowledge* (not just obtaining information!) which is the result of cognitive process obtained by the student. Strong potential of computer-based training aids brings students' "traditional" skills up to a new level: finding the linkages between various parameters, specification of the task, comparison of different methods of solving, results analysis, and synthesis of acquired knowledge.

Widespread adoption of computer-based training aids must be accompanied by special measures aimed at students' emotional development and moral education. According to psychologists, the danger of technocratic thinking influenced by computer equipment is that such thinking is characterized by the superiority of means over the target, the aim over the sense and universal human interests, the sense over existence and the realities of modern world, technologies (including psychotechnology) over human being and his / her values.

Modeling, provoking and implementation of non-standard solutions contribute to the development of imagination and creativity. However, according to research of I.N. Rosina, work with virtual reality systems allowing students to improvise in cyberspace, to provoke isolation, unsociability, escape from reality. If there is an unbalanced replacement of real action by some symbolic models, it is difficult to expect complete personality development.

So the effects of the use of computer-based training aids can be both positive and negative, one or another training aids cannot be assessed unilaterally. Planning the use of computer-based training aids in the educational process, the teacher must analyze all the potential direct and indirect influences on the student's personality which will determine his / her development.

Lecture 11. Theme: Types of information and educational environments

closed learning environments – закрытые информационно-образовательные среды
data and knowledge bases – базы данных и знаний
free access – свободный доступ
information and educational environment – информационно-образовательная среда
information resources – информационные ресурсы
in-house information systems – внутренние информационные системы
local computer networks – локальные компьютерные сети
open learning environments – открытые информационно-образовательные среды
software methodological complex – программно-методический комплекс
software methodological training aids – программно-методические разработки
the system of education web portals – система образовательных порталов
unified information and educational environment – единая информационно-образовательная среда

1.Closed learning environments

We can define information and educational environment of the educational institutions which develops and uses software methodological training aids and other information materials within its structure as a closed educational environment of educational institutions.

Educational environment of the educational institutions can function within the closed model but the demands of time, world community development, scientific and technological achievements in the use of modern information technologies dictate a different approach to the educational environment organization – an open,

dynamic, and integrated with the educational environments of other educational institutions.

In the latest documents of the Ministry of Education is raised the question of the fundamental changes in access to public information of any user through computer networks of different levels. Just the principle of free access to information, wherever it may be, at the request of a student, a teacher and other specialists requires a fundamentally different organization of educational environment of any educational institution. In addition, all educational institutions must provide in electronic form on their own website information on their information resources and open access. On the other hand, the same institution can use the same principle of access to information located on educational sites of other educational institutions.

2. Open learning environments

The main fundamental difference between two models of educational environments is the integration of information and educational resources of different educational institutions in the region and the country.

Informatization of educational process management is aimed at:

- creation and development on the basis of local computer networks in-house information systems in the region interacting with domestic and international information systems;
- generation and spread of distributed database and knowledge-base systems enabling educational process management;
- development of functioning processes and training process technologies.

Under informatization conditions of the educational process it is necessary to create software methodological complexes, data and knowledge bases. Within the bounds of informatization of educational process management should be created software methodological teaching aids and informational resources aimed at integrated use in the developed unified information and educational environment.

It should be noted that information gathering and distribution presented in various forms (in one format approved at federal level and the standard) allow creating the system of education web portals supplementing each other and providing a choice of a portal according to individual user's demands. The most priority question for realization of unified information and educational model of federal and regional levels is that software product and administrative and managing kernel of portals which should be created centrally and by skilled team. Delivery of such software product to regional levels has to be carried out under the patronage of the Ministry of Education which pays this work and all subjects of the unified educational environment have to be integrated into this structure on the developed procedures.

The main task of the subjects of unified information and educational environment is the development of information and methodological materials and upload of the latest to the minisites of the educational institution with free access to information resources.

Lecture 12. Theme: Formation and development of unified information and educational environment (UIEE)

continuing professional education – дополнительное профессиональное обучение
fundamentals of educational technology – технологические основы обучения
higher professional education – высшее профессиональное обучение
hyperlink – гиперссылка
initial vocational education – начальное профессиональное обучение
Internet broadcasting – Интернет-трансляция
macro environment – макросреда
modern educational model – современная модель образования
multimedia demonstration materials – мультимедийные демонстрационные материалы
multimedia modeling materials – мультимедийные моделирующие материалы

secondary vocational education – среднее профессиональное обучение
way of information exchange – способ обмена информацией

UIEE tasks in education. How is the work in UIEE useful for participants involved in the education process? To consider this question we shall define the most important tasks and directions that can be solved due to the development and subsequent use of UIEE:

1) The application of network learning technologies as the basis of modern educational model and its testing in practical teaching and research activities.

2) The arrangement of conditions for personalized learning and individual development, development of democratic concept in education on the bases of modern information and educational technologies.

3) Activation of teaching staff's cooperative work of educational institutions for the development of modern computer-based training aids in the form of:

a) electronic teaching aids and textbooks with hyperlinks;

b) multimedia demonstration and modeling materials;

c) interactive computer-based teaching aids in various areas of education process;

d) and other.

4) The arrangement of conditions for education quality improvement, self-education, the provision of teaching materials and computer-based teaching aids.

5) Improvement of the system of continuous professional development of teachers and lecturers working with information and network technologies.

6) The development of creative potential of all participants in the educational process, organization of scientific-practical conferences of pupils, students, teachers, and lecturers.

7) Conducting meetings and seminars on key and topical issues through videoconferencing and Internet broadcasting.

8) Conducting surveys and questionnaires on various aspects of educational activities of all educational institutions and the education system as a whole.

Approaches to the formation and development of UIEE

Environment in the broad sense of the word (macro environment) covers socio-economic system as a whole, viz.: productive forces, public relations and institutes, social conscience and culture. Environment in the narrow sense of the word (microenvironment) includes a direct person's environment, viz.: family, employees' and students' groups. Environments can be classified according to different grounds, in our view, the most specific are:

- *according to global degree of environmental estimation* (universally recognized): macro-, meso- and microenvironments;

- *according to the existence and development of matter*: biological, technical, cultural and ethnic and others;

- *according to direction of solved socially significant tasks:* spiritual development and human existence; physical development and healthy lifestyle; education, teaching process and lifelong professional development; technical and communicative level of development of a country; ecological state of a country, region and village; social and economic state and development of a country, etc.;

- *according to the control of cognitive processes and ways of information exchange between students.*

Let's consider the components of the term *information and educational environment*.

Educational environment is a multidimensional, comprehensive whole, social and psychological reality and provides people with necessary material and moral incentives for their educational activity, the whole set of necessary psychological and educational conditions for human involvement into purposeful information flow and methods of its study, comprehensive personality development.

Information and educational environment (IEE) is a multidimensional, comprehensive whole, social and psychological reality and provides people with necessary psychological and educational conditions, modern educational technologies and software methodological teaching aids developed on the basis of modern information technologies providing the necessary

maintenance of cognitive activity and access to information resources (V.A. Krasilnikova).

The given term *information and educational environment* contains the word "informational", perhaps odd at first glance, as far as the learning environment cannot be "non-informational". By means of the word "informational" we are talking about modern information technologies as the technological basis of the construction of information and educational environments.

In forming the educational environment of educational institutions can be applied different approaches. The most often considered approaches are:

1) type of control (distributed, centralized);

2) the direction of education (general education, professional);

3) specialization in education (humanities, technical, artistic);

4) the level of education (general, initial vocational, secondary vocational, higher professional, undergraduate and postgraduate, continuing professional and other education).

Approach to the development of educational environment should reflect not only the complete set of necessary illustrative material rich in content but also the development of fundamentals of educational technology (methods, techniques, modern teaching aids) that allows designing and maintaining control of cognitive activity. Educational environment should be constantly changing which takes into account a variety of students' personal characteristics. In our view, the main task of educational environment development is to make the conditions for formation and development of student's incentive for independent search.

Lecture 13. Theme: Videoconferencing system is the prospects of UIEE development

computer-aided design – компьютерный дизайн
innovative learning technologies – инновационные технологии обучения
multilevel training – многоуровневая подготовка
WEB conference system – система WEB вещаний

Network informational, computer and other innovative teaching technologies are the basis of creation and development of a unified educational environment of the region improving educational environments of various educational institutions.

From the point of view of teaching possibilities of communication aids the most interesting are video- and Internet conferences which can be used not only to improve the quality of research, but also to provide innovative learning technologies, interpersonal and intercultural communication.

Use of videoconferencing and Internet broadcasting will:

1) develop a methodology of network and multimedia technologies and their application to improve information and educational environment with the use of distance learning technologies;

2) develop the system of organizational activities and the creation of software-based and methodological teaching materials for computer and network educational technologies through WEB conference system;

3) develop methodology and implementation models of network educational technologies and lectures and seminars by means of videoconferences for all forms of study;

4) improve the system of attracting and increasing the interest in the continuous training and upgrading of multilevel training of the most talented students and pupils through WEB-conferences and development of distance and open learning technologies in different knowledge areas in the use of computer equipment, computer-aided design and network technologies.

It should be noted that the development of network video- and Internet technologies will provide some level of human resources in the region for other federal programs implementation and it can also be a prerequisite for the development of computer technology in different industries.

Lectures 14-15. Theme: Education web portal. Electronic Rectorate

education web portal – образовательный портал
educational process modernization – модернизация учебного процесса
extendibility – наращиваемость
external users – внешние пользователи
free access – свободный доступ
functional capabilities of the portal – функциональные возможности портала
hardware-software complex – аппаратно-программный комплекс
information and methodological support – информационно-методическая поддержка
internal users – внутренние пользователи
mailing list – почтовая рассылка
man-machine software-based and information system – человеко-машинный программно-информационный комплекс
registered portal user – зарегистрированный пользователь портала
remote place – удаленная точка
search engine portal – поисковая система портала
source file – оригинал
the content of portal column heading – содержание рубрик портала
unified format – единый формат
unregistered portal user – незарегистрированный пользователь портала

According to our understanding of education web portal we think that for the formation of unified information and educational environment in any region, it is necessary to understand not only the interconnection of educational environment and education web portal. In the first place open, dynamic and comprehensible education web portals architecture must be developed.

What is an education web portal?

Education Web PORTAL is compound man-machine software-based and information system intended for storage of ready information as well as for preparation, distribution and use of

distributed scientific, scientific and methodological, educational and other information directed toward the improvement of educational process organization and management in different institutions.

Creating of a portal is a complex work of professionals, but a lecturer and a Computer Science teacher of any education institution should have an idea of general form of portal structure especially as define requirements and creation principles and efficient work.

The main purpose of the creation and development of PORTAL is information and methodological support of educational community activity. Portal of educational community must be an integrated, open instrument of storage and use of distributed learning resources, efficient means of image forming of education system.

Education Web Portal is a system that performs the mission of providing information and teaching materials of lecturers, teachers and students of different types, integration of innovative work experience in educational institutions.

Principles of creation of an education web portal

Let's consider the basic principles of creation and maintenance of work of an education web portal.

1. Extendibility of a program complex that allows supplementing subsystems of various levels for external and internal users;

2. Free access to open information for all users of the portal.

3. Equal participation of all educational institutions in:

a) formation of the requirements reflecting functional capabilities of the portal and filling its contents;

b) development, discussion and application of the developed software products and methodological material providing requirements of various users and aimed at educational process modernization;

c) various forums and seminars on discussed problems and pedagogical activity modernization on the basis of Internet technologies;

d) having free access to open information.

4. Integration of the creative powers of teaching staff and workers of university, its branches and the pedagogical staff of the educational institutions related to the university.

5. Involvement in filling of education web portal content of more well-known specialists as authors and experts of represented materials.

6. Development of a hardware-software complex and an education web portal performs this function; its information and methodological content has to become an information and technological basis of designing not only of the unified information and educational environment, but will allow modeling individual environment and training trajectory.

Subsystem interaction with other education web portals should provide the following capabilities:

1) to store information about other education web portals both in the same subject area, and in other subject areas;

2) to store information about education web portals of higher level;

3) to send notifications content updates automatically to all portals;

4) to receive information about content updates of other portals.

5) to allow users to search for information on specific criteria selected by the user on the portals.

6) to process the requests for information search in a portal to other portals. You only need an interface with a search engine portal;

7) to establish and maintain requests for information about the portal content. Portal content information must include the title of each document, its abstract and unique address;

8) to process requests for the given document forwarding.

The program unit of interaction with external users:

1) free access to educational, scientific and popular scientific information created in Russian or translated to Russian with saving the source file;

2) demand frequency monitoring of the content of portal column headings;

3) possibility of search of necessary information according to the column headings, authors, summary, context, and hyperlink;

4) possibility of mailing list for news and events;

5) establishment of user rights for participation in various forums, seminars and chat-room discussing the problems;

6) providing interactive and delayed advisory students' support;

7) providing the possibility of interactive work in self-study process;

8) possibility of videoconference viewing, participation in Internet conferences on condition of necessary equipment provision in remote places;

9) possibility of interactive consulting student's support in considered subject;

10) comprehensible and convenient user interface and unified format of the same information presentation.

Subsystem support for students' activity

Education web portal is the storage of different information intended for different user types, not only for a particular higher education institution or school, and that is the point of creation of unified information and educational environment. Taking into account that we have previously considered the basic principles of modern distance learning technologies, we should understand that any education web portal is intended primarily for student's self-study.

The main focus in the development of subsystem students' support should be placed on the creation of computer interactive learning and control environments.

A very important mode of operation on the portal is to provide work with different means of communication. The most widespread are e-mail, chat-room and forums. Let's consider such means of communication as a forum.

Subsystem moderated Internet forums

The question of Internet forums administration is important in the organization of communicative interaction. There are closed and open Internet forums.

Here in brief we shall describe general requirements established for Internet forums:

1) work on the closed Internet forums is available only to the internal users registered on a portal;

2) any portal user (both registered, and unregistered) may read information on any open Internet forum;

3) only registered portal users may take an active part in the work of Internet forums (to ask questions and to give answers to the questions). A user of the forum can automatically be promoted to a more privileged user group based on criteria set by the administrator. An unregistered user of the site is commonly known as a guest or visitor. Guests are typically granted access to all functions that do not require database alterations or breach privacy. A guest can usually view the contents of the forum or use such features as read marking, but occasionally an administrator will disallow visitors to read their forum as an incentive to become a registered member.

4) each forum should have hiding system of obscene expressions;

5) the message is automatically added in a forum taking into account message category (a question or an answer to already question posed) owing to what the forum is treelike in structure;

6) Each Internet forum has a moderator (an administrator). The moderators are users (or employees) of the forum who are granted to the posts and threads of all members for the purpose of moderating discussion and also keeping the forum clean. Moderators also answer users' concerns about the forum, general questions, as well as respond to specific complaints. Common privileges of moderators include: deleting, merging, moving, and splitting of posts and threads, locking, renaming, banning, suspending, unsuspending, unbanning, warning the members, or adding, editing, removing the polls of threads. The administrators manage the technical details required for running the site. As such, they may promote (and demote) members to / from moderators, manage the rules, create sections and sub-sections, as well as perform any database operations. Administrators may also make forum-wide announcements, or change the appearance (known as the skin) of a forum.

7) the convenient system of information search, both on separate forums, and on forums set, must be developed;

8) there must be the system of selective (according to search results for a certain period of time) and general archiving of forum materials. This allows users to download archives of forum materials and to take part in forum work in off- or online states;

9) the system of forums maintenance must be high reliable.

Attempts of information educational environment creation in a certain educational institution are only the beginning of a large-scale and difficult way of formation and development of informatization processes of all kinds of activity of educational institutions. It is now reasonable to consider possible prospects of integration of future information environments of educational institutions in the unified information and educational space formed on nationwide scale. It is obvious that following a similar course will positively be reflected in rates of complex informatization of state education system.

It is clear that integration of information resources and technologies in one unified complex used in all areas of educational institutions and being the basis of information educational environments is necessary. Widespread in the entire education system, such system should be supplemented with the same type of general methodological requirements and recommendations. Development of appropriate design, technical, pedagogical and methodological approaches would gradually form unified information and educational environments of certain schools and combine them to form a unified information and educational space.

Information and educational space can be defined as the space of human personality changes for educational purposes through the use of modern information and communication technologies, the increasing role of them in the organization of educational activities determines task topicality of designing and structuring of information educational space of a city, region, and country.

Created space will be distributed and should have a unified navigation providing all categories of users the ability to find quickly and easy:

- an educational institution, regardless of the location and areas of students;

- complete information about the structure and functioning of the institution;

- a list of educational institutions providing education within a particular occupation through their information and educational environments;

- any information resource registered in information and educational space, regardless of its physical location and membership of information and educational environment of certain educational institutions.

On a nationwide scale information and educational space as a whole must integrate information and educational spaces of all regions of the country. Integration of regional segments must be on the grounds of mutual contracts and cooperative agreements on an equal basis.

On a regional scale information and educational space is the integration of information and educational environments of various educational institutions created on a voluntary basis and in strict accordance with pre-developed and approved scientifically grounded pedagogical models, requirement systems, technologies and specifications.

It is obvious that the only real practical way of creation of unified information and educational space in the country is its basing on modern computer means of telecommunication exchange, such as global Internet. In this regard is increasing requirement topicality of the creation of information and educational environments of educational institutions in the form of information and educational Internet portals based on the maximum use of advantages of regional and global information networks. At present a nationwide scientific and education web portal is being developed that stores similar regional portals and is the development basis of information and educational space of the country.

In addition, taking into account the lack of computer and telecommunications equipment in educational institutions, approaches and technologies of information and educational

environment development should provide equal opportunities for functioning and interaction of all educational institutions, regardless of their technical level.

Let's hope that in the short term information systems and resources united in information and educational space will be based on high-speed, qualitative communication channels providing a universal, operational and reliable exchange of educational information.

2. COURSE OF LAB WORKS

Lab Work 1. Distance learning technologies. Acquaintance with distance learning system "Prometheus"

The aim is to get acquainted with the concept of distance learning technologies and the possibilities of its use for educational purposes

Objectives:

1. to review and analyze the concept of distance learning technologies.
2. to review and analyze the system "Prometheus" from different viewpoints.
3. to learn how to work with the system "Prometheus".

Lab Work implementation plan:

1. to study suggested material, create your own course in the chosen discipline.
2. to make a report on the work done.

Requirements to the results processing of independent work: a progress report.

Form of control: defense.

Theoretical material:

1) The main document regulating social relations in the sphere of education in Kazakhstan and defining the main principles of state policy in this field is the Law of the Republic of Kazakhstan "On Education".

The term of distance learning technologies (DLTs) is introduced in this document. They are defined as training implemented with the use of information and telecommunications aids in the mediated (at a distance) or not completely mediated interaction between a student and teaching staff.

At present in the Republic of Kazakhstan there are three state standards that determine the implementation of distance learning technologies:

1) State compulsory education standard of the Republic of Kazakhstan "DISTANCE LEARNING IMPLEMENTATION. BASIC CONDITIONS" (SCES of the RK 5.03.004-2006);

2) State compulsory education standard of the Republic of Kazakhstan "HARDWARD AND SOFTWARE OF DISTANCE LEARNING. General technical requirements" (S of the RK 34.016-2004);

3) State compulsory education standard of the Republic of Kazakhstan "INFORMATION TECHNOLOGIES. ELECTRONIC PUBLISHING. Electronic textbook" (S of the RK 34.017-2005).

In addition to the above documents, on November 29, 2007, the Minister of Education and Science of Kazakhstan approved the "Guidelines for educational process implementation applying distance education technologies". In accordance with these Guidelines sets three basic distance education technologies are defined:

- network technology (network courses in offline mode or virtual departments, universities using the Internet);
- distance learning on the basis of case-technologies;
- TV-based distance learning.

E-books and training on the Internet.

At present one of the modern trends in education is Internet-based learning (training courses, training) or online-learning, or interactive learning, which include distance education (higher education, distance learning courses, specialists' training and skills development, etc.) via the Internet. Internet-based learning can be paid and free.

Internet-based technologies provide learning stimulus beyond traditional learning methodology from textbook, manual, or classroom-based instruction. For example, computer-based technologies offer user-friendly solutions for satisfying continuing education requirements. Instead of limiting students to attending courses or reading printed manuals, students are able to acquire

knowledge and skills through methods that are much more conducive to individual learning preferences. For example, computer-based technologies offer visual learning benefits through animation or video, not typically offered by any other means.

Computer-based technologies can be a good alternative to printed learning materials since rich media, including videos or animations, can easily be embedded to enhance the learning. Another advantage to computer-based technologies is that they can be easily distributed to a wide audience at a relatively low cost once the initial development is completed.

However, computer-based technologies pose some learning challenges as well. Typically the creation of effective computer-based technologies requires enormous resources. The software for developing computer-based technologies is often more complex than a subject matter expert or teacher is able to use. In addition, the lack of human interaction can limit both the type of content that can be presented as well as the type of assessment that can be performed. Many learning organizations are beginning to use smaller web-based technologies activities as part of a broader online learning program which may include online discussion or other interactive elements.

An electronic book (variously, e-book, digital book, or even e-edition) is a book-length publication in digital form, consisting of text, images, or both, and produced on, published through, and readable on computers or other electronic devices. Some computers offer programs to make the experience more like reading a book, and they feature the ability to “turn pages”, as one would with a regular book.

Not all e-books are free. Some libraries, particularly college libraries, offer free access to numerous texts, but in general, contemporary popular novels or popular works of non-fiction need to be purchased. This type of book is also not necessarily in the public domain. A person may gain access to reading them, but must still use citation methods of quoting them, or may need to ask the author if the book can be cited or reproduced.

Sometimes, e-books are written specifically for the Internet, and they may contain helpful features like word or subject searches, and hyperlinks to other sites or other sections of the text.

You can find them in various formats and until the industry has a standard accessible in all devices these various formats will exist. PDF format is a popular format for e-books. All platforms are able to gain access and read PDF formatting. So regardless if you have a PC or Mac, you are in business! Other popular formats include: HTML (which can be read on your computer screen and laptop); TXT, RTF, DOC, HTML, CHM, EXE, PDF, DjVu, FB2 and other.

Although the expansion of the Internet blurs the boundaries, distance education technologies are divided into two modes of delivery: synchronous learning and asynchronous learning. The four types of distance learning fall under the categories of either synchronous or asynchronous. Synchronous literally means "at the same time", while asynchronous means "not at the same time".

In synchronous learning, all participants are "present" at the same time. In this regard, it resembles traditional classroom teaching methods despite the participants being located remotely. It requires a timetable to be organized. Web conferencing, videoconferencing, educational television, instructional television are examples of synchronous technology, as are direct-broadcast satellite, internet radio, live streaming, telephone, and web-based VoIP. Synchronous learning is less flexible and disrupts the student's life to a greater extent. It is, however, the most popular form of college distance learning and continuing education programs, as it facilitates a greater amount of interaction between students and professors.

In asynchronous learning, participants access course materials flexibly on their own schedules. Students are not required to be together at the same time. Mail correspondence, which is the oldest form of distance education, is an asynchronous delivery technology as are message board forums, email, video and audio recordings, print materials, voicemail and fax.

Distance learning can also use interactive radio instruction, interactive audio instruction, online virtual worlds, digital games, webinars, and webcasts.

These four types of distance learning are: 1) Open Schedule Online Courses; 2) Hybrid Distance Learning; 3) Computer-based Distance Learning; and 4) Fixed Time Online Courses.

Open Schedule Online Courses: With open schedule online courses, students are allotted the greatest amount of freedom. This is an asynchronous form of learning in which students are provided Internet-based textbooks, mailing lists, email and bulletin boards to complete their coursework. At the beginning of classes, the student is provided a set of deadlines, but is allowed to work at their own pace as long as the work is turned in by the deadline. This type of learning is great for students who work well independently and those who do not procrastinate.

Hybrid Distance Learning: Hybrid courses combine synchronous and asynchronous learning to create a structure in which the students is required to meet at a specific time in a classroom or Internet chat room. However, they are allowed to complete assignments on their own time and may pass them in through an online forum. This option is sometimes offered when a university lacks adequate space to accommodate all their course loads.

Computer-based Distance Learning: The main difference between computer-based and hybrid learning is that students are not allowed an open schedule. They are required to meet in a specific computer lab or in a classroom at a designated time each week.

Fixed Time Online Courses: The most common type of distance learning today is fixed time courses. As the title states, these courses are strictly online, but students are required to log-in to their online learning site at a specific time. Although they are completely online, the format remains synchronous because mandatory live chats are often required.

Pedagogical approaches or perspectives: It is possible to use various pedagogical approaches for eLearning which include:

- social-constructivist – this pedagogy is particularly well afforded by the use of discussion forums, blogs, and online collaborative activities. It is a collaborative approach that opens educational content creation to a wider group including the students themselves.

- cognitive perspective focuses on the cognitive processes involved in learning as well as how the brain works;

- emotional perspective focuses on the emotional aspects of learning, like motivation, engagement, fun, etc.;

- behavioral perspective focuses on the skills and behavioral outcomes of the learning process;

- contextual perspective focuses on the environmental and social aspects which can stimulate learning.

Benefits: Distance learning can expand access to education and training for both general populace and businesses since its flexible scheduling structure lessens the effects of the many time-constraints imposed by personal responsibilities and commitments. Distance education programs can act as a catalyst for institutional innovation.

Distance learning may enable students who are unable to attend a traditional school setting due to disabilities, handicaps, or sicknesses such as decreased mobility and immune system suppression to get a good education and may provide equal access regardless of socioeconomic status or income, area of residence, gender, race, age, or cost per student.

Analysis of Kazakhstan's normative documents clearly shows that distance education in the Republic of Kazakhstan is considered important. The Republic of Kazakhstan is dynamically developing new technologies in education. With such a legal framework it can be assumed that in the near future in many higher education institutions of Kazakhstan training will be conducted not only in the traditional form, but with the widespread use of distance learning technologies, in accordance with present international standards.

2) *Distance learning technologies of NKSU*

At present in North Kazakhstan State University named after M. Kozybayev applying distance learning technologies (DLTs) study students of five faculties in part-time form of education: Faculty of Information Technologies, Engineering and Technology Faculty, History and Law Faculty, Faculty of Economics, and Musical and Pedagogical Faculty.

According to the guidelines for educational process implementation applying distance education technologies in the

learning process should be applied at least two technologies. In NKSU are widely used network and case technologies; due to them is available access to distance learning system (DLS) "Prometheus", as well as recording of training cases. All this provides each student with teaching materials and curriculum-based literature.

In addition, there is the possibility of regular lab and practical works or applying distance technologies, as well as access to the means of distance learning which implement two-way communication between the university (lecturers, teaching methods specialists) and students.

General regulations

Distance learning technologies (DLTs) is a method of correspondence education based on the use of specific educational technologies applying modern teaching methods, technical means of communication and information transfer.

3) DLS "Prometheus" is a system developed for implementation of full-fledged process of distance learning and / or independent knowledge testing and is intended for large flow of students. It consists of components for implementation and control of educational process with varying degrees of compliance with the classical model of university education.

DLS “Prometheus” is designed for organization and conduction of electronic learning of different categories of listeners in any spheres of human activity.

The virtual educational centers created on its basis support all cycle of electronic learning, starting from planning of learning, registration of attendees and up to provision of reports on taking of a learning course, passing of final tests and receipt of final certificates.

The system can be also used for the internal electronic learning and testing, for the evaluation of knowledge, skills and habits.

Main functions of DLS “Prometheus”:

- control over access to courses for different users group;
- e-learning management with application of the Internet or intranet; distribution of informational and reference materials on the e-learning portal;
- design, implementation and control of lesson plans;

- design and importing tests and educational materials into different formats;

- interaction between students and teachers by means of forums, chats and other electronic communication forms;

- implementation of examination and self-checking tests, error analysis ad correction.

Guidelines for the development of teaching materials for e-learning courses (distance education and credit-based educational technologies) can be downloaded here: http://192.168.0.9:8000/client/items.asp?ItemId=11.

Lab Work 2. Knowledge-based monitoring systems used at NKSU

The aim is to analyze the existing knowledge control system at NKSU paying particular attention to the computer-based testing.

Objectives:

1. to review and analyze the main knowledge control forms.
2. to examine the data on the knowledge control forms.
3. to consider testing shells used for computer-based testing.

Lab Work implementation plan:

1. to study suggested material and analyze it.
2. to make a report on the work done.

Requirements to the results processing of independent work: a progress report.

Form of control: defense.

Theoretical material:

Testing system is a software product or signal-processing equipment intended for student's control of acquired knowledge. The role of assessment continues to evolve along with new challenges in education. As the nation searches for ways to improve student achievement, educators and policy makers continue to evaluate and

reform their educational systems. Educational testing, or assessment, is a key component of all education systems. Assessments can be used to monitor educational systems for public accountability; help improve curricula; evaluate the effectiveness of teaching and instructional practices; measure student achievement; and determine a student's mastery of skills. Although educational testing is a complex field, there are several basic principles that provide a foundation for further understanding.

What are the key foundational principles for educational assessment?

The purpose of tests is to deliver accurate and reliable information, not to drive educational reform. Some politicians and policy makers have called for new tests, thinking that these alone will create educational achievement. What they are really looking for is better results. It is important to understand that a new assessment system cannot cure an ailing education system. Tests do not create better students. Good teachers do.

The problems facing our nation's education system are serious. There is no single cause, and therefore no single cure. No single test can ascertain whether all educational goals are being met. A variety of tests – multiple measures – is necessary to provide educators with a well-rounded view of what students know and can do. Just as different tests provide different information, no one kind of test can tell us all we need to know about a student's learning. This "multiple-measures approach" to assessment is the keystone to valid, reliable and fair information about student achievement.

Any one type of test – whether it is norm-referenced, multiple-choice or performance assessment – is only one part of a balanced approach to assessment. Some tests, for example, are designed to indicate whether a student needs additional work in specific subjects, while others measure overall group progress toward broadly stated goals.

All tests and test types should be held to the same high technical standards for delivering accurate information. All assessments should be designed, piloted, and published using nationally accepted technical standards. In recent years, many new

assessments and test formats have been developed. These tests, too, must be held to these same high standards. We should not permit invalidated tests – especially those with high-stakes outcomes – to be administered to students.

Educators recognize the value of using a variety of tests. A comprehensive assessment program may include several different measures, among them the following basic types and formats:

- Aptitude Test: A test consisting of items selected and standardized so that the test predicts a person's future performance on tasks not obviously similar to those in the test. Aptitude tests may or may not differ in content from achievement tests, but they do differ in purpose. Aptitude tests consist of items that predict future learning or performance; achievement tests consist of items that sample the adequacy of past learning.

- Criterion-referenced tests: This type of assessment is designed to compare a student's test performance with clearly defined curricular objectives, skill levels, or areas of knowledge. While norm-referenced test results compare student performance to peers – for example, a student spelled better than 95 percent of his or her classmates – results from criterion-referenced tests compare the performance to a predefined set of objectives – and demonstrated mastery (knowledge) of a specific subject, such as long division.

- Formative assessment: A process used by teachers during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes. Formative assessment provides educators with critical information about student and classroom progress and can be used to adjust the teacher's approach and the pace of instruction throughout the year. Formative assessment is often used as a tool for uncovering opportunities for instructional intervention because it gives teachers information about where additional practice and support may be needed.

- Multiple-choice tests: many standardized tests give students the opportunity to select responses to test questions from among a number of specific choices. This format, called "selected response" or "multiple choice" is efficient and practical. Carefully designed

multiple-choice questions can provide valid information about students' knowledge and their ability to reason logically and apply complex thinking processes to solve problems. In most instances, multiple-choice tests are scored by computers and provide impartial, accurate results.

- Standardized achievement tests: These tests are commonly used to provide valid, reliable, and unbiased information about students' knowledge in various areas. "Standardized" means that the test is always given and scored the same way. The same questions are asked and the same directions are given for each test. Specific time limits are set, and each student's performance may be compared with that of all the other students taking the same test. Most standardized achievement tests are multiple-choice tests.

E-assessment is becoming widely used. It has many advantages over traditional (paper-based) assessment. The advantages include:

- lower long-term costs;
- instant feedback to students;
- greater flexibility with respect to location and timing;
- improved reliability (machine marking is much more reliable than human marking);
- improved impartiality (machine marking does not "know" the students so does not favor nor make allowances for minor errors);
- greater storage efficiency – tens of thousands of answer scripts can be stored on a server compared to the physical space required for paper scripts;
- enhanced question styles which incorporate interactivity and multimedia.

There are also disadvantages. E-assessment systems are expensive to establish and not suitable for every type of assessment (such as extended response questions). The main expense is not technical; it is the cost of producing high quality assessment items – although this cost is identical when using paper-based assessment.

Information about the department of computer-based testing at NKSU

Department of computer-based testing has been engaged in the organization and implementation of computer-based testing (for

university students, pupils, and students of professional development and retraining institute) in computer classrooms of NKSU connected together to unified corporate computer network.

Department of computer-based testing manages the implementation process of teaching methods and systems of test tasks development and their examination, work of software-based and methodological test materials, advises university staff on the questions concerning computer-based testing. Department of computer-based testing takes an active part in international, Republican and inter-university programs and projects connected with testing and knowledge audit.

All test tasks are stored in unified data bank of the department of computer-based testing.

Only some workers of the department of computer-based testing have access to the test bank (engineer of the department of computer-based testing, operator of the department of computer-based testing typed the test and the author of the test).

This enables to ensure confidential and centralized tests storage.

2) Data on test analysis are located at http://192.168.0.18:800/ums/okt/index.php?level=8.

3) Example of a testing program

Consider work methods of the ExaMINATOR shell program.

Test tasks in the ExaMINATOR shell program are located at http://www.softwerk.ru/ttypes_r.htm.

Lab Work 3. Methodology of computer-based communication mechanisms application

The aim is to study the use of computer-based communication mechanisms, as well as methods of their use.

Objectives:

1. to consider the concept of computer-based communication mechanisms;
2. to study various techniques.

Lab Work implementation plan:

1. to study the material on the given subject.
2. to make a report on the work done.

Requirements to the results processing of independent work: a progress report.

Form of control: defense.

Theoretical material:

Communication is beneficial for the human race. By communicating with one another, information can be shared – past experience, current affairs, predictions of the future – from here, there and everywhere. Also, resources and expertise can be shared, by communicating with the right people.

Similar observations apply to computers, too. Individual computers are capable of gathering, processing, storing and distributing information, under the direction of humans.

There are three main areas where benefits can be expected if one computer is able to communicate with others:

- it can get information that is stored by other computers;
- it can get other computers to do specialized work;
- it can communicate with humans that use other computers.

The features of communications are classified under three main headings:

- information: the type of information that is communicated;
- time: when, and how quickly, a communication takes place;
- space: which computers, and inter-connecting channels between computers, are involved in a communication.

There are two main problems associated with communication: achieving agreement between computers on the nature of communications; and implementing the required communications using available physical communication media.

Present-day uses for computer communications arise from a convergence between two different worlds. The first is a computer-centered world, where computers existed, and then it became

convenient to inter-connect them. The other is a human-oriented world, where communication facilities existed, and then it became convenient to computerize these facilities. In the latter world, there was also convergence between telecommunications facilities largely used for inter-personal communication, such as the telephone, and broadcasting facilities largely used for entertainment, such as television.

In the earliest days of computers, the roomful of boxes containing the component parts of the computer was the center of attention. Information was supplied to a computer, and retrieved from a computer, by people who were physically present in the computer room. In the unusual event that there was any communication between computers at all, this was done by carrying paper tapes or magnetic tapes produced by one computer along to be read by another computer. Thus, people were the servants of computers as much as computers were the servants of people. The first developments in communications were designed to make life easier for people, by eliminating the need to be physically adjacent to the computer when interacting with it.

The Internet has become the best-known specialized mechanism for providing links between computers located in all continents of the world. The World Wide Web (WWW), or just "The Web" for short, was the revolution that brought the Internet to the attention of the general public. The WWW is a mechanism for allowing access to documents stored on computers around the world. A major attraction for users is that it can be used without any needing to know any details of how computer communications work. The Hypertext Mark-up Language (HTML) and the Hypertext Transfer Protocol (HTTP) are the two agreed protocols that are specific to the application. The standard Internet TCP / IP protocols are then used to support a reliable conversation between WWW client and WWW server using HTML and HTTP. The Internet identifier of the WWW server is inferred by the WWW client using the Uniform Resource Locator (URL) for the required page. The speed of access depends, among other things, on the number of simultaneous clients being handled by the server. The TCP / IP communication is supported by

the standard message routing mechanisms over the Internet. This makes use of relevant physical channels that exist between computers.

Human communication via a medium is long-established. In the mid-nineteenth century, the telegraph became an economical method for the electrical transmission of information represented in Morse code, or similar, over long distances. In style, Morse code is not far removed from the bit-focused approach to information followed by computers. The difference is that information is expressed in a three-valued form (dot, dash and pause) rather than a two-valued form. The major problem with the telegraph was the need for an expensive physical cable between the communicating parties. The medium was used fairly wastefully, because the speed of transmission was limited to the speed at which people press Morse keys to send information and the speed at which people could listen to the transmission to decode the information.

Around the turn of the twentieth century, the telephone became available. Like the telegraph, a large investment in cabling was necessary. However, unlike the telegraph, the telephone was an analogue device, in that human speech was directly converted to electrical waveforms for transmission. Nowadays, most telephone systems employ digital transmission systems, with speech being represented using a series of bits. This is because it is rather easier to reconstruct a series of bits from a damaged electrical signal than directly encoded speech. A complex collection of automated national and international telephone exchanges provides a near-worldwide telephone communication system, going a fair way towards a goal of allowing every person in the world to speak to any other. Transmission is not exclusively via cabling, with radio transmission becoming increasingly used by mobile telephones. The telephone system can be used as a vehicle for computer-oriented communication, for example, as a way of connecting a terminal to a computer. This does not involve computers speaking to one another in a human way over the telephone. Instead, electrical waveforms of a similar style to those used to encode speech are transmitted, but they in fact encode serried of bits of computer-style information.

The modern telephone system has evolved to be like a distributed computer system. The digital exchanges are just special-purpose computers, and the links between them are similar to links between computers.

Other telecommunication services have been developed in addition to telephone, geared to transmitting textual-style information rather than direct human communications. One of these is fax (facsimile), which can be used to transmit an image of a text page from one telephone to another. This involves a digital representation of the page in terms of bits of information being transmitted between two fax machines, encoded as a telephone-style electric signal. The fax machines are really just special-purpose computers, which conduct a conversation over the analogue telephone system.

A further family of information transmission services is those based on telex. These are fairly close relatives of computer-oriented communications that involve textual information being sent between computers and terminals or between computers. Telex itself is a long-established telegraph service that allows textual messages to be transmitted between subscribers. The messages can be composed of upper case letters, numerical digits and some punctuation symbols. They are transmitted in a digital form, but the transmission rate is only 50 bits of information per second, which equates to only 10 characters per second.

A more modern offering is teletex, which allows a much larger character set, including graphical symbols and word processor style facilities for composing pages. It has a much faster transmission rate of 2400 bits per second, but this is still slow in modern computer communications terms. Both telex and teletex are simple mechanisms for transmitting digital information between two specialized machines.

Videotex is a variation that is akin to the client-server model for distributed computer systems. It is used over the normal telephone system. A user of videotext has a special video terminal attached to the telephone line, and this acts as the client. It is possible to telephone computer databases worldwide, and then conduct

searches for information. The databases are the servers. One place where videotex is often seen is in travel agents, where video terminals are used to interrogate holiday and travel booking systems over the telephone. Videotext is an example of a value-added service operated by telecommunications providers.

Given that a computer is able to participate in communications using one or more channels, there are two activities it can carry out in order to assist in implementing communications requiring channels that are not directly available. The first is filtering, which means selectively ignoring some of the information that is communicated to it. This can be used to reduce the number of computers involved in a communication. The second is switching, which means selectively communicating further some of the information that is communicated to it. This can be used to increase the number of computers involved in a communication. For computers to assist in implementing communications, agreements on information, time and space are necessary. These guide the filtering and / or switching actions performed by the computers. The norm is to have agreement packages among a collection of computers that result in the implementation of services providing channels that allow certain information flows between these computers.

A communication involves information sharing among a collection of computers using a single channel. A collection of computers and channels that uses general agreements on information, time and space matters among the computers in order to implement idealized channels using the actual channels is called a computer network. The computers have to be given unique identifies. Identifier schemes may be either flat or hierarchical, the latter making allocation of unique identifies easier. All of the computers involved in a communication have to have some knowledge of the map of the space. This might result from an absolute agreement, where the space is fixed before communication. More usually, the map of the space is relative to the communication. That is, computers acquire knowledge of the space when a communication begins, or as it continues. The communications that can be carried out using computer

communication systems are usually forced to have one of three forms:

- unicast – one computer transmits information to another;
- multicast – one computer transmits information to several others;
- broadcast – one computer transmits information to all others.

And most physical channels support either unicast or broadcast transmission directly.

Lab Work 4. Use of communication technologies in education

The aim is to study the use of ICTs in education.

Objectives:

1. to consider the concept of ICTs;
2. to consider the use of ICTs in education;
3. to pose one's own idea on ICTs use in higher education institutions.

Lab Work implementation plan:

1. to study the material on the given subject.
2. to make a report on the work done.

Requirements to the results processing of independent work: a progress report.

Form of control: defense.

Theoretical material:

ICT is a force that has changed many aspects of the way we live. If one was to compare such fields as medicine, tourism, travel, business, law, banking, engineering, the impact of ICT across the past two or three decades has been enormous. But when one looks at education, there seems to have been an uncanny lack of influence and far less change than other fields have experienced. Education is a very socially oriented activity and quality education has traditionally

been associated with strong teachers having high degrees of personal contact with learners. The use of ICTs in education lends itself to more student-centered learning settings. With the world moving rapidly into digital media and information, the role of ICTs in education is becoming more and more important.

There have been a number of factors impeding the wholesale uptake of ICT in education across all sectors. These have been included such factors as a lack of funding to support the purchase of the technology, a lack of training among established teaching practitioners, a lack of motivation and need among teachers to adopt ICT as teaching tools. But in recent times, factors have emerged which have strengthened and encouraged moves to adopt ICTs into classrooms and leaning settings. These have included a growing need to explore efficiencies in terms of program delivery, the opportunities for flexible delivery provided by ICTs; the capacity of technology to provide support for customized educational programs to meet the needs of individual learners; and the growing use of the Internet and WWW as tools for information access and communication.

As we are in the 21st century, these factors and many others are bringing strong forces to bear on the adoption of ICTs in education and contemporary trends suggest we will soon see large scale changes in the way education is planned and delivered as a consequence of the opportunities and affordances of ICT.

The use of ICTs in higher education can focus on:

- the dissemination of information and publications;
- communication between teachers and students and between students;
- collaboration: group discussions, joint project work, etc.;
- information and resource handling: search engines, access to multimedia databases, etc.;
- specific teaching and learning purposes: such as interactive tutorials, quizzes, simulations, videoconferencing for lecture participation.

The use of ICTs must reflect principles of good and effective education. These relate to an active involvement of students and

interaction among students, a process orientation, and a student-centered approach. Besides questions of effectiveness, efficiency issues also play a role. First of all because of the students who want to complete their studies in an efficient way. Secondly, because of the instructors who have to perform their tasks having limited means and time. In many cases instructors show reluctance concerning the use of ICTs in higher education.

The impact of ICTs on *what* is learned: Conventional teaching has emphasized content. For many years course has been written around textbooks. Teachers have taught through lectures and presentations interspersed with tutorials and learning activities designed to consolidate and rehearse the content.

Contemporary settings are now favoring curricula that promote competency and performance. Curricula are starting to emphasis capabilities and to be concerned more with *how* the information will be used than with *what* the information is. Traditionally generic skills have involved such capabilities as an ability to reason formally, to solve problems, to communicate effectively, to be able to negotiate outcomes, to manage time, project management, and collaboration and teamwork skills. The growing use of ICTs as tools of everyday life has seen the pool of generic skills expanded in recent years to include information literacy and it is highly probable that future developments and technology applications will see this set of skills growing even more.

The impact of ICTs on *how* students learn: Just as technology is influencing and supporting what is being learned in universities, so too is it supporting changes to the way students are learning. Moves from content-centered curricula to competency-based curricula are associated with moves away from teacher-centered forms of delivery to student-centered forms. Through technology-facilitated approaches, contemporary learning settings now encourage students to take responsibility for their own learning. In the past students have been trained to let others present to them the information that forms the curriculum. The use of ICTs in educational settings acts as a catalyst for change in this domain. Students using ICTs for learning purposes become immersed in the

process of learning and as more and more students use computers as information sources and cognitive tools, the influence of the technology on supporting how student learn will continue to increase.

The impact of ICTs on *when* and *where* students learn: In the past educational institutions have provided little choice for students in terms of the method and manner in which programs have been delivered. Students have been forced to accept what has been delivered and institutions have tended to be quite staid and traditional in terms of the delivery of their programs. ICT applications provide many options and choices and many institutions are now creating competitive edges for themselves through the choices they are offering students. These choices extend from when students can choose to learn to where they can learn. The communications capabilities of modern technologies provide opportunities for many students to enroll in courses offered by external institutions rather than those situated locally. These opportunities provide such advantages as extended course offerings and electric class cohorts comprised of students of different backgrounds, cultures and perspectives. Through online technologies students are free to participate in learning activities when time permits and these freedoms have greatly increased the opportunities for many students to participate in formal programs.

Lab Work 5. Work with Education Web Portal

The aim is to study the structure of the education web portal of NKSU, main features, and access levels.

Objectives:

1. to consider the structure of the education web portal of NKSU and its purpose, its main features.
2. to study existing access levels, as well as the need of their use.

Lab Work implementation plan:

1. to study the material on the given subject.
2. to make a report on the work done.

Requirements to the results processing of independent work: a progress report.

Form of control: defense.

Theoretical material:

An education portal is a specially designed website that provides a host of educational services. The term portal was historically used to describe a port or location of multiple loading and offloading activities. It is now used most widely to describe a multi-function website that includes public and private sections, data retrieval and submissions tools, personalized content, and often links or connections to education related systems or services.

The ability to provide personalized, user-specific content is central to the core functionality of an education web portal. The technology required to support this type of website structure became widely available in the mid 1990s, with the advent of user management functionality as part of a web server. There are two ways to provide this content: a series of template forms or the use of a content management solution.

A public website typically provides a range of general information about the education institution, programs, course, history, and admissions. The content manager is responsible for reviewing and publishing content that is accurate, relevant, and easy to locate.

Web portals for higher education can help you:

- record and share grades with students electronically;
- create online communities for students, faculty, administrators, and alumni to collaborate;
- facilitate sharing of best practices among faculty and administrators;

- enable students, faculty, administrators, and alumni to access your institution's resources anytime from any connected device;

- post lesson plans, coursework, research content, and more to online document libraries;

- share information with your board of directors and community members.

Registered students are provided with a unique user name and password to log into the private area of the website. Students can log on to the education web portal for their education institution and see their current courses, program of study, fees, and other relevant information. The depth and breadth of information varies widely and is often tied to the system architecture of this institution.

Creating and maintaining an information portal is a new technological development and has resulted in the creation of new jobs and career paths. There are two areas of skill that are required to form an educational portal: computer systems and content management. Content management refers to all the text, pictures, files, and data provided to users through the education web portal. In many organizations, a site administrator logs into the website with his unique account information and has the ability to maintain or add content to the websites, both public and private.

Lab Work 6. Work with modules of Electronic Rectorate

The aim is to acquire skills for work with the system modules of *Electronic Rectorate*.

Objectives:

1. to consider the structure of the system of *Electronic Rectorate*;

2. to study the concept of a system module of *Electronic Rectorate* and its purpose;

3. to describe the selected system module of *Electronic Rectorate.*

Lab Work implementation plan:

1. to study the material on the given subject.
2. to make a report on the work done.

Requirements to the results processing of independent work: a progress report.

Form of control: defense.

Theoretical material:

1) *University Automation System*

E-University is a complete solution for universities those are looking for an automated system to manage the whole university administration system and online accessibility in a single place. This is a centralized system for smooth operation of the day to day activities of the university and also have an online system where students, faculties can advise courses for the semester, registrar's office, accounts and finance, grade submission and publishing, online faculty evaluation system, new format for Official transcript (single page), library and other concern departments are also integrated to the system.

Basic features:

- application access control system (ACS) with authentication and authorization;
- group based access system (students, faculties, chairmen, secretary, admin and library);
- completely online students advising system by the faculties and students;
- students' ability to get advised by themselves from the Internet;
- student's semester billing and accounting;
- student's accounting history;
- grades management and publishing by faculty;
- registrar's office automation;
- official and unofficial student's transcript generation and printing facilities;

- semester schedule management, make-up class, registration dates and cancellations;
- user management system;
- admission and students' management;
- faculty management;
- course and curriculum management;
- final exam scheduling;
- faculty evaluation system.

2) Since 2004, in North-Kazakhstan State University named after M. Kozybaev there is an information analytical complex for an automated system to manage education process *Electronic Rectorate* providing information support and key functions for operational monitoring of educational resources and educational management.

At present, an information analytical complex for an automated system to manage education process *Electronic Rectorate* consists of 20 projects which include 260 modules and sub-modules. This interface configuration is quite popular part of university information space, and it can be seen from the fact that the given resource is used more than 2, 000 times a day.

For securing information and allocating of access rights to the complex *Electronic Rectorate* there is role-based access control to the system and in connection with it there were developed 69 roles which include 246 university employees (Rector, Vice-Rectors, Deans, Vice-Deans for Educational and Methodical work, Education Methods Specialists (full-time and part-time studies), Heads of Departments, and Learning Support Staff).

In the structure of the university information systems can be identified a number of subsystems both independent and integrated into the general *University Automation System*. There are following subsystems:

- subsystems such as *E-Dean's Office*;
- subsystem of education process monitoring including the functions of study schedule development;
- subsystem of methodological teaching aids management intended for maintenance of teaching and methodological documents and electronic teaching resources;

- subsystem of research sector management (Department or University Research Institute);

- subsystem of business correspondence maintaining the work of University Office, University Archives and Records Center, University Dispatch Office, and so on;

- subsystem *Human Resources*;

- accounting and economic and financial planning subsystems;

- library management information system intended for library stock accounting, search for literary resources, design and demands satisfaction;

- subsystem of distance education management which is include in software support of education web portals;

- subsystem of maintenance of University engineering services and a number of others which are determined by the specific character of a higher education institution.

The development of corporate information systems (CIS), including systems of higher education institution management is connected with Enterprise Application Integration (EAI). In most cases, the integration of subsystems into a unified system *E-University* is performed on the basis of application of XML and technologies such as SOA, ESB, and BPEL.

The basis of most these automated control subsystems are database management systems (DBMS) or data storage and documents and documentation management systems. In modern software markets there are a large number of such systems. It is necessary to be able to compare these systems specifications with the scope and specificity of the tasks fulfilled by higher education institutions departments.

Databases content of and data storage are determined by university features. Therefore the development of information application models, reflecting different aspects of university activity, and data collection must be implemented by the university employees.

3) An exemplary list of modules for self-study:

- search for university entrants;

- work with university entrants;

- admission statistics;
- admission requirements;
- study schedule;
- overview of active filter configurations;
- selection of students;
- elective course catalogue;
- catalogue editor;
- teaching staff – disciplines;
- students – disciplines;
- work of advisers.

Lab Work 7. Development of computer tests

The aim is to acquire skills for the development of computer tests.

Objectives:
1. to study the material on the subject.
2. to develop 20-25 test tasks of different types.

Requirements to the results processing of independent work: a progress report.

Form of control: defense.

3. MATERIALS FOR INDEPENDENT POSTGRADUATE'S WORK

IPW 1. Problems associated with Information Technologies adaptability in the system of education

The aim is to study the use of information technologies in education system, main problems and difficulties.

Objectives:

1. to review and analyze main task programs aimed at solving problems of educational informatization;
2. to describe and classify main problems in the educational activity based on personal observation;
3. to give one's own idea of IT problems in higher education institution;
4. to propose the necessary additions or changes to the standard.

IPW implementation plan:

1. to study the additional material ad literature on the given subject;
2. to make a report on the work done.

Additional material

As it becomes obvious, information technologies are not so much tools of education system supplementing and functioning of scientific and educational knowledge, as need for the establishment of new knowledge and its institutional structures.

There are some key epistemic trends that are the part of the virtual space and virtual communication theory which destabilizes status distribution and social structure as a whole.

The virtual space theory rethinks the vague notion of "virtual space" and links it to the study of visual media; the result is a whole new way of seeing pictorial images. We are used to approaching images in one of a few ways. Sometimes we identify them with the

visual content that we see in them or what they symbolize; sometimes we consider them to be physical or cultural objects, sometimes we think of them in terms of how they were made.

The virtual space theory extends to address the whole range of questions that naturally arise once this interpretation is introduced: How does this space relate to the physical space we inhabit? How does it differ from the mental space of our imagination? What kind of technologies do we have for producing such a space and for providing access to it? What are the rules that govern this space, and what internal structure might it have? How would we design places for this space, and how would they affect our experience of it? What is the history of making places in virtual space, and what is being done nowadays?

One of the most important problems in the study of this question is the classification of information technologies because there are a variety of approaches to it. Information technology is used in creating lot of technologies that really plays an important role in maintaining the life in the present as well as in the future.

So, all the types that we generated in the field of computer networking or in this technological world are called as the types of the information technology. But some common types of information technologies are different types of mobile technologies; different types of technologies used in solving the computational tasks, some types are also used in creating different types of industrial detection system and processors, etc.

Requirements to the results processing of independent work: a progress report (4-5 pages of A4 format size).

Form of control: defense.

IPW 2. Possibilities of use of computer-based teaching technology

The aim is to study the use of computer-based teaching technology.

Objectives:

1. to define didactic functions of computer teaching aids and communication interactions and present them in the schematic form.

2. to give a detailed answer to the issue, "I and my education: necessary conditions, possibilities and problems".

3. to analyze the state of schools computerization and suggest approaches to more effective use of computer-mediated communication tools in a particular and hypothetical school.

IPW implementation plan:

1. to study the additional material ad literature on the given subject;

2. to make a report on the work done.

Additional material

Computer technologies have the potential to transform education by generating innovative learning and teaching situations. Innovations in ICTs suggest that there are considerable opportunities to enable much wider access to higher education and the ability to support learners as and when they need it and from any possible location. So higher education needs to respond to these new student demands.

The potential of computer technologies to revolutionize university teaching and learning has long been celebrated by education technologists. In developed and developing countries alike, computer technologies have become an icon of early 21st century higher education provision.

Despite huge efforts to position computer technology as a central tenet of university education, the fact that many students and faculty make only limited formal academic use of ICTs during their teaching and learning is less discussed by educational technologists. The actual formal use of new technologies in undergraduate and graduate studies remains inconsistent and highly variable from course to course and institution to institution.

Basic effects of ICT on the teaching process:

- has an edit effect in terms of quality of student work and practical examples through visualization;

- equalizes individual differences and has particularly dramatic effects for students with special needs;

- enables collaborative learning with little indication of the isolated learner;

- develops communication skills and awareness of different audiences;

- increases information reliability and accuracy according to authenticity of learning tasks, with realistic and up-to-date information;

- increases student motivation through hands-on activity, visual representations and improved modes of presentation;

- encourages independent learning and individual preferences for process, layout, style and format;

- allow students to produce high quality multimedia products;

- changes teacher practices, planning tools and assessment rubrics;

- has allowed students to learn independently, which has enabled more work to be completed;

- has enhanced achievement due to the reinforcement and practice that ICT has afforded.

The impact of ICTs on the learning process seems to be more important and requires more than looking only to curricula. Improved student outcomes are observed, with regard to: motivation, enjoying learning; self-esteem; ICT skills; collaborative skills; subject knowledge; information handling skills; meta-cognitive skills, etc.

According to Hackbarth, "there are at least eight major categories of computer-based learning: drill-and-practice, tutorial, problem solving, simulation, inquiry, electronic performance support system, testing, and programming". These eight categories indicate that teachers are able to choose appropriate computer based learning materials based on the educational aims within a particular learning situation. In other words, if teachers choose inappropriate materials, it will not be an efficient learning experience for their students.

Requirements to the results processing of independent work: a progress report (10-12 pages of A4 format size).

Form of control: defense.

IPW 3. Psychological and pedagogical possibilities of computer-based teaching aids

The aim is to study the issue of psychological and pedagogical aspects of the use of new ICTs.

Objectives:

1. to define positive and negative impacts of computer-based teaching aids on the development of student's personality.
2. to study possibilities of computer-based teaching aids for self-study.
3. to study possible ways of learning process implementation on the basis of combination of conventional and computer-based teaching aids.
4. Put 5 questions for E-seminar "Computer-based teaching aids".

IPW implementation plan:

1. to study the additional material ad literature on the given subject;
2. to make a report on the work done.

Additional material

The development of student's personality, individual's preparation for comfortable life in the information society:

- the development of thinking (for example, visual-effective, visual-imaginative, intuitive, creative, and theoretical thinking);
- aesthetic education (for example, through the use of computer graphics, multimedia technologies);
- development of communication skills;

- formation of decision-making skills or solutions offering in a difficult situation (for example, by means of computer games aimed at optimization of decision-making activity);

- development of experimental research skills (for example, through the implementation of computer simulation or use of computers and associated equipment);

- formation of information culture and information processing skills (for example, by means of integrated software packages, different graphics and music editing software).

Thanks to information technologies in education is implemented social order due to the computerization of modern society:

- training of computer science specialists;

- user's training by means of new information technologies;

Also are enhanced all levels of the educational process:

- improvement of learning process efficiency and quality by means of new ICTs;

- offering incentives aimed at the activation of cognitive activity (for example, due to computer visualization of information, application of game situations, management possibilities, choice of learning activity type);

- intensification of interdisciplinary relationships due to the use of up-to-date information processing aids including audiovisual aids for solving tasks of various subject fields.

New ICTs can be used as:

1) teaching aids improving teaching process, increasing its efficiency and quality;

2) the instrument of environmental knowledge and self-knowledge;

3) means of student's personality development;

4) the object of study (for example, in the course of computer science);

5) means of communication (for example, on the basis of asynchronous telecommunications) to distribute innovative educational technologies;

6) means of the automated processes of control and correction of study results, computer-based pedagogical testing and psychodiagnostics;

7) means of the automated process of experimental data processing (laboratory, demonstration) and the management of educational facilities;

8) means of implementation of intellectual leisure-time and educational games.

Requirements to the results processing of independent work: a progress report (4-5 pages of A4 format size).

Form of control: defense.

IPW 4. Use of communication technologies in education

The aim is to study the use of ICTs in education.

Objectives:

1. to review and analyze the most popular education web portals of the global network.

2. to suggest possible headings of the education web portal you would like to add to the structure of the analyzed five-six portals on the Internet.

3. to analyze any education web portal you like from the viewpoint of the effectiveness of its work and suggest the criteria system of evaluating the portal.

4. to describe the educational environment of the institution which you studied at and suggest your model of this environment based on IT.

IPW implementation plan:

1. to study the additional material ad literature on the given subject;

2. to make a report on the work done.

Additional material

ICT has become within a very short time one of the basic building blocks of modern society. Many countries now regard understanding ICTs and mastering the basic skills and concepts of ICTs as a part of the core of education, alongside reading, writing and numeracy.

ICTs in education deal with the use of ICTs within educational technology. ICTs in education can be broadly categorized in the following ways as:

- ICT as a subject (i.e., computer studies);
- ICT as a tool to support traditional subjects (i.e., computer-based learning, presentation, research);
- ICT as an administrative tool (i.e., education management information systems);
- ICT as a medium of knowledge exchange.

ICT in education means implementing of its equipment in teaching and learning process as a media. The purpose if ICTs in education is to generally make students familiar with their use and how they work.

Education web portals

Widespread use of the Internet has seen the number of education portals on the Web growing rapidly. The main task of a web portal is to unify content and services into one area easy access. Three salient characteristics of web portals are identified. They are:

- gateway to information;
- user-centered and community-based;
- multiple services.

Based on these characteristics, a web portal may be defined as a gateway to searchable and personalized information on the web, which also functions as a communication center for its target users.

Education web portals refer to portals that provide educational services to their users. Such portals consist of three main components: a community of practice, a body of knowledge, and services to maintain the body of knowledge. There are three types of education portals:

- Networking Education Portal: This portal provides users a point of access to various educational tools and facilities. It functions as a center of communication for the different types of users, thus forming a network among them.

- Organizational Education Portal: This portal is constructed for organizations whose core business is to deliver educational material. It contains background information about the organization, its philosophy and members of the staff.

- Resource-Based Education Portal: A resource-based portal provides access to various educational resources online. Generally, these types of portals contain adequate search facilities, links to other relevant organizations or institutions as well as subscription services. They usually offer three types of resources:

- Generic resources that consist of teaching and learning tools for educators and learners, as well as managers and administrators around certain topics and themes;

- Subject specific resources that are specifically suited to teachers and learner of a specific domain;

- Links to other education related resources.

A web portal can help you address several key challenges, including:

- innovative and effective instructional resources and methods not being shared among faculty members;

- uninformed and uninvolved alumni and community leaders;

- students receiving only periodic feedback on performance and progress;

- student information, such as class schedules, health records, and grade transcripts kept in different places requiring different systems to access;

- not having access to the information needed to make informed decisions.

A list of education web portals of the global network:

1) Almaty Technological University – http://atu.kz;

2) Aktobe State University named after K. Zhubanov – http://agu.kz;

3) Kazakh Leading Academy of Architecture and Civil Engineering – http://www.kazgasa.kz;

4) Kazakh Academy of Transport and Communications named after M. Tynyshpayev – www.kazatk.kz;

5) Kazakh National Agrarian University – www.kaznau.kz;

6) Al-Farabi Kazakh National University – http://www.kaznu.kz/ru;

7) Kazakh National Technical University named after K.I. Satpayev – http://www.kazntu.kz/ru;

8) Kazakh Economic University named after T. Ryskulov – http://www.kazeu.kz;

9) Kazakh-American University – http://kau.kz;

10) Suleyman Demirel University – http://www.sdu.edu.kz;

11) Turan University – http://turan.edu.kz;

12) Astana Medical University – http://www.amu.kz;

13) L.N. Gumilyov Eurasian National University – http://www.enu.kz;

14) S. Seifullin Kazakh Agrotechnical University – http://agun.kz;

15) Kazakhstan branch of Moscow State University named after M.V. Lomonosov – http://www.msu.kz;

16) Nazarbayev University – http://rus.nu.edu.kz.

Requirements to the results processing of independent work: a progress report (15-20 pages of A4 format size).

Form of control: defense.

IPW 5. Work with modules of Electronic Rectorate

The aim is to acquire skills for work with the system modules of *Electronic Rectorate*.

Objectives:

1. to review and analyze main modules of the system *Electronic Rectorate.*

IPW implementation plan:

1. to study the additional material ad literature on the given subject;

2. to make a report on the work done.

Additional material

Since 2004, in North-Kazakhstan State University named after M. Kozybaev there is an information analytical complex for an automated system to manage education process *Electronic Rectorate* providing information support and key functions for operational monitoring of educational resources and educational management.

At present, an information analytical complex for an automated system to manage education process *Electronic Rectorate* consists of 20 projects which include 260 modules and sub-modules. This interface configuration is quite popular part of university information space, and it can be seen from the fact that the given resource is used more than 2, 000 times a day.

For securing information and allocating of access rights to the complex *Electronic Rectorate* there is role-based access control to the system and in connection with it there were developed 69 roles which include 246 university employees (Rector, Vice-Rectors, Deans, Vice-Deans for Educational and Methodical work, Education Methods Specialists (full-time and part-time studies), Heads of Departments, and Learning Support Staff).

The project *Electronic Rectorate* is one of the most advanced developments in the field of education informatization and implements all major components of educational process management providing:

- effectiveness improvement of the whole learning process management (information awareness of professionals and university departments, ease of curriculum and schedule planning, teaching loading and the staff of departments, offices, laboratories and laboratory equipment, etc.);

- automated quality control of curriculum implementation (accounting and analysis of interim tests results, tests and examinations) up to a particular student;

- full support of all processes of entrants' intake.

Requirements to the results processing of independent work: to study not less than 10 main system modules of *Electronic Rectorate* and make a progress report.

Form of control: defense.

IPW 6. Develop a computer test on 10 modules of Electronic Rectorate

The aim is to acquire test tasks construction skills

Objectives:

1. to study different types of test items;
2. to construct 100 test questions on the basis of previously learned material.

IPW implementation plan:

1. to study the additional material ad literature on the given subject;
2. to make a report on the work done.

Additional material

There are three basic reasons for testing on computer. The first is to enable measurement of constructs or skills that cannot be fully or appropriately captured by paper-based tests. The second is to improve measurement by increasing the precision or efficiency of the measurement process. The third is to make test administration more convenient for examinees, test sponsors, or both.

In a perfect world, every test would be short, reliable, secure, convenient to administer, cheap to develop, and easy to maintain, and would offer immediate and detailed summative and formative scores. Unfortunately, in the real world, most of these desirable characteristics stand in direct opposition to others. The design of any test is necessarily a compromise, ideally one that properly reflects the

values of its developers, the preferences of examinees and administrators, and the needs of its score users.

The most important test properties can be organized into five categories: measurement efficiency; test security; item development requirements; design complexity, and cost.

Integrative tasks should be developed for final assessment of school-leavers and its contents should embrace system of knowledge. In educational test tasks are given according to the level of task difficulty – from easiest to most difficult. In other words, the main formal backbone feature of the test is a distinction between tasks according to the level of their difficulty.

A specific form of test tasks is different in that the test items neither questions nor tasks, but tasks given in the form of statements which are true or false, depending on the answers. Traditional questions, on the contrary, cannot be true or false, and answers to them are often so vague and verbose and appreciable costs of teacher's intellectual energy flow are required for the detection of tests' accuracy. In this sense, the traditional questions and answers are not producible and it is better not to include them in the test.

Specific content means the use of only such control material in the test which corresponds to the discipline contents; other material is not included in educational test under any pretext. For example, test of intellectual development level is the subject of psychological testing. Test contents is stored and transmitted in one of the four main tasks forms. Out of test forms neither test nor its contents exist. Theoretically reasonable contents sequencing criterion of so-called homogeneous test is the criterion of task difficulty. Extracurricular content (for example, test of intellectual development level) is not included in educational test. This is the subject of psychological measurement.

The increasing task difficulty can be compared with the barriers on the stadium running track where each following is higher than the previous. Only those who are better prepared will be able to run the race and successfully overcome all the barriers. Because of task sequencing in the test from easiest to most difficult some students already fail at the easiest first task, other students at the

following tasks. Average pupils can answer correct only half the test tasks and only the most competent pupils will be able to give the correct answer to the tasks of the highest difficulty level which are located at the end of the test. Task difficulty can be defined in two ways: a) in a speculative way, on the basis of supposed number and nature of mental operations which are required for efficient task fulfillment, and b) after empirical task testing, calculation of right answers percentage. In classical test theory only empirical indicators of difficulty have been considered. In new variants of psychological and pedagogical test theories more attention has been paid to the nature of students' mental activity in the fulfillment process of test tasks of various forms.

Task difficulty indicator is considered as an important backbone and at the same time structure-forming factor of a test. We can add one more factor – the factor of logical definiteness of test tasks. It can be formulated in the words close to the statement of H. Curry that the task is specific if it can be answered in the affirmative or negative and if there is a sufficient process for such answer search.

An answer to a pedagogical test task is a brief opinion connected by means of contents and form with task contents. Each task has correct and incorrect answers. Correctness criteria are defined by the authors of the test. Probability of a correct answer to any task depends on the ratio of student's level of knowledge and the level of task difficulty. If there are comparable scales, this probability is expressed between 0 and 1.

The evaluation of answers in terms of their correctness is rare, but if necessary, tasks are created with the answers that are right in varying degrees. Instructions for students in such cases might be such: "Circle the number (press a number key) of more correct answer!"

Knowledge, skills and ideas are checked due to testing. In terms of educational measurement is useful to introduce two key dimensions of knowledge quality – knowledge level and structure. They assess both knowledge, and lack of knowledge of all the required components of checked teaching material. For the objectification of this process, all components must be equal. And

assessment rules are equal, too. These conditions give the way for objective comparison of individual structures of knowledge and lack of knowledge.

Guidelines for the development of test tasks. The test tasks:

- cover a realistic problem of the professional and corporate work practice;
- incorporate the characteristic professional work tasks of the occupation and the corresponding training objectives, organized into tasks for novice, advanced beginner, competent performer and proficient performer;
- require not only technical competences, but also the consideration of aspects like efficiency, utility, and environmental compatibility;
- require an approach that is typical for the profession. The mastering of the task focuses on the aspects of planning and conception and is documented by appropriate forms of expression;
- need not be solved practically because the test assignment assesses professional competence development at the conceptual level and not at the level of concrete proficiency (performance), etc.

Requirements to the results processing of independent work: to construct 100 test questions of different types and make a progress report.

Form of control: defense.

4. MATERIALS FOR THE CONTROL AND ESTIMATION OF POSTGRADUATE'S EDUCATIONAL ACHIEVEMENTS

Examination Preparation Questions

1. What are main advantages and disadvantages of computer learning tools?
2. Describe up-to-date means of communication technology.
3. What are the capabilities of information and communication resources for implementation of innovative learning technologies?
4. What are the reasons of traditional educational model incompatibility with modern conditions of social development?
5. What main objectives of a new educational paradigm do you know?
6. What are the main principles of a new educational paradigm?
7. What can give a new educational paradigm to different age groups of students?
8. What is fundamental novelty of a new educational paradigm from your viewpoint?
9. What is a computer learning technology?
10. What fields of science are fundamental while considering theoretical foundations of computer learning technology?
11. What is the main objective of computer learning technologies implementation?
12. Is it always necessary to leave individual study tempo and trajectory to student's choice?
13. What subjects of educational process can be applied working in a computer interactive learning environment?
14. What is an interactive mode of learning?
15. What are multimedia technologies?
16. What role do multimedia technologies play in the development of computer learning technologies?
17. Are there limits in the use of multimedia technologies?
18. What are distance learning technologies?

19. What conditions are necessary for the implementation of distance learning technology?

20. What requirements should be completed by students in distance learning?

21. How do you understand advanced learning technologies?

22. What are the similarities and differences in distance, open and advanced learning?

23. Is there a peculiarity, incompatibility or contradictions in the use of computer and traditional learning technologies?

24. What main implementation directions of computer learning tools do you know?

25. What main didactic functions of teaching tools can you distinguish?

26. Explain advantages and disadvantages of the use of computer learning tools.

27. What new features does educational process have in computer learning environment?

28. What is an interactive mode and how it may affect the student?

29. Name the main functions of an interactive mode of computer learning tools.

30. What is the positive side of computer learning tools implementation in educational process?

31. What negative sides should be avoided while computer learning tools implementation in educational process?

32. What are the peculiarities of educational process organization using computer learning tools?

33. How does teacher's work change in the conditions of computer-based learning?

34. How are individual teaching methods implemented by means of computer learning tools?

35. What is fundamental difference between educational process organization on the basis of traditional and computer learning tools?

36. When is the use of computer teaching systems reasonable and leads to efficiency increase?

37. What modern communication means do you know? Give a brief description.

38. What is a pedagogical communication?

39. What are main features of information and communication means?

40. What didactic capabilities of modern communication means can be used in educational process?

41. What are learning peculiarities in computer-based environments in the conditions of up-to-date communication technologies use?

42. What possibilities of the Internet are significant for contemporary education?

43. How can e-mail be used for educational process organization in different education forms?

44. What is a forum? Describe the didactic potential of this interaction means.

45. What are electronic seminar objectives?

46. What are necessary main technical conditions for electronic seminar implementation?

47. What are psychological and pedagogical peculiarities of work in contemporary communication environments?

48. How can information and communication means help teachers and students?

49. Are there ethical problems of communication in digital environment?

50. How do you understand unified information and educational environment?

51. What capabilities does unified information and educational environment have for the modernization of education system?

52. What key conditions are necessary for the formation and development of region's UIEE?

53. What are main differences between open and closed models of educational environments in educational institutions?

54. What is an educational website?

55. How do you understand a portal and its difference from website?

56. What major sub-systems and operation mechanisms can ensure full operation of the portal?

57. What educational websites and portals do you know?

58. What should be taken into account while equipping rooms for videoconferencing?

59. What basic principles should be laid down for the formation and development of UIEE?

60. What can UIEE give to personalized learning and how do you imagine it?

61. What is a technological basis for the formation of UIEE?

62. Are not the principles of portal creation and functioning broken if there is information for different age groups?

BIBLIOGRAPHY

1. Балафанов Е.К., Бурибаев Б., Даулеткулов А.Б., Новые информационные технологии, Алматы: 2001,428 с.
2. Грабауров В.А., Грабауров С.В., Гулин В.Н., Лабоцкий В.В., Информационные технологии, Мн.: Соврем. Шк., 2006, 432 с.
3. Гусаков В.П., Шевчук Е.В., Редикарцева Е.М.. Модели и технологии оценки знаний методом компьютерного тестирования. - Алматы: ЛЕМ, 2008.-196с.
4. Дьяконов В., Новиков Ю., Рынков В. Компьютер для студента. – СПб., 2000.
5. Загвязинский В.И. Теория обучения: Современная интерпретация. – М., 2001.
6. Михеева Е.В., Информационные технологии в профессиональной деятельности, М.: Издательский центр «Академия», 2006., 384 с.
7. Мутанов Г.М., Шевчук Е.В., Шпак А.В. Система поддержки принятия решений по распределению аудиторного фонда вуза. – Астана: Фолиант, 2008. – 200 с.
8. Полат Е.С., Бухаркина М.Ю., Моисеева М.В., Петров А.Е. Новые педагогические и информационные технологии в системе образования: Учеб. Пособие. – М., 2001.

CONTENTS