PRE-SERVICE TEACHER TRAINING
Case of Kazakhstan

This survey is being conducted as part of the drive to implement ICT teacher training into every country in the Asian and Pacific region by 2008. Currently the 45 countries in the Asia and South Pacific region have a wide range of policies with regard to ICT in education, from those yet to fully develop a policy to those undergoing upgrades to longstanding policies. These variations in ICT take-up within education have led to relative variations in the scale of teacher training provision in the use of ICT as a teaching and learning tool. The survey will therefore make a detailed assessment and analysis of the present level of provision of ICT training specifically in pre-service teacher education throughout the region. The survey will include the use of all types of technology currently in use, ranging from computers to television and radio, and will include distance training programmes.
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I. Objective of the case studies

1. To analyze pre-service teacher training initiatives, developments, and current practice via in-depth situational analyses of six selected countries, in order to provide a range of studies to which certain classifiers may be attributed to facilitate the production of a regional overview.

2. To serve as an initial needs analysis (more in-depth assessments to follow), to learn from current national strategies and solutions to problems encountered, and to assess and plan the best path for pre-service ICT teacher training progress in each country.

II. Programme objectives

1) Goals and objectives of ICT pre-service programme
The goal of ICT pre-service program is to train teachers of informatics & computer engineering and other teachers able to use ICT in education.

2) Expected outcome and benefits of the programme
After four years of training on “Bachelor” programme, the teacher training specialization will be conducted in two directions:
- Training of informatics & computer engineering school teachers
- Training of other school teachers who are able to use ICT in teaching process
The benefits of this program are as following:
- Use of ICT by students/pupils
- Use the Internet in teaching/learning process
- use of PC by pupils
- development of simple computer programmes by learners
- use of ICT by teachers for strengthening foreign languages learning process
- Conduct of virtual laboratory works on physics, chemistry, biology and geography
- Monitoring and assessment of pupils learning achievements

3) Existence of national policy and pre-service training curriculum
The National Educational Policy is ensured by the “Law on Education” which was adopted on 7 June 1999. The Law provides the structure, content, management in education, interrelation between trainers and trainees, defines rights and responsibilities of pupils, students and teaching staff.

The implementation of the Law on education ensures by the Kazakhstan National Education Development Programme for 2005-2010, which was approved by the Decree of the President of the Republic of Kazakhstan #1459 as of 11 October 2004.

ICT introduction into the learning process has led to the increase of student ratio use per 1 PC:
General secondary school – 54 pupils per 1 computer
Vocational School – 31
College – 25
University – 16

Increased access to internet:
- General secondary schools – 44%
- Vocational schools – 39%
- Colleges – 51%
- Universities – 100%

Pre-service teacher training is organized/conducted in 7 pedagogical institutes and in 1 pedagogical university.

177 Higher Educational Establishments provide pre-service training courses for selected pedagogical professions. There are 8260 general secondary schools with enrolment 3,026,200 students. There are 270,000 teachers of general secondary schools, including 4,542 informatics teachers. 72% of general secondary schools teachers have higher education diploma, 9.4% have incomplete higher education; 15.3% - secondary vocational diploma; and 3.4% – general secondary education only.

State standards on the subject of informatics have been introduced for all education levels of education. Standards have been approved by the Ministry of Education and Science of the Republic of Kazakhstan.

There is compulsory and non-compulsory curriculum, compulsory curriculum provides state standards. Within non-compulsory curriculum all educational institutions have right to increase additional hours to selected subjects, including informatics. Moreover, standards include glossary of educational terminology (Annex 1).

III. Programme development and methodology

1) Differences in ICT training for primary & secondary teachers

There are no differences in pre-service teacher training on ICT in higher educational establishments for primary school teachers and secondary school teachers. Training is conducted according to the basic state standards. The level of ICT use at the lessons by teachers depends on their individual computer skills.

Pre-service teacher training for teachers of informatics, physics and mathematics includes extended and detailed volume of subject on informatics as per state standards.

2) Differences in ICT training for informatics teachers

In accordance with the pre-service teacher training standards for non-informatics pedagogical staff a subject “Informatics” consists of 135 academic hours. Training course of informatics is conducted in the first semester and is concluded by an examination.
There is a difference in pre-service teacher training of “Informatics” for future teachers on physics and mathematics. In the compulsory curriculum there is a subject “Programming Languages” and it has 145 academic hours. The course is conducted in the 3d semester and is concluded by an examination.

The volume of the ICT content of pre-service teacher training for informatics teachers is increased and extended because they are supposed to teach Informatics at schools, colleges and vocational. This is reflected in the Annex 3 where one can find that the general subjects are supported by main basic subjects, and informatics has 90 academic hours. This course is concluded by an examination.

3) Level of educational ICT usage in training programme

Training on ICT aims at getting generalized knowledge on information systems, their development and functioning pattern.

However, ICT training is not aimed at teaching other non-informatics subjects. Actually in higher education institutions ICT training for non-informatics teachers is presented as a methodological tool and means. As a result, knowledge of ICT does not positively influence on teaching process. The lack of learning software in higher education institutions adversely affects the teaching process of non-informatics subjects.

4) Usage of Training Methods

In the teacher training process of informatics and non-informatics teachers different methods and techniques are used – academic lectures, practical trainings and seminars, researches. The only difference in training for informatics and non-informatics teachers is a content load/volume and number of academic hours.

5) Usage of distance learning systems

The development of distance education in Kazakhstan is somehow hampered by poor technical equipment supplying. Out of 8 higher educational institutions (HEI) that were established in 2003, 5 of HEIs do not provide the distance education. Out of existing 8260 general secondary schools only 717 schools are connected to the distance education network. The network operates through satellite learning television channel. The TV learning programmes are devoted to certain topics and sections of the learning subjects. There is no any distance learning programme containing one full learning subject.

The lack of software and content for the distance education programmes is an obstacle for distance education development. The distance education is organised and provided better for teaching technical subjects rather than pedagogical specialties.

6) Duration of programme and courses for informatics teachers

The further ICT teaching includes the following subjects within the basic general cycle:

- computer practical training (practicum) – 270 hours
- theoretical informatics – 90 hours
- programming languages – 180 hours
- architecture of a computer – 45 hours,
  and profiling disciplines:
- pedagogical informatics – 90 hours
• data base and information systems – 90 hours  
• technologies and methodologies of teaching informatics – 180 hours  
• studying operations – 90 hours  
• artificial intelligence – 90 hours.

All courses are completed by examinations and tests.

Pre-service teacher training of informatics teachers lasts for 4 years and all subjects of this profile have been conducting from 1st to 7th semester. The training ends/concludes with practical training:
• pedagogical – 45 hours (in the 2nd semester),
• computing – 45 hours,
• pedagogical – 45 hours (6th semester)
• technological – 45 hours
• professional – 180 hours
• pre-final – 90 hours.

The four-year training ends up either with a state examination in “Informatics” or defending a diploma thesis. The main content of the standard curriculum of the subject “Informatics” is in Annex 3.

7) Qualification levels of teacher trainers

Pedagogical staff of higher educational institutions is not homogeneous. The main reason is a short period of time since the “Informatics” was introduced into the university curriculum (in 1994). Scientists and different qualified specialists with degrees in physics and mathematics have been invited for teaching “Informatics”. About 34% of teachers have a scientific degree. This relates to the existence of the special committee on defending and certificating dissertations in the ICT related issues in Kazakhstan. This committee is located at the Almaty National Pedagogical University named after Abai.

Below there is a statistical table on approved defended dissertations and researches:

<table>
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<th>Main topics of dissertations and researches</th>
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<tr>
<td>Issues of teaching various subjects using ICT</td>
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<tr>
<td>Informatization in assessing quality of learning achievements</td>
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</table>

Topics of defended dissertations are presented in the Annex 4. The majority of dissertations are devoted to the learning informatics at secondary schools. Out of 13 presented dissertations only three are devoted to the information technology issues.
The current situation shows low use of ICT by teachers in teaching process at universities. Less than 10% of pedagogical staff at universities is able to use multimedia equipment and work with computers during lessons and lectures. It is obvious due to the fact that more than 80% of pedagogical staff at universities have achieved age of 50-55 years old. Another fact that leads to the low use of ICT is lack of or insufficient number of modern equipment.

8) Key programme elements

All pedagogical higher educational institutions have chairs on informatics and computer engineering actually at each faculty. Institutes have departments for programming and computer equipment service centres. The key elements of the programme include course:

- General Education Course (GEC);
- Basic Course (BC);
- Profile Course (PC);

**General Education Course**

The GEC has the subjects “Informatics” with 2 credits (or 35 hours). The objective of the course is to familiarize with basic informatics, programming language, processing, keeping and saving data, PC and software structure. The course is a sequel of informatics subject at the secondary school level.

**Basic Course**

Theoretical subjects in the BC are:

«Theoretical information basics» has 2 credits (90 hours). The BC introduces to information basics, information processes, continuous and discontinuous information delivery, information volume and units, as well as to algorithm complexity and its main characteristics, algorithm executor, methods of algorithm submission, main methods of algorithm development, rough combined algorithms, evaluation algorithm accuracy.

«Programming languages» has 4 credits (180 hours). The main objective is to familiarize with the programming languages, imperative, functional, logical, management streaming and structure of data, programming technology and programming paradigms; structural module, objective (impartial) oriented, programming languages syntax and semantic formalization.

«PC architecture» has 1 credit (45 hours). The main objective is to study computer techniques development history, computer characteristics, and modern development trends of computers. Students gain knowledge on channel and bas-bar systems engineering, microprocessor and PC memory, interruption systems, registers and memory access methods, PC external devices management principles.

**Profile Course**

Subjects of PS course:

«Pedagogical informatics» has 2 credits (90 hours). The main objective is to teach students to use ICT in the learning process. Didactical basis for creation and use of ICT tools. Pedagogical ergonomic requirements for creation and use of electronic learning tools, and their quality assessment. Information and methodological provision of the learning process.
and educational institution management. The requirements for informatics class equipment and recommendations on its work.

«Data bases and information systems» has 2 credits (90 hours). The objective is to learn models of information data, creation consistency of information model, types of data models, conceptual and logical model of the subject, defining the correlation between data base elements. Physical description of data, data base administration. Object oriented data base programming. Introduction to SQU. Use of SQU for table derived data, creation of SQU requests. SQU server. Use the “client – server” technology.

«Operation research» has 2 credits (90 hours). The main objective is to learn linear programming, simplex method, dual problems, and problems of non-linear programming. Lagrange multiplier Method. Dynamical programming basics. Basics to the mass service theory.

9) Programme developed locally or internationally

Due to a highest level of centralization in the tertiary education in Kazakhstan, the Ministry of Education and Science entrusts to a selected university to develop a typical programme and then having a copyright the university sells this programme to other universities. The programme developers identifies main thematic topics and content but each university defines the hour load in accordance with national educational standards. Thus, each university has the right to develop and adopt its own ICT programme/course according to their professional needs and requirements.

IV. Programme participants

1) Profile of participants

Enrolment in 8 pedagogical HEI is about 40000 students. In other universities at pedagogical departments the enrolment is more than 100,000 students. Majority of the students are from urban areas and women prevail among students in pedagogical high schools.

2) Pre entry qualification requirements

The university entrants must have a school-leaving certificate (general school, vocational school or collage with the general secondary school certificate). Besides, they have to pass a national testing on compulsory subjects such as language, history of Kazakhstan, mathematics, and 4th subject selected by the high school. The entrant becomes a student after getting minimum 40 points of possible 120. The collage graduates can enter 2nd or 3rd year of the related specialty.

3) Certification on graduating from high school

On graduating higher education institution new specialists gain their diplomas. They become bachelors and are qualified as teachers on informatics. Also the university graduates can be granted two qualifications such as a teacher of mathematics and informatics, and a teacher of physics and informatics. In that case training period increases from 4 to 5 years.
4) Enhancements of salary and future prospects

Certificated specialists are contracted to work at secondary education institutions. The teaching load in a general secondary school is 18 hours per week. Initial teacher salary is 14,200 Kazakh tenge (1 USD= 135 tenge, as of July 2005). The salary increases actually depends on years of experience and it is now approx. 20,908 Kazakh tenge after 20 years of experience. Due to the shortage of teachers the working teachers can increase their work load in urban area at 1,5 rate, and in rural area double rate. Supplementary salary is paid to teachers for chairmanship at school, checking students’ copy-books, tutorials and other extra work.

As the ICT specialists are highly demanded in the labour-market many of them after graduation of the university try to find a better paid job and usually it is not related to the pedagogical activity.

5) Programme feedback from participants

There is no such practice or system to provide feedbacks on content of training courses received. But feedback is integrated in the in-service teacher training courses. Every five years the teaching staff passes professional attestation and certification. It means that within 5 years a teacher should have in-service teacher training courses at local or national levels. Or they should have additional short-term training courses.

6) Compulsory/voluntary nature of programme

All programmes and courses offered by universities and institutes have compulsory and selective, non-compulsory programme components.

In the general education course the compulsory components contain 20 credits (900 hours), selective components contain 12 credits (540 hours). In the basic subject course the compulsory components contain 34 credits (2880 hours), selective components contain 30 credits (1350 hours). In the profile course the compulsory components contain 22 credits (990 hours). Every university independently selects non-compulsory components.

V. Programme resources

1) Level of ICT resource provision

All pedagogical universities and institutes, including pre-service teacher training institutions are equipped with computer classes. The computer classes equipped with standard set comprising of 20-25 PCs, printers, modems and software. There are differences in the equipment provision, informatics teacher training classrooms equipped with more advanced Pentium PCs and non-informatics teacher classrooms have more ordinary PCs. All pedagogical universities and institutes are equipped with language laboratories to teach foreign languages.

Equipment upgrading depends on each university budget.
2) **ICT classrooms**

Usually ICT classrooms are equipped with standard plan 1 PC for teacher and from 14 to 30 PCs for students. The classrooms are equipped and regulated according to the standards (for 1 student per 2 square meters). All higher pre-service teacher training institutions have all necessary equipment according to students’ needs.

3) **Other hardware**

Alongside with the computer equipment the higher education institutions have additional hardware such as digital video and still cameras, and multimedia LCD projectors. Some high schools have television studio for the learning purposes. Access to additional hardware for students and for teachers is limited because of insufficient number of such equipment.

4) **Internet access**

In general, all universities and institutes have access to Internet. In Kazakhstan “Nursat” is the largest company providing Internet services. However, there are many other companies providing chargeable Internet access, especially in provinces.

At the same time, Internet is not available for most of students and teachers due to its high cost. The limited number of users can constantly use Internet on their own expenses. In the learning process Internet is used only when students study “Internet” training course. In order to provide wide access to study Internet, immitation programmes and software usually are used. Universities use Internet mostly for administrative purposes. Grant programmes provided by international organizations and other sponsors can solve the problem of access to Internet only partially, but those grant programmes cannot provide access to Internet for all students and to respond to all students’ needs.

5) **Software**

All PCs set up in the higher education institutions have Windows operation system. Computers usually are purchased with already installed operation system in the selling PCs. Depending on the training level such software like Turbo Pascal, Delphi, Acrobat, Pagemaker, Photoshop etc. are installed in the PCs. PC are protected by antivirus programmes and the most popular antivirus programme is the Kaspersky.

VI. **Programme providers**

1) **Programme provided by government, private donor, NGO, or other.**

The Ministry of Education and Science has identified the leading higher education institutions for development of standards and programmes for certain specialities. For example, the Kazakh National Pedagogical University named after Abay (located in Almaty) is a pedagogical standard and programme developer. The standards and programmes for training of informatics teachers are developed by specialists from the Kazakh National Technical University named after K. Satbayev (located in Almaty). This work was funded by the government. In the selective non-compulsory component of the curriculum, the
software for teaching the “Informatics” subject is developed by each university according to their needs.

But there is a problem in sufficient government financing for development of programmes. Therefore most of universities and institutes have to develop the software and programmes themselves. However, the quality of the developed programmes and software usually do not meet requirements. In that cases the higher education institutions purchase the software from the leading high schools or from specialized companies.

As the software and programme development is an extra load for the university staff and the university defines itself the cost for the work. Sometimes, the development of programmes and software is the part of methodological work of teachers and in that case it might not be paid.

2) Level of government support for the programme
In 1998 the Ministry of Education and Science established a Republican Centre for Informatization in Education (RCIE). This Centre has its own branches in each province (total 14 provinces). Its activities on software development focus on secondary and primary schools, and technical vocational education.

VII. Programme Quality

1) Accreditation systems in use
Currently there is no a special accreditation system for the software in Kazakhstan. That is why the software passes accreditation according to the Government Resolution #1290 as of 2.09.1999. The Resolution regulates “development order, approval and validity of the state compulsory standards”. The Ministry of Education and Science identified evaluation and approval procedures and it is mentioned in the Ministerial document # 400 “Direction on competition for state compulsory higher education standards” (dated of 8 May 2004).

2) Level of applicable national standards
Currently a National Centre of the State Educational Standards conducts an external assessment on use of national standards. It evaluates the standards development and implementation based on final and intermediate students’ knowledge control.

It is supposed that a newly established National Centre for Education Quality Assessment (2005) will monitor the entire education system and combine all information resources into unified monitoring system.

VIII. Programme Funding

1) Running cost of programme and individual modules
The bachelor of the specialty «050111- informatics» must attend the four-years training course. During the training a student must master no less than 128 credits (5760 hours) of theoretical course, and no less than 10 credits (450 hours) of practical course. At the same
time the student must master 78 credits (3510 hours) of compulsory component and 50 credits (2250 hours) of selective non-compulsory component.

Preparation and defense of the diploma takes 4 credits (180 hours).

During one academic period (semester) a student must master 12-18 credits.

2) Funding responsibilities

All pedagogical institutes and universities are state educational establishments. Their funding is carried out through three sources: state grants, state credits and payment from students. Annual payments vary depending on specialty from 140 to 200 thousand Kazakh tenge (1 USD= 135 tenge). All funds received by the high schools are spent mostly for teachers salary, public utilities, equipment and furniture purchase etc.

3) Permanency and sustainability of programme

The above described programmes have been functioning for the last 15 years. There were changes in accordance with adoption of new state educational documents. The overall picture shows that the teaching staff in general is stable. There are some changes in composition of the teaching staff due to the post-graduate training but usually after getting a scientific degree teachers come back to their workplaces.

IX. Programme Needs Analysis

1) Future ICT in Education and ICT in pre-service training plans and opportunities

Using ICT in education widens and increases opportunities. At the moment the informatics pre-service teacher training has actually achieved the international training level both at theoretical and practical levels. However, use of ICT for pre-service teacher training for non-informatics teachers does not focus on teaching other school subjects. As a result future teachers, for example, on chemistry, biology, history and languages do not have ICT skills and do not use ICT in the teaching process as well as in monitoring of learning achievements.

2) Results of any prior impact study

According to the Ministry of Education and Science statistics there are 270 thousand teachers, 4,542 out of them are informatics teachers. 80% of informatics teachers are women. The male flow-out to non-education fields of activities is due to higher fees and salaries. Previously, before 1990 higher education institutions did not provide trainings for informatics teachers. The Informatics subject was an additional (second) specialty for teachers of physics and mathematics.

Within the Asian Development Bank loan project of 1998-2000 on education system improvement all secondary school teachers attended upgrading courses. Such trainings were a follow up to the approval of the Education State programme on computerization of
secondary education. At that time the average age of informatics teachers was 40-45 years. Today the average age of informatics teachers is 25-35 years and they have bachelor or master degree.

X. Critical Analysis

1) **Strengths, innovations, local inventions and solutions**

Currently it has been developed a two-level tertiary education training standards – bachelor degree (de bachelier), magistracy (magistrature).

Within the framework of educational standards there have been developed basic training programmes. A content of these documents meet international requirements and consider local university peculiarities, national development requirements an dindividuals’ needs.

Tertiary education possesses qualified specialists who are able to develop modern multimedia programme tools and software. The state is committed and solves the organizational and infrastructural issues for sustainable functioning of universities, especially with regard to stable provision of heating, telephone lines, electricity and etc.

2) **Weaknesses**

One of the weak points in use of information communication technologies in pre-service teacher training is the lack of central coordination unit responsible for the ICT compulsory content development.

Future teachers are trained only as simple computer users. Current training programmes do not include basic technologies in using multimedia equipment in teaching history, languages, chemistry, physics and etc. This is a most constrained factor in using information communication technologies in teaching school disciplines.

The current pre-service teacher training curriculum does not consider “Informatics” as a cross cutting subject which needs to be linked with other school disciplines as well. Education specialist who teaches Informatics has to disseminate computer knowledge and computer skills to other subjects and disciplines as well.

Development of software requires significant funding which is unrealistic for universities to get from centralized educational resources at present. A multimedia educational programmes market provides only one time software and programmes that do not meet requirements and education standards.

High cost and expensive ICT equipment make impossible its wide-spread utilization in teaching process.

The majority of university teaching staff has pre-pension age (50 - 55 years) and that makes inefficient to provide them with ICT in-service training and refreshing or upgrading courses on the use of multimedia equipment in the teaching process. Recruiting of extra technical staff will significantly increase a tuition fee.
Due to the rapid development of modern PCs and equipment, educational organizations cannot afford modernization of equipment and that affects the quality of education. Outdated computers do not meet the modern software requirements.

3) Opportunities

Opportunities of In-service teacher training and re-training of teaching staff on use of ICT in education through the established network of In-Service Teacher Training Institutes.

One of the proposed solutions is to organise training course on ICT use for available teaching staff at the age of 40-45 years old. Also it would be helpful to integrate a training course on the use of multimedia equipment into a pre-service teacher training curriculum for a bachelor and magistracy programme. This measure will also improve teaching techniques.

Another possible solution is to provide universities and institutes with modern multimedia equipment for improvement of teaching process.

Organise in-service teacher training courses on use of ICT and multimedia equipment in the teaching process.

4) Threats

Frequent shift of young teaching staff: After getting the refreshing and upgrading training courses teachers can leave the high school for better paid workplaces.

There is a threat to use modern equipment for other non-teaching purposes due to the weak management and administrative control., indirect (sometimes commercial) use of ICT equipment to obtain extra-budgetary funds.

XI. Contact information

Contact details of key institutions and players in the country

<table>
<thead>
<tr>
<th>Name/Title</th>
<th>Address</th>
</tr>
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<tbody>
<tr>
<td>Ministry of Education and Science of RK - Mr. Zhumazhan Zhukenov – Deputy Director of the Department for Secondary Education, Ministry of Education and Science, 010000, Astana, Republic avenue 21,</td>
<td>Ministry of Education and Science of the Republic of Kazakhstan 010000, Astana 21 Republic Avenue tel. 7-3172 33-30-15; e-mail: <a href="mailto:dsoo@mail.ru">dsoo@mail.ru</a></td>
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<td>Mr. Esen Bidaibekov – professor on informatics</td>
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<td>Ms. Aida Dossaeva – Education programme manager</td>
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<td>IREX (Council for International Research and Exchange</td>
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**XII. Resources:**

5. State compulsory standards of higher vocational education – 2004 г:
   - 050111 – informatics;
   - 050103 – pedagogic and psychology;
   - 050119 – foreign language;
   - 050109 – mathematics
XIII. Annexes

Annex 1.

Definitions and Abbreviations used in the State Educational Standards of the Republic of Kazakhstan

**Academic hour:** an equivalent of 1 contact hour (50 minutes) of lectures, practical seminars, or 1,5 contact hours (75 minutes) of studio training, or 2 contact hours (100 minutes) of laboratory studies and physical training, or 5 contact hours (250 minutes) of any kind of practices.

**Bachelor degree:** a primary level of the higher basic education which lasts during four years.

**De bachelier:** an academic degree and qualification which is given graduates who has completed successfully a syllabus of obligatory courses and tertiary education components.

**Credit:** Unified measurement of time and work load in studying for student/teacher. 1 credit equal to 1 academic hour of auditorium works/lectures per week during the whole academic period, which is followed by 2 hours of an independent work/study.

**Credit studying system:** an educational system which aims for increasing a level of self and creative studying based on an individual choice of educational trajectory and knowledge in forms of credits.

**Speciality:** area of professional activity.

**Specialist:** a graduator who gained a higher education degree, and who is able to work effectively in certain areas of professional activities.

**Specialization:** a concrete area of professional activities within the framework of a certain speciality.

**Typical curriculum:** the main document approved by the Central Executive Body of the Republic of Kazakhstan in education which set up obligatory training in a form of the registration list of studying disciplines, which are united in studying cycles with appropriate units of credit.

**Note:**
1. A typical curriculum is developed in accordance with the state educational standards.
2. A typical curriculum consists of a speciality, a getting qualification and a study duration, and additional data (a number of state obligatory examinations, types of practical works, etc.).

**3.10 Lesson Plan:** a document developed by an individual university in accordance with the national curriculum with supplements and clarifications for a concrete professional specialization, stages/phases of studying processes. A lesson plan consists of a number of studying disciplines, grouped by certain components and related to the obligatory and non-obligatory disciplines.
3.11 Individual lesson plan: a document individually prepared by a student in each studying year in accordance with the lesson plan, includes number of studying disciplines selected by the students and a number of required credits. The individual lesson plan reflects an educational trajectory of a certain concrete student.

3.12 Compulsory education: a list of obligatory studying disciplines and corresponding appropriate minimum of required credit units, determined by the state educational standards.

3.13 Elective courses (non-compulsory education): a list of studying disciplines and corresponding appropriate minimum of required credit units, suggested by universities and selected individually by students.

3.14 Syllabus: an outline of a studying discipline which includes a description of its content, its goals and objectives, topics and duration of each lecture, tasks and time for consultations, teacher requirements, merit criteria, timetable for an intermediate monitoring, and a list of recommended literature.

3.15 Tutor: a teacher who is conducting and leading lectures and other studying works and who is responsible for academic consultations for a certain discipline.

3.16 Advisor – a teacher of a leading university department who is functioning as an academic mentor, helping in selection and determination of the student individual educational trajectory, and in developing of student individual lesson plans.

The current educational standards use the following abbreviations:

- GED – general educational disciplines;
- BD – basic disciplines;
- PD – profiling disciplines;
- TAW – teacher advisory work (with students) - mentoring;
- SSS – student self study
Annex 2

A typical “Informatics” curriculum for specializations “Education and Psychology”
(for non-informatics),
3 credits (135 hours)

**Discipline Goals**
A goal for “Informatics” studying is to gain general knowledge about any information systems, revealing of common regularity in its development and functioning.

**Discipline Objectives:**
- Getting understanding about a modern scientific picture of the world;
- Forming definitions regarding researches and studying of information processes and its nature;
- Gathering knowledge about a modern design and development of information equipment including hard- and soft- wares, different technologies and techniques for data processing, and latest researches of information processes;
- Forming basic skills in problem solving and engineering for an efficient utilization of computers and information technologies in all spheres of people life;
- Developing general scientific skills and culture in utilization of information;
- Professional development.

**Expected results after studying:**
Students will:
- Know basic definitions in informatics;
- Have understanding about general techniques for data collection, transformation, processing and saving for project design and development, and about main characteristics of technical programming tools and devices for forming of information processes;
- Know programme languages, data base, programme support and programme technologies;
- Know main principles of information system development and its technologies in concrete areas in order to make recommendations regarding its life cycle: for project design and development of systems, its production and functioning;
- Know a role of Informatics in the modern world;
- Know how to use a computer graphics, geometric modelling and how to work with geometric objectives (2- and 3- metric mapping);
- Know how to create communication models in different areas of human life;
- Know how to use information technologies in education.

For most successful studying of the **Informatics as a discipline** it is necessary to possess basic knowledge of Informatics definitions given during a school course.

**Discipline Content. Lectures**

Arithmetic ground of Informatics. Forms of information presentation. Computing systems. Actions in different computing systems.

Logical ground of informatics. Algebra of logic. Logical connections, meaning and expression. Logical operations. Logical schemes and logical machines.


Conditions and tendencies in development of programming. Main definitions and terminology of programming. Main specifications of programming, packages of applied programming and instruments. Programming technologies.

Operational Systems. Role of the operational system in using PC. Functions of the operational systems. Classification of operational systems. Univalent and multiplace operational systems. Mono and poly using operational systems.


Operational system. MS-DOS. Main characteristics and capacities. Working technologies in MS-DOS. Norton Commander – working instruments.


Text processor. Basic capacity. Working with texts, publication systems.


Graphic editing. Classification of editors. Tridimensional graphic system. Presentation tools.

Laboratory works

**Transferring numbers and figures from one system to another.** Binary computing system. Binary arithmetic. Computing logical expressions.

**Methods of algorithms descriptions.** Verbal, graphical, and table. Step by step implementation of algorithms.


**Operational system - MS-DOS.** Loading OS MS DOS. Working with catalogues: opening, renaming, deleting, copying, moving. Work with files. Norton Commander – working with information window panel. Working with catalogues and files.

**Programs-Achives:** WinRAR, WinZIP. Antivirus programming tools: AVP, Norton Antivirus, DrWeb.

**Text processor Microsoft Word.** Main objectives. Copying, moving and deleting texts. Formatting, work with windows. Tables. Inserting pictures. Objects in WordART


**Internet.** Electronic mail. Web-page in Microsoft Front Page.
Annex  3

Typical curriculum for “Informatics” Duration – 4 years
Academic degree: bachelor degree in informatics

<table>
<thead>
<tr>
<th>Disciplines</th>
<th>Credits</th>
<th>Hours</th>
<th>Semester</th>
<th>Control</th>
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<tr>
<td><strong>General Course</strong></td>
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<td>Kazakh/Russian languages</td>
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<td>135</td>
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<td>Ecology</td>
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<td>History of Kazakhstan</td>
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<td>Foreign languages</td>
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<td>360</td>
<td>1-4</td>
<td>Exam</td>
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<td>Informatics</td>
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<td>135</td>
<td>2</td>
<td>Exam</td>
</tr>
<tr>
<td>Philosophy</td>
<td>3</td>
<td>135</td>
<td>2</td>
<td>Exam</td>
</tr>
<tr>
<td>Age Physiology and Hygiene</td>
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<td>45</td>
<td>2</td>
<td>Exam</td>
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<tr>
<td>Sport and Physical Education</td>
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<td><strong>Basic course</strong></td>
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<td>Psychology</td>
<td>2</td>
<td>90</td>
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<td>Elemental Mathematics</td>
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<td>Mathematics Analysis</td>
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<td>Theoretical Informatics</td>
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<td>1</td>
<td>Exam</td>
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<td>Algebra and Geometry</td>
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<td>135</td>
<td>3</td>
<td>Exam</td>
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<tr>
<td>Programming language</td>
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<td>2-3</td>
<td>Exam</td>
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<td>Discrete/ Digital Mathematics</td>
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<td>Exam</td>
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<td>Computer Architecture</td>
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<td>4</td>
<td>Exam</td>
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<tr>
<td>Mathematics Logic</td>
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<td>4</td>
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<td>1350</td>
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Annex 4

A Dissertation Council of the National Pedagogical University named after Abai approved the following dissertations during 2002-2005

Dissertation Research on Information Technologies in Education
2002-2005

<table>
<thead>
<tr>
<th>No</th>
<th>Dissertation Topics</th>
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<tr>
<td>1.</td>
<td>Methods of mathematics modelling and computing experiment in course of Informatics</td>
</tr>
<tr>
<td>2.</td>
<td>Technological design of learning process in course of Informatics for a new type of schools</td>
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<tr>
<td>3.</td>
<td>Improving of methodological techniques in computer simulation and modelling within the Informatics course at secondary schools (in Kazakh language)</td>
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<tr>
<td>4.</td>
<td>Improving student self studying techniques within a course of Informatics (in Kazakh language)</td>
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<tr>
<td>5.</td>
<td>Different methods in teaching a “Data base and its applications” course in high schools with a humanitarian orientation</td>
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<tr>
<td>6.</td>
<td>Methodological ground for using network technologies in a distance training course of Informatics</td>
</tr>
<tr>
<td>7.</td>
<td>Methodological training of university students on how to use information tools in primary schools</td>
</tr>
<tr>
<td>8.</td>
<td>Methods of studying techniques of information presentation within Informatics course in medical universities.</td>
</tr>
<tr>
<td>9.</td>
<td>Informatics studying system development on base of the intranet technologies.</td>
</tr>
<tr>
<td>10.</td>
<td>Studying methods of work with information and telecommunication systems (based on a sample of Kazakh Internet segments).</td>
</tr>
<tr>
<td>11.</td>
<td>Methods monitoring learning achievements within Informatics course.</td>
</tr>
<tr>
<td>13.</td>
<td>Methods of studying Informatics elements based on cross-subject lings at Primary schools.</td>
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