PRE-SERVICE TEACHER TRAINING  
Case of Mongolia

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 prepare teachers of dual professions and officers with broad knowledge and skills of modern information technology developments and other branches of science and technology.

2) **Expected outcome and benefits of the programme**

After four years of training, the teachers are expected to be able to teach informatics and mathematics subjects at the secondary schools.

The benefits of this program are as following:

- Understanding of algorithms
- Computer basics: hardware, software, operating systems: Windows and MS-DOS
- Application programs – Microsoft Office package suite: Word, Excel, Power Point, Internet Explorer and Pagemaker
- Programming languages: Pascal; Visual, C, C++, Visual FoxPro, C
- Solving informatics’ problems;
- Understanding about database systems, structure and management, working with SQL server
- Understanding about object-oriented programming
- Understanding about web page programming, web design, etc.
- Basics of computer English language

3) **Existence of national policy and pre-service training curriculum for a percentage of teachers or all teachers?**

The most recent law on Education was adopted on May 3, 2002. It provides general guidance on general principal, structure, content, management and organization of education sector, defines rights, duties and responsibilities of those involved in the education sector and coordinate the relationship and coordinate relationships related to civil rights for education. ^2

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There are standards on the curriculum of informatics subjects at the primary and secondary schools, which is used as a guideline for providing pre-service training for teachers. The standards have recommendation, which outlines ways of applying standards to teach informatics subjects at the primary and secondary schools. Moreover, there is an informatics education standards, which has been developed by directive from Ministry of Education, Culture and Science (MECS) and with support from Second Education Development Program of ADB and MECS. It has five major components: standard directives; standard vision; content standard, evaluation standard and methodology development. This standard documents are main documents used at the MSUE to provide training for teachers of informatics, informatics-mathematics and computer-English teachers.

III. Programme development and methodology

1) Differences in ICT training for primary & secondary teachers

There are differences for ICT training for primary and secondary teachers. Considering that the informatics’ subject is taught only for grades 8-10, the content of the ICT training mostly developed for secondary teachers. There are no ICT trainings for primary teachers. According to Survey conducted within framework of ICT consultancy services, the teachers who teach at the primary levels do use computers preparing for their classes. Surprisingly, the teachers of the primary levels use computers more than other subject teachers – 15% of all primary teachers participating in the survey indicated that they use computers to prepare for their classes.

As for ICT training for secondary teachers, it is different for informatics and non-informatics subjects. The ICT training for informatics subjects’ teachers consists of 32 credit hours program and it is conducted mainly at the School of Computers and Information Technology of Mongolian State University of Education. The training for non-informatics subject teachers is limited to providing basic computer knowledge and skills of working with computers.

2) Differences in ICT training for informatics & non-informatics teachers.

Most of the training curriculum offered at the Computer and Information Technology school of MSUE is developed for teachers of the informatics’ subjects’ teachers. The ICT training for informatics subject teachers differs from training for non-informatics teachers as following:

- The training for informatics subject teachers more focused on providing skills to understand algorithms, to use programming languages and developing software applications as per existing standards of informatics’ subject
- The training for informatics subject teachers is combined with training for mathematics’ subject teachers, thus, the teachers are expected to have more advanced skills and knowledge of logics, maths, etc.
- The training has few but limited components related to delivering training for teaching ICT to students, the most of the training courses are designed to equip teachers with

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3 Second Education Development Program, Report of survey conducted within information and communications technology consulting services, March 2005, p. 93
knowledge of using ICT, rather teaching them with skills on how to deliver ICT training for students. 
- Since there are limited number of equipment, such as digital camera, LCD, scanner, printer and others, there are no courses offered to potential teachers to use those equipment in their teaching practices.

The training for non-informatics subject teachers
- Focused mostly on providing basic skills on using computers, applications and software programs.
- There is a training on how to use computers to teach their subjects to students
- There is limited number of applications to assist teachers to teach their subjects, but even there are some applications, but not many of them are used in training
- Although, there are opportunities to use printers and scanners, but there are limited, almost no courses offered on how to use LCD in classes, digital camera or other tools.
- For teachers of non-informatics subjects, there are no manuals and guidelines on how to use certain software and applications for specific subjects or topics of their subjects, thus there are limited number of courses on this.

3) Level of educational ICT usage in training programme
The curriculum of School of Computer and Information Technology provides training on using specific ICT tools in training program. However, there are no indications, that the educational ICT is used in the training programs, despite the fact that the computer and software development companies have developed different CDs, programs and software applications to facilitate learning process. For example, the English language CD has been developed by the Speaker group and according to English language curriculum standard, but so far it was not used in the training program at the MSUE.

4) Methods used in training
The training program in most cases delivered in the forms of lectures and seminars, thus reflecting the traditional teacher-centered approach used in Mongolian education system. The new constructivist methods are starting to be introduced in the education system, but limited to the separate courses on methods, not combined with the ICT training. There are participatory approaches are used, such as group discussions, working in pairs, corner methods, etc. But these approaches are mostly used in separate methodology classes, not connected with ICT trainings.

5) Usage of distance learning systems
Currently, there are no facilities right now to provide pre-service training for teachers. The teleconferencing center has been established at the School of Communications and Information Technology of Mongolian University of Science and Technology in 2002 to provide facility for in-service training for teachers. Since its establishment, the in-service trainings for teachers of specific subjects for 600 hours were organized and over 400-500 teachers from soums schools were participated in those trainings.

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4 Soum – small administrative unit of Mongolia. Usually, it has around 500-600 people at the soum center with population of around 2300-3000 people. There is one secondary school in soum center (sometimes upper secondary and sometimes 8th grade schools.)
6) Duration of programme and courses

The Computer and Information Technology school of MSUE offers bachelor degree, Master’s and Doctorate programs. The Bachelor degrees are offered for informatics subject teachers, double degrees of informatics-mathematics subjects’ teachers, double degree of informatics-English language subject teachers. The students are required to fulfill 36-credit hour courses requirements. The Bachelor’s degree program consists of the following courses:
- Computer basics
- Object-oriented programming
- Programming language C++
- Structure of databases
- Database management system
- Application programs
- Theory of Operating systems
- Programming language Turbo Pascal 7.0

The Master’s programs offered for 2 years with total of 24 credit-hours and thesis. Since its establishment, over 25 students graduated from Master’s program. Currently, for years 2004-2005 school years, it had admission of 14-15 new student’s at Master’s degree program. The MSUE is planning to introduce Doctorate program for 2005/2006 school years and preparations are underway for this program. There are 5 doctorate students currently at the Computer and Information Technology School of MSUE, which were admitted from year 2003.

7) Number and qualification levels of teacher trainers

The Mongolian State University of Education (MSUE) as the main institution, which provides pre-service training of teachers has been established in 1951 with 4 departments, 8 teachers and 212 students. Over 50 years of preparing teachers for secondary schools in Mongolia, it has prepared over 50,000 teachers in 40 specialties. Currently it has over 450 professors and teachers, around 500 staff, 6000 students and over 500 students studying at Master’s and Doctorate degrees.

The Computer and Information Technology of Mongolian State University of Education as the main institution, which provides ICT training for future teachers has 4 departments, which employs altogether over 20 teachers and 5 support staff. The school of Computers and Information Technology is headed by Vice-professor L. Chojoovaanchig. All teachers have at least Master’s degrees related to ICT field. A number of the teachers and lecturers were able to participate in different short and long-term trainings offered for informatics subject teachers, such as training offered by Korean government, Japanese government, with support of UNDP, etc.

8) Key programme elements, including

The Computer and Information Technology school of MSUE has 2 departments:
- department of Network and information systems;
- department of programming.

The CITS of MSUE has a computer repair and maintenance center.

The following is the list of the key program elements:
- **Computer basics**
The computer basics course has 2 credit hours and has no prerequisite to take this subject. The main purpose of this course is to provide students with knowledge on computer basics: structures, design, principals of operating systems as well as with experience of using computers in their everyday work. The students will gain knowledge about hardware, software, operation systems (including Windows and MS-DOS) and be able to use application programs, such as Microsoft Office package suite – Word, Excel, PowerPoint.

- **Theory of operating systems**
The theory of operating system subject has 2 credit hours and has a prerequisite of computer basics course. The main purpose of this subject is to understand the main principals of operating systems, learn to use this knowledge for developing programs, and have thorough understanding of working principals, design, structure and implementation of the operating systems. The students will gain knowledge on RAMs, ROMs, processors, structure of operating systems’ security and how to use it.

- **Programming languages (Turbo Pascal 7.0)**
The programming languages (Turbo Pascal 7.0) course has 3 credit hours with a prerequisite of subjects such as algorithms and content of mathematics, physics and informatics subjects of secondary schools. The main purpose of this program is to understand the core of the Turbo Pascal 7.0 programming language and skills to use it. The students will gain theoretical and practical knowledge of Turbo Pascal, be able to solve problems using this programming language as well as will have basis to learn other programming languages.

- **Object-Oriented programming**
The Object-oriented programming subject has 3 credit hours and has a prerequisite of algorithms, programming languages (such as C++) and experience of developing programs. The main purpose of this subject is to introduce to a concept of object-oriented programming (OOP) based on C++. The students will have understandings of major components of OOP, introducing to C++ and practicing using C++ as well as with opportunities of developing programs using OOP and abilities of selecting best approach.

- **Database system**
The database system has 3 credit hours. The main purpose of this subject is to provide students with methods of using computers as a tool for approaching data and information. It enables students to create, process and use different database systems. The students will gain the knowledge on general principles of the database management systems, creation of database systems and experience of working at different database systems programming languages.

9) **Programme developed locally or internationally**
Most of the programs described above are developed locally. Few courses are introduced using external resources. The Tokyo State University has provided support in the development of “Network universal language” course; the UNDP has provided support in the development of “Informatics subject curriculum for secondary schools”, etc.

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5 From training program of Computer and Information Technology School of MSUE, 2003/2004, p.5
IV. Programme participants

1) Profile of participants
The MSUE has over 6,000 students studying at 12 schools. There are over 300 students currently studying at the Computer and Information Technology School of MSUE and the majority of students are students from country-side. The majority of students (87%) are females.

2) Pre entry qualification requirements
For entrants to informatics subject teachers program, the prospective students are required to undertake entrance exams consisting of exams on mathematics and one of the foreign languages, such as Russian language or English.

3) Post programme certification given to participants
The graduates of Computer and Information Technology School of MSUE are awarded with Bachelor’s degree of informatics, double degrees of informatics-mathematics subjects and double degrees of informatics-English language subjects.

4) Enhancements of salary / prospects etc
The graduates from Computer and Information Technology School usually have agreements with aimag and soum schools to work there upon their graduation as well as the schools provide them with some stipends during their studies. Thus, upon graduation of tertiary institution, most of the students return to the schools, with which they have agreement. They usually get start-up salary for teachers around 50,000-60,000T per month (1USD=1186T as of May 7, 2005). This salary usually is added by reimbursements for number of extra hours, which teachers can teach at the schools, such as extra hours for mathematics classes or extra curriculum classes, etc. In some cases, the students pay off their loans to the schools and look for some employment options in other places – in Ulaanbaatar, aimag center, etc. Since the information and communications technology sector in Mongolia is growing rapidly, the graduates of the Computer and Information Technology school can easily find work in software development companies, mobile service providers, providers of Internet services and others.

5) Programme feedback from participants
The participants of the program at Computer and Information Technology school of MSUE usually have opportunities to provide feedbacks on courses and contents used to teachers and lecturers, but not all of the students use this opportunity.

6) Compulsory/voluntary nature of programme, & level of inclusion
All programs and courses offered at the MSUE and Computer and Information Technology School of MSUE have combined compulsory and voluntary natures of programs. The courses taught in years 1-3 of the University are compulsory. From last year of study, the students can select courses to fulfill 36-credit hours schedule to graduate from the University.
V. Programme resources

1) Level of ICT resource provision

The management of MSUE and Computer and Information Technology School budget extensive resources for enhancing University and School itself with latest computers, hardware, software and other equipments.

For the last 3 years, the University increased number of computer labs and enabled Internet connection for all schools of University. For English language classes, the University has a lingo phone cabinet and Internet café is operating at the premises of University.

2) PCs

The MSUE has 9 computer labs total. The Computer and Information Technology School of MSUE has 4 computer labs with over 80 computers. Most of the computers are of Pentium type computers, but one of the labs has 15 computers, which are of 486-DX types designed for teaching programming languages. Two computer labs are used for teaching for non-informatics subject students and the other two for informatics’ subject students.

3) Other hardware

Apart of computers, there are over 4 printers, 1 digital cameras, 1 LCD projector. There are no scanners at the school. All of the equipment is used by teachers of the Computer and Information Technology school and are not available for use by students, potential teachers.

4) Internet access

The MSUE has Internet connection to one of the 8 Internet service providers in Mongolia – Erdemnet, one of the Internet service provider targeting services for education and scientific and technological institutions. It has 128 kbps Internet connection using ADSL.

5) Software

All of the computers at computer labs have Windows operating systems. These computers have Windows Package suite installed, which consists of Word, Excel, Access, Power Point, Internet Explorer, Outlook Express (in some cases Microsoft Outlook), etc. Moreover, there are some specific programs installed in the computer labs used for informatics-subject students, such as Turbo Pascal, C++ and Delphi. In addition to this list, the special programs are also installed in computers, such as Adobe Acrobat, Winzip, WinRAR, Pagemaker, Photoshop, Dreamweaver, etc.

VI. Programme providers

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

All program taught at the MSUE is provided by the Ministry of Education, culture and Science. Some specific programs are developed locally at the methodological department of the MSUE.
2) **Level of government support for the programme, and evidence of stakeholder participation process**

The government support for the program is 100%, since MSUE is a state university.

VII. Programme Quality

1) **Accreditation systems in use**

There is an accreditation system in use in Mongolia. The Mongolian State University of Education has been awarded with the certificate for 10 years from Certification commission on April 28, 2004.

The accreditation system used in MSUE is conducted on yearly basis. The commission is established by order of Rector of MSUE and schedule is developed on which departments are accredited. Considering that there are many departments at MSUE, the accreditation is conducted on take-turn basis, for example, the two departments of Computer and Information Technology school has been accredited last year and this year, it’s a turn of different departments of different school. The accreditation is done on teachers delivery of contents, development of training materials, students performance, etc.

2) **Level of applicable national standards**

The national standard on pre-service teacher training on ICT has first been developed in 1997 and introduced to the teacher training institutions since school year 2000. Based on lessons learnt for last 3-4 years, the new standard has been developed and introduced to teacher training institutions in school year 2003. It has new approach of introducing use of applications in teacher training curriculums, compare to old method of teaching algorithms, programming languages, etc. Moreover, the teachers have got some freedom of teaching different application programs, such as Word, Excel, Power Point, email programs, access to Internet, search for information at Internet, etc. However, the majority of the national standards and exams of informatics subjects use the programming logics, algorithms, etc, thus, there is a need of revising national standard.

VIII. Programme Funding

1) **Running cost of programme and individual modules**

The double degree of mathematics-informatics’ subjects teachers course, course of informatics-English language and informatics teachers course costs around 350,000T (1USD=1186T). There is no scheme for individual modules, so once you are enrolled in one of the above mentioned courses, you need to collect credits to be able to graduate from the school. The students need to collect over 36 credit hours.

2) **Funding responsibilities**

The MSUE is a state university, supported by Government of Mongolia. The students’ tuition fees collected at the beginning of the year is mostly used to cover on-going expenses, such as fees for lecturers and teachers, Internet connection, heating, electricity, etc.
The students, whose parents are civil servants, receive subsidy from the government for their tuition fees.

3) **Permanency and sustainability of programme**

The program described above has been running for last 6-7 years. The teachers are stable working at the MSUE for over 5-6 years. The turnover of teachers is 1.2% per year, but this is mainly due to the opportunities of sending teachers to study abroad at some courses, programs, etc.

**IX. Programme Needs Analysis**

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

There are many opportunities in ICT in Education and ICT in pre-service training. One of the major components, which is currently being tested at the MSUE itself is to introduce ICT training for non-informatics subject students. Along with this initiative, there is a need of development of the curriculum, content and teaching and students materials, so that the students – future teachers will have some experience of using computers in their teaching practices, not limited only to preparing for open classes or preparing handouts for students, rather be able to use computers and applications in teaching their subjects.

2) **Results of any prior impact study**

According to statistics at the Ministry of Education, there are 21,458 teachers working at the secondary schools throughout Mongolia. Out of these teachers, 33% are working at the schools of Ulaanbaatar and the rest 67% are working in schools of 21 aimags. As it can be seen from these statistics, around 80% of teachers are female teachers and 80.2% of teachers are full-time teachers.

According to survey conducted within Second Education Development Program (SEDP), implemented at Ministry of Education, Culture and Science with support from Asian Development Bank (ADB), it was said that the major problems of teaching informatics in secondary schools are of insufficient number of computers and lack of electricity.

The majority of informatics subject teachers working in secondary schools, which participated in this survey were graduates of the Mongolian State University of Education (MSUE) – 41%, 28.2% were graduates of National University of Mongolia.

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6 From interviews of teachers of Computer and Information Technology School of MSUE.
7 Second Education Development Program, Report of survey conducted within information and communications technology consulting services, March 2005, p. 244
9 SEDP, Report of survey conducted within information and communications technology consulting services, March, 2005, p. 44
X. Critical Analysis

1) **Strengths, innovations, local inventions and solutions**
- Provides knowledge and skills on developing applications using logistics, algorithms and different programming languages courses
- The graduates are competitive in the market and can go to work as software developers in different organizations, not only to teach at secondary schools.

2) **Weaknesses**
- Programs are not user-friendly, they are targeted more for software developers, rather to provide skills on using computers in their everyday life
- As a consequence, the curriculum of informatics subject is bound to teach algorithms, programming languages (Pascal and C++) and others, thus making informatics subject uninteresting for those who are not interested in developing software applications and programs.
- There are limited courses for non-informatics subject teachers on using computers in their teaching practices
- There are limited resources available to students, such as printers, scanners, digital cameras, LCDs, etc. thus students have no opportunities to use those equipment. Therefore, it’s difficult to ask students to develop local contents or use that equipment in their teaching practices.

3) **Opportunities**
- It’s possible to develop software programs and applications to introduce different tools for using ICT in teaching of natural and social science subjects, since most of the schools lack any resources for conducting any tests or experiments during those classes (for example, it could be chemistry or physics experiments)
- There is a need of development of special curriculum for non-informatics subject teachers, so that those teachers will have knowledge and skills of using computers and equipment (printers, scanners, digital camera, LCD, etc) to develop their own content and present it to students using this equipment
- There is a need of introducing some subjects to use different equipment, rather than computer, such as printers, scanners, digital cameras, LCDs, etc.

4) **Threats**
- Although most of the students graduating from MSUE work as teachers at schools, considering that some of them go to work in different organizations, companies, etc, there is a danger that the schools would not have professionally trained and knowledge teachers. According to report of baseline survey conducted within “Innovating ICT for Rural Education of Mongolia” project of MOECS, ADB and Japanese Fund for ICT, the survey was conducted among 23 soums of Bayankhongor, Gobi-Altai, Khuvsugul and Zavkhan aimag, which found that the majority of informatics’ subject teachers are not informatics’ teachers, rather they combine their major with informatics subject.10

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10 Report of baseline survey conducted at Bayankhongor, Gobi-Altai, Khuvsugul and Zavkhan aimags of Mongolia, March, 2005
Therefore, there is a need of ensuring that the informatics’ subject teachers would be working in their fields upon graduation, signing a contract with ECDs and soum schools on their demand of informatics subject teachers.

- There is a need of introducing informatics’ curriculum at secondary schools more related to use of computers and applications, rather use of programming languages, algorithms, etc, since the graduates of secondary schools are expected to be proficient using Windows operating system Windows office package suite programs, such as Word, Excel, Power Point, Internet Explorer, Outlook, etc as well as working with email programs, looking for information at website and have skills to communicate with people on and off-line.

XI. Contact information

Contact details of key institutions and players in the country (both private and public)
Dr. Bat-Erdene, Director of Education department of Ministry of Education, Culture and Science.
Mr. Mishigjav, State secretary of MECS,
Mr. Baasanjav, Head of tertiary education institutions, Ministry of Education, Culture and Science.
Prof. Jadambaa, Rector of Mongolian State University of Education
Vice-Prof. Choojoovaanchig, Dean of School of Computers and Information Technology, MSUE
Mr. A. Batjargal, Director of National IT park building

XII. Resources:

1. Second Education Development Program, Report of survey conducted within information and communications technology consulting services, March, 2005, Ulaanbaatar, Mongolia
2. Brochure of Mongolian State University of Education, August, 2004, Ulaanbaatar, Mongolia
5. Interviews with teachers of the Computer and Information Technology School of MSUE