Pre-Service Teacher Training on ICT use in Education: Republic of Korea

In the Republic of Korea (South Korea) pre-service teacher training on ICT use for school education began in the mid 1990s at elementary and secondary schoolteacher training institutions. From 2002 the central and local governments introduced “The Teachers Information Literacy Accreditation” based on “ICT Use in School Education Plan” which was established in May 2002 by the MOE&HRD. These programs have provided active and systematic preparation for those preparing to be schoolteachers and teacher training institutions overall.

I. Pre-Service Teacher Training Programme Objectives

Long-term goal
- Accelerate quality of higher education through the application of advanced technology
- Strengthen international competitiveness of pre-service teacher institutions through state of the art IT infrastructure
- Enhance quality of teaching-learning to reduce the teaching information divide
- Strengthen HRD of student teachers with advanced ICT training
- Facilitate the introduction of pedagogy using ICT in pre-service teacher training programme

Short-term goal
- Effective adoption of ICT to enhance quality of teaching, learning, and pedagogical approach
- Strengthen student teachers' competency in the use of ICT in education to better prepare for rapid changes in the educational environment
- Enhance quality of ICT educational program and capability of student teachers' ICT applied teaching-learning curriculum development
- Provide optimum effectiveness of teaching-learning using advanced ICT

National Policy
- The central government provides funding to elementary teacher training college for a set up of multimedia lab
- The central government developed and disseminated the “ICT Skill Standard for Teacher” in 2002. This standard is adopted for pre- and in-service training for
teachers.

- Regional governments run a recruiting system for teachers that takes ICT literacy or computer related certificates into account.

II. Programme development and methodology

1) Current Status of Curriculum

There are 11 national universities of education that train elementary school teachers and 40 colleges of education (13 National, 27 Private) that train secondary school teachers in South Korea. All 11 universities have offered computer education courses either as a major field or elective courses since mid 1990s.

Student teachers are required to take a total of 140 - 151 credits to earn teacher certificate at 4-year universities.

Curriculum in the area of ICT for elementary and secondary schoolteacher education is composed of 3 parts: cultural subjects, basic courses, and advanced courses.

- Cultural subjects focus on ICT skills such as how to use office software and multimedia tools.
- Basic courses focus on how to apply ICT into teaching-learning methods in specific subjects. (Study on ICT teaching-learning material for primary & secondary education, study on how to adopt ICT for teaching-learning subject matters)
- Advanced courses focus on advanced use of ICT to develop teaching-learning methods including knowledge of computer structure, operation and management of web-server, learning management and programming

The number of courses for cultural subjects, basic courses, advanced courses, number of ICT applied courses, and credit authorization differs from university to university.

2) Differences in ICT training for primary and secondary teachers

The training for primary and secondary school teachers are similar in terms of providing the opportunity to understand (1) PC and the peripherals, system software, application software, (2) the concept of and ability to develop courseware with multimedia authoring software, computer networks, and information ethics, and (3) management and development of resources on the Internet and apply them to teaching. There are slight differences between the two groups. For secondary school teachers the curriculum is divided into computer education and educational technology. Computer education courses focus on preparing students to use computers effectively, while educational technology courses prepare students to be able to carry out research and development in advanced educational technology including PC, TV, and Video in either a school or industrial setting.
3) **Differences in ICT training for informatics & non-informatics teachers**

For informatics teachers, the curriculum is focused on understanding the systems and functions of computers, the peripherals, application software, authoring software, programming languages, algorithm, and database management. For non-informatics teachers, however, the curriculum is set up to provide understanding of the basic concepts and functions of hardware, software, PC communications, the Internet, and Web that are necessary to make effective use of computers in teaching, learning, and school administration.

4) **Methods used in training**

- Develop and operate various educational programs in ICT to strengthen student teachers ICT skills
  - Run classes using multimedia and computer assisted programs to develop educational media
- Develop various methodologies for each subject
  - Utilize multimedia, spreadsheet, strategy to apply GSP, online chat rooms, virtual experimentation, and the use of mind-maps
- Develop ICT applied programs through diversified learning
  - Discussion, collaborative study, virtual teaching, and practical teaching
- Differentiate development method of ICT educational program for student teachers
  - Design educational programs which imply exemplary cases of classes using ICT
  - Observe a film of class and practice of lecture
- Develop a program in connection with the whole curriculum within elementary teacher training college
- Develop operational guide book for teacher training faculty
- Develop advanced programs using ICT by subject
  - Organize from basic ICT to advanced ICT skills
- Apply program model based on problem-solving ability
  - Provide real examples that may occur in the educational field and solutions using modules
- Modularize the use of ICT educational program
  - Develop training program which enable program operator reorganize and modify
- Develop method for program operator (lecturer)
  - Main lecturer and supportive lecturer who provide technical assistance
- Program is operated for approximately 4 weeks period usually in senior year
- Establish ICT applied teaching-learning model process by specific subjects
  - Analyze each subject to determine next learning theme and ICT-applied teaching-learning model → Design and development ICT-applied teaching-learning → Input the result of development into the educational metadata
Table 1. Teaching-Learning Plan Using ICT: Mathematics Class

<table>
<thead>
<tr>
<th>Area</th>
<th>Research for Appropriate Instruction Model</th>
<th>Focus Model of ICT Curriculum Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number &amp; Calculation</td>
<td>- Model of learning concept formation&lt;br&gt;- Model of activity game class&lt;br&gt;- Discovery class through individual tutor&lt;br&gt;- Model of a problem solving-based learning&lt;br&gt;- Model of discussion learning</td>
<td>- Revitalize of Interaction&lt;br&gt;- Repetition of Learning&lt;br&gt;- Relating learning to real life</td>
</tr>
<tr>
<td>Character &amp; Method</td>
<td>- Model of learning concept formation&lt;br&gt;- Discovery learning class through individual tutor&lt;br&gt;- Model of problem solving-based learning</td>
<td>- Cognitive process of reconstruction meaning&lt;br&gt;- Repetition of Learning&lt;br&gt;- Relating learning to real life</td>
</tr>
<tr>
<td>Regulation &amp; Function</td>
<td>- Model of activity game class&lt;br&gt;- Discovery class through the individual tutor&lt;br&gt;- Model of based on WEB-based learning&lt;br&gt;- Model of a given problem solving-based learning</td>
<td>- Regulation discovery through an actives&lt;br&gt;- Observation of co-relation between the two variants&lt;br&gt;- Drawing a graph&lt;br&gt;- Relating learning to real life</td>
</tr>
<tr>
<td>Probability &amp; Statistics</td>
<td>- Model of hands-on practice learning for concept formation&lt;br&gt;- Model of game learning&lt;br&gt;- Model of WEB-based learning&lt;br&gt;- Model of problem solving-based learning&lt;br&gt;- Model of discussion class</td>
<td>- Applying ICT to real life&lt;br&gt;- Analyze &amp; data research&lt;br&gt;- Prediction &amp; inducement of issues</td>
</tr>
<tr>
<td>Diagram</td>
<td>- Model of learning concept formation&lt;br&gt;- Model of WEB-based learning&lt;br&gt;- Model of problem solving-based learning&lt;br&gt;- Model of discussion class</td>
<td>- Understand of geometrical figure &amp; space&lt;br&gt;- Relating learning to real life&lt;br&gt;- Drawing of diagram&lt;br&gt;- Various diagram of affinity cognizance</td>
</tr>
<tr>
<td>Measurement</td>
<td>- Model of learning concept formation&lt;br&gt;- Model of WEB-based learning&lt;br&gt;- Model of problem solving-based learning&lt;br&gt;- Model of discussion class</td>
<td>- Understand &amp; apply concept through measurement&lt;br&gt;- Relating learning to real life</td>
</tr>
</tbody>
</table>
Table 2. Pre-service Teacher Training Program Using ICT

<table>
<thead>
<tr>
<th>Section</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to the Use of ICT</td>
<td>Understand the use of ICT in education &amp; National Curriculum</td>
</tr>
<tr>
<td>in Education</td>
<td>Introduction to the use of ICT in teaching-learning</td>
</tr>
<tr>
<td></td>
<td>- Psychological aspect in the use of ICT in education</td>
</tr>
<tr>
<td></td>
<td>- The use of ICT in subject matter</td>
</tr>
<tr>
<td></td>
<td>- The use of ICT in teaching-learning</td>
</tr>
<tr>
<td></td>
<td>The use of ICT in teaching-learning</td>
</tr>
<tr>
<td></td>
<td>- Selected teaching method in the use of ICT</td>
</tr>
<tr>
<td></td>
<td>- Various methods of adopting ICT for teaching-learning</td>
</tr>
<tr>
<td></td>
<td>Instructional design for the use of ICT in education</td>
</tr>
<tr>
<td></td>
<td>- Analysis, design, development, and implementation</td>
</tr>
<tr>
<td>Practice of the Use of ICT in</td>
<td>Teaching-learning strategy in the use of ICT in English Literature</td>
</tr>
<tr>
<td>Subject Matters</td>
<td>- Recognize of learning goals</td>
</tr>
<tr>
<td></td>
<td>- Understand teaching model</td>
</tr>
<tr>
<td></td>
<td>- Monitor classes through video records</td>
</tr>
<tr>
<td></td>
<td>- Analyze ICT adapted teaching-leaning subjects</td>
</tr>
<tr>
<td></td>
<td>- Analyze ICT adapted teaching-learning strategy</td>
</tr>
<tr>
<td></td>
<td>Design teaching plans</td>
</tr>
<tr>
<td></td>
<td>Run mock-class</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
</tr>
<tr>
<td></td>
<td>Teaching-learning strategy using ICT for mathematics</td>
</tr>
<tr>
<td></td>
<td>Teaching-learning strategy using ICT for social studies</td>
</tr>
<tr>
<td></td>
<td>Teaching-learning strategy using ICT for science</td>
</tr>
</tbody>
</table>

5) Usage of distance learning systems

For pre-service training programme, distance learning systems are not popular. Web surfing, e-mail, application software are frequently used, but teaching-learning is mostly in a lecture room or multimedia lab.

6) Duration of programme and courses

Pre-service teacher training in ICT is a bachelor programme at a total of 11 national universities of education for primary school teacher training, and 9 4-year national universities along with a number of colleges at private universities for secondary school
teacher training in the nation. The courses for primary school teacher training are as follows:
- Introduction to informatics and computer education
- Computer programming
- Theory and application of Information and communications
- Concept of database management and application in school education
- Development of multimedia data and its adoption in school education
- Computer-assisted education
- System operation
- Programming and algorithm
- Developing courseware with authoring tools

The courses in computer education departments at secondary school teacher training institutes are as follows:
- Introduction to computer science
- Understanding and application of digital information
- Mathematics and logic
- E-Learning and Computer education
- Computer programming
- Computer and data structure
- Educational multimedia design and development
- Computer graphics
- Database management systems
- Operating systems

The courses in educational technology departments at secondary school teacher training institutes are as follows:
- Understanding teaching media
- Instructional design and system development
- Educational technology and psychology
- Educational TV and education
- WBI design
- Educational technology and evaluation
- Management of multimedia information center

7) Key programme elements

Gyungin National University of Education (GNUE) is one of the 11 primary school teacher training institutes. It was established in 1946 in Incheon and has produced 22,000 teachers as of February 2005. There are currently 126 faculty members, 3,432 undergraduate students, and 945 graduate students. The Computer Education Department is composed of 5 faculty and the followings are the key programmes.

Informatics and computer education
The informatics and computer education course is a 3-credit programme. This course focuses on the concept and needs of computer education, the content of informatics, and
how to adopt informatics for teaching-learning.

Data structure and programming
The data structure and programming course is a 3-credit programme. This course focuses on the diverse data structure which is fundamental for computer programming.

Theory and application of information and communication
The theory and application of information and communication course is a 3-credit programme. This course focuses on understanding of the basic information and communication to enhance the ability to apply information and communication to teaching-learning.

Theory and application of database
The theory and application of database course is a 3-credit programme. This course focuses on understanding of the principles of database systems to cultivate the ability to apply information and communication to school sites.

Education and multimedia
The education and multimedia course is a 3-credit programme. This course focuses on understanding of multimedia concept and its distinctive features, how to develop and adopt multimedia for primary school education.

Computer-assisted instruction
The computer-assisted instruction course is a 3-credit programme. This course focuses on understanding the concept and distinctive features of computer-assisted instruction. This course provides understanding on how to effectively use diverse courseware for teaching-learning.

Children and programming
The children and programming course is a 3-credit programme. This course focuses on the application of algorithm in order to enhance children’s problem-solving skills and understanding on algorithm with the use of programming languages.

Authoring tools
The authoring tools course is a 3-credit programme. This course focuses on the concept, needs, and effectiveness of authoring tools for teaching-learning. This course provides an opportunity to develop courseware with the use of authoring tool.

8) Programme developed locally or internationally

In general, pre-service teacher training programme is developed by faculty at each university. The ICT Skill Standard for Teacher was developed by the MOE&HRD in 2002-2003. The MOE&HRD recommends that this standard be adopted in the curriculum of pre- and in-service teacher training.
IV. Program Participants

1) Profile of participants / Pre entry qualification requirement

Any student in a pre-service teacher training programme can take ICT basic courses such as introduction to computer education or teaching method in computer education. In order to take computer education as a major, students must complete the two aforementioned courses in their first and second year of college.

2) Post programme certification given to participants

There is no certification issued for those who complete the basic courses on ICT. However, those who completed core courses on computer education are issued with teacher certification in computer education. Nowadays, there is a tendency to seek double major degrees and computer education is a popular field.

3) Enhancements of salary / prospects etc.

There is no salary difference between those who majored in computer education and those who did not. However, 12 out of 16 regional governments gives extra points (about 5~10%) in teacher recruiting process to those who have ICT certification.

4) Programme feedback from participants.

At the end of the course, students fill out a course evaluation sheet. The results are used to appraise faculty job performance and to be referenced for faculty lecture notes in a following semester.

V. Program Resources

Each pre-service teacher training institute has set up a multimedia classroom with Internet connection. In the lab, there is a round table for 8 students and 1 PC is shared by 2 students. Some of faculty maintain lecturer home pages for interaction among lecturer and students and for sharing assignment on a bulletin board. In general, one or two multimedia labs are set up with 20 to 40 Pentium IV or Pentium V PCs and the peripherals, courseware, and application software. The facilities vary according to institutions. Approximately 80% of institutes are connected to the Internet.
at a speed of 10Mbsp.

VI. Program providers

“Teacher Training Center” is run at each university to provide pre- and in-service teacher training including ICT and to promote research on how to use ICT in each subject and encourage interdisciplinarity.

VII. Programme Quality

There is no national certification or quality management for pre-service teacher training program in ICT in Korea. However, the central government disseminated ICT Skill Standard for Teacher in 2002-2003, which is applied to teacher’s competency test in ICT and pre-service program.

VIII. Programme Funding

Primary funding sources for pre-service teacher training institute are tuition fees for private institutions and the government budget for national and public institutions. Some universities raise funding from the private sector by seeking research funding related to the “Teaching-Learning Development Center” which includes ICT training and teaching-learning R&D. Korea Education & Research Information Service (KERIS), e-Learning R&D organization funded by the central government, provides project funding to elementary teacher training institutes. In 2005, this funding amounted to approximately USD 20,000 per project.

For individual students, tuition fees vary depending on the type of institution as national, public, and private. For 4-year courses each student pays between USD 10,000 and USD 30,000.

The programme of pre-service teacher training in ICT use in education has been actively offered since the mid-1990s and gained more interest due to governmental support at the national level. The programme is to be expanded as e-Learning support plan was established in 2004 by the MOE&HRD.
IX. Programme Needs Analysis

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

As ICT is emerging as a key tool for quality education, pre-service teacher training in ICT will gain more attention and the integration of ICT into curriculum will be emphasized much more in Korea. Since 2000, the MOE&HRD has recommended that ICT in teaching-learning make up at least 10-20% of the curriculum in each subject. The recommendation was guided through in-service training but was not sufficient in pre-service training. In order to prepare students for the class, we must emphasize how to adopt ICT in teaching-learning. This requires faculty’s active participation and R&D on integrating ICT into teaching-learning, particularly on a learner-centered program in order to enhance learners’ creative and logical thinking which has been critical issues to educators.

2) Results of any prior impact study

In 2004, KERIS has conducted a survey on teachers’ ICT skill at the national level. The questionnaire was sent to 10 teachers at each of 87 elementary and secondary schools at random base. The return rate was 73.7% (641 out of 870). The survey result showed that 61.9% of teachers use ICT for teaching-learning, 60.3% for educational administration, 46.9% for self-training, and 40.9% for student counseling. And elementary school teachers used ICT more frequently than secondary school teachers. Teachers recognized that ICT skills were important for teaching-learning (2.86 out of 4.0), educational administration (2.85 out of 4.0), student counseling (2.76 out of 4.0), and self-development (2.76 out of 4.0).

This survey indicates that teachers use ICT for various purposes as a result of pre- and/or in-service training. The survey indicates that teaching-learning and educational management with the use of ICT must be emphasized together in pre-service teacher training programmes.

X. Critical Analysis and Suggestion

There are many factors to strengthen pre-service teacher training on ICT use. The fundamental factor is to integrate ICT into subject matter systematically by co-research by faculty from different disciplines and research organizations. Computer education alone will not result in the effective use of ICT for teaching-learning. In Korea a study to identify teachers’ skill required for integrating ICT to subject teaching was initiated

in 2002 and still there is a long way to go. Systematic R&D to train and motivate faculty is a necessary step toward successful ICT use in teaching-learning.

XI. Contact Information

Dr. Sohn, Byung-gil, Executive Director, e-Learning R&D Center, KERIS, sohnbg@keris.or.kr
Dr. Han, Tae-myung, Executive Director, e-Learning R&D Center, KERIS, ttmhan@keris.or.kr
Dr. Ahn, Mi-lee, Associate professor, Computer Education Department, Hanyang University, mlahn@hanyang.ac.kr
Dr. Kim, Young-gy, Professor, Dean of Graduate School of Education, Gyungin National University of Education, young7@ginue.ac.kr
Dr. Kim, Young-soo, Professor, Educational Technology Department, Ewha Womans University, youngkim@ewha.ac.kr

XII. Resources

Ewha Womans University www.ewha.ac.kr
Gyungin National University of Education www.gin.ac.kr
Hanyang University www.hanyang.ac.kr
MOE&HRD www.moe.go.kr

Writers: Myung-sook PANG, Yeon-Joo CHOI, Jin-Hee KIM