

Country Papers on the Status of the Use of
Microcomputers in Computer Education: Korea

By

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**A WORKSHOP
ON THE USE OF
MICROCOMPUTERS IN
COMPUTER EDUCATION**

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1. Introduction [1]

1.1 Country

The Korean peninsula, located between China's Shantung peninsula and Japan, is divided into two parts -- the north Korea and the south Korea (Republic of Korea ; Republic of Korea may be abbreviated as Korea in this paper for readability.). The Republic of Korea's administrative control covers 98,992km or about 45 percent of the total peninsula. The population of the Republic of Korea is more than 40 millions. The population of the Republic of Korea is very young with 55.8 percent under 25 years of age, and most of them are highly educated.

In 1980, the Fifth Republic, which provides for a presidential system designed to achieve the strong and effective leadership, was constructed.

1.2 Language

The Korean character, called Hangul, is composed of basic characters according to the syntactical rules, and the display of basic characters must obey some graphical rules. The complexity of handling the Korean character is much simpler than that of the Chinese character but is more complex than that of Japanese character. So the display of Korean character must have special hardware and/or software. The special feature of formation and display of Korean character prevent the direct use of good software and hardware systems developed by other countries. You can compose a sentence with only Korean characters or combinations of the Korean and Chinese characters.

1.3 Educational System

Korea has adopted a school system dividing education into six-year elementary schools, three-year middle schools, three-year high schools and four-year colleges or universities, with graduate schools leading to a Ph.D degree. Two-year junior colleges and vocational colleges have also been established. There are now over 11 million children and young adults attending schools, colleges and universities in Korea.

Six-year primary school is free and compulsory. In 1981, 98.7 percent of school age population attended elementary schools, 95.7 percent of graduates of elementary schools entered middle schools and 91.2 percent of graduates of middle schools entered high schools. The number of students in each college and universities are regulated by the government. The following table shows the numbers of schools and students.

Number of Schools and Students (As of 1981)

151 Graduate Schools	44,731 Students
232 Universitits and Colleges	745,905 Students
1,402 High Schools	1,823,039 Students
2,174 Middle Schools	2,573,945 Students
6,517 Primary Schools	5,586,494 Students

2. Availability of Microcomputers

2.1 Overview

The first computer was introduced in the Republic of Korea in mid-60's. Currently, there are a variety of computers available in Korea, from mainframe computers to personal computers, from the imported computers to the locally developed computers.

All mainframe computers in Korea are imported from USA and Japan. IBM has over 60% of the share followed by UNIVAC and Fujitsu. Other computers such as CDC, Burroughes, and, NCR are available, too.

Minicomputers are very popular in Korea. Almost all minicomputers made in USA are available in Korea, too. Among them, the computers from DEC, DG, HP, HIS and Prime are popularly seen in Korea. Japanese minicomputers from NEC and Hitachi are available, too. Several overseas computer makers have made arrangement to produce minicomputers in Korea. Examples are DEC, HP, HIS, Prime, ATT, NEC and Hitachi.

The microcomputer market in Korea is changing rapidly starting from IMSAI and CROMEMCO in mid-70's. There are imports, locally manufactured products, and locally developed products. Both the USA and Japanese microcomputers are common in Korea. They are increasingly manufactured locally. Several microcomputers are developed by the Korean computer manufacturers. These include the CP/M and MSDOS machines, and the UNIX machines[4]. The word processors based on the microcomputers are gaining popularity with several products. They handle both the Korean and Chinese characters.

The personal computer industry is going through extremely rapid growth now. Starting from the Apple compatibles among small companies in early 1980's, this market is exploding with both large and small computer manufacturers. The explosion was started with the Educational Computer Project sponsored by the Ministry of Science and Technology in 1983 as a part of Computer National Project. Five computer manufactures participated to educational institutions, mainly among high schools[3]. More manufactures are joining in this market. Currently, over 10,000 personal computers are produced monthly with growth rate of several hundred percents annually. These computers cost from \$200 to \$1,000, comparable to color televisions. Even lower cost computers under \$100 will be available in 1984.

2.2 Personal Computers

There are three distinct periods; the initial period (1978-1982), the second period (1982-1983), and the present period. During the initial period, personal computers were imported, and the Apple-compatibles were developed at many small companies. The second period is the period of the Educational Computer Project, which delivered the 5,000 personal computers to high schools and other governmental offices. The project ignited the personal computer market. The five manufacturers and others are developing the second generation personal computers as they are going up on the learning curve. They have added the Korean language capability which was not available on the original 5,000 computers.

The production volumes of the personal computer are estimated as follows[5];

<u>Year</u>	<u>No. of Computers</u>
1981	1,000
1982	5,000
1983	50,000 - 100,000
1984	150,000 - 200,000 (Expected)

The available software packages include game, English, science, computer and others.

2.3 Microcomputers

Larger computers than the personal computers are common, too. They are the CP/M machines, MSDOS machines, and the UNIX machines. Some are imported, and others are locally developed. The development of the microcomputers started in late 1970's. We are seeing increasingly more locally manufactured microcomputers than the imports. The microcomputers are particularly popular among colleges due to readily available software packages. The UNIX machines are gaining popularity, too. There are over ten kinds of the UNIX machines in Korea now. Some of them are locally developed.

Turnkey systems based on microcomputers are gaining popularity. Among them, small business computers and word processing systems are dominant products with frequent announcements of new products.

3. Computer Education

3.1 Overview

The available personal and microcomputers among the primary and secondary education systems are as follows as of 1983[5]:

	<u>No. of Schools</u>	<u>No. of Computers</u>
Elementary School	6,517	2,814
Middle School	2,174	1,294
High School	1,081	
General	781	637
Technical	100*	614
Commercial	200*	6,748
Science Museum	30	390
Total		12,492

There are no formal curricula on the computer education among the elementary and middle schools. Many students in this age group are learning computers in vocational schools. High schools are classified into three groups; general, technical, and commercial high schools. Colleges have typically mainframe computer and/or minicomputers for their education. The personal computers are not used for regular course work in general. This will change soon due to availability of inexpensive personal

computers. Computer education at vocational schools are popular as the personal computer becomes readily available. We are seeing the big boom recently.

Many schools have access to large computer systems at the Korea Advanced Institute of Science and Technology (KAIST) for programming, CAI through PLATO and others[9]. There are a few networks to connect educational institutions as well as R & D organizations[2]. There may be major development of the educational network in near future for better access to computing resources.

3.2 Elementary Schools and Middle Schools

There are no formal curricula among elementary and middle schools as of 1983. They are planned for the latter part of 1980's. Despite the absence of formal computer education in this age group (7 to 15 years old), there are many students who are learning computers in vocational schools, in particular during vacation periods. There are over 20,000 students who are attending computer schools in this winter. Most of the computer schools have personal computers for instruction.

Good handling of the Korean language as well as good coursewares will be the major problems to overcome before the computer education become popular among this age group.

3.3 High Schools

The Educational Computer Project delivered 5,000 personal computers mainly to commercial and technical high schools in 1983. In addition, they purchased more personal computers recently.

The commercial high schools have four majors related to computers; information processing, accounting, commerce, and trade. There are required courses to all, data processing and programming. The information processing major has to take many more courses on computers. There are typically 30 personal computers for each commercial high school in addition to larger computers at some schools.

Many technical high schools have information technology major which teaches computer hardware and software in addition to computer operation. All students are required to take the programming courses. Computers are used in various ways ranging from control to computation. The Educational Robot Project is being carried out now. It delivers the educational robots to many technical high schools in 1984. The robots are controlled by the personal computers.

The general high schools are not emphasized on computer education. There are a few computer related topics in mathematics and industrial technology courses.

3.4 Universities

Many colleges have a computer science department. Its curriculum is based on the ACM curriculum[6]. Microcomputers are used among various department in engineering schools. There are many personal computers in colleges as personal possession not for formal course works except at a few colleges. One of them is using many TRS-80's with networking for the programming courses[7]. The personal and microcomputers are increasingly

used among engineering, business and education departments. Computer related courses are offered at all colleges. They range from programming to applications. There are also many two year colleges which offer a business data processing major and a computer technology major.

Utilization of computers range from primitive to most advanced depending on the level of colleges. Examples of the most advanced utilization is the core course at KAIST which is mandatory to every entering graduate student, and the national design center for VLSI. The core course which starts this year covers CAI on a computer, electronic mail and filing, typesetting for publication, and advanced languages. The instruction may be carried out without papers. Later, advanced workstations may be incorporated.

The national design center for VLSI which may be set up in 1984-1985 is based on a computer network with several workstations at each university and R & D organization, and central computers at the center. The PLATO system is similarly constructed for CAI with 80 terminals at schools and governmental offices, but it is based on the CDC mainframe computer. The system may be converted to personal computers later.

Several universities as well as R & D organizations and companies are linked by a computer network with microcomputers and minicomputers. The network is linked to USA and Europe now[2].

4. Outside of School System

There are over 400 computer schools in Korea. Currently, over 20,000 students ranging from ten to sixty years olds are taking one week to six month computer courses. Some of the computer schools are managed by the computer shops. Majority of the schools use personal computers with BASIC.

Private companies as well as governmental offices have inhouse computer courses on word processing, programming, and system analysis. They are augmented by many workshops and seminars by the academical associations, research institutes and universities. More systematical retraining curricula are desired.

5. Education Using Personal Computers

As mentioned earlier, the commercial and technical high schools offer limited courses on English, mathematics, and science as well as programming. Since the personal computers were delivered in 1983, it will take sometime before extensive coursewares are developed. The PLATO system has been popular with variety of coursewares, but it is not based on the personal computers.

Technical high schools and engineering schools in colleges use micro and personal computers for computation, control, and the imbedded applications. Their usage in formal courses is rather limited. Two interesting applications are development of the maze mouse in 1983, and delivery of the educational robots to the schools in 1984.

Several business schools use personal computers for instruction. They use the standard data processing software packages, spreadsheets, simulation languages and others. Audio-visual and education departments are involved in graphics and CAI development.

6. Conclusion and Remarks

Micro and personal computers are catching up in the Republic of Korea, too. We will go through microelectronics revolution like many other countries. In particular, the Educational Computer Project was successful. We expect a similar result on the Educational Robot Project. Things are not going on orderly. We are having chaotic time to digest the current personal computer phenomena. It partially solves lack of computing resources. Students have easier access to the computing resources than before. We need much more computing resources including hardware, software and courseware than what we have now.

Personal computers can be provided more easily than larger computers since our computer manufacturers can readily manufacture the former at this moment. Thus, the personal computers penetrate to the school system much faster than other computers. This causes the following problems;

- (1) We need good softwares and coursewares.
- (2) We need standardization for compatibility and transportability.
- (3) We need networking among personal computers, and between personal computers and large computers for more efficient usage.
- (4) We need much more qualified instructors and specialists.

Lack of good software packages poses a difficult problem. If we use software packages in English, then we can utilize the overseas software assets readily[8]. But, we cannot carry on effective education which requires the instruction based on the native language. If we use software packages in Korean, then we don't have any choice but to build up our own software assets. The conversion of the overseas software packages to that of the Korean language is not trivial effort. We have to look after both approaches as compromise.

How to penetrate into elementary schools and kindergarten has not been solved yet. We need much better man-machine interfaces and well-designed coursewares. We still don't know if conventional keyboards are proper to this age group or not. CRT's, languages, and coursewares pose problems, too.

Another area to study is development of the next generations of computers. They include workstations based on advanced microprocessors and much advanced software systems. Development of such computers meet the need of the Korean computer manufactures, too.

7. References

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