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Author(s)	Chong, Tian Hoo
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# COMPUTERS IN INSTRUCTION

CHONG TIAN HOO

Nowadays, the computer is such a popular topic that it is mentioned almost daily in the newspapers. Government ministers talk about making Singapore a computer centre for this region; businessmen and industrialists think of computerising and mechanising their operations; MPs want to set up computer hobby clubs in their constituencies; and immigration officials hope to retrieve instant information on visitors coming into and leaving the country. I am sure more and more government departments and organisations in the private sector will look towards the computer as a means of increasing efficiency and productivity.

People are quite impressed by actions taken so far by the authorities to popularise the use of computers. For instance, the National Computer Board has been set up to coordinate and guide computerisation in government departments and ministries. It will train computer personnel to develop, set up, operate and maintain computer systems and monitor the growth of the computer software industry in this country. The Japan-Singapore Institute of Software Technology and the Institute of Systems Science have been established to train and educate professionals and users in the public and private sectors. These activities are in addition to the many privately owned computer centres which are already conducting classes to train students as computer programmers and systems analysts.

Computers are still a mystery to many of us. Are they that intelligent? Are they so wonderful that they can solve most, if not all, of our problems? Teachers would like to know whether the computers will take over their place in the classroom. A visiting specialist foresees a bigger role for computers in classroom activities in the coming years.

The answers to some of these questions will depend on how far we are prepared to go in the development and utilisation of computers.

## Computers in Schools

Computer science has been introduced as an 'A' level subject in the pre-university curriculum. Junior colleges will be supplied with minicomputers. The topics include data representation and storage, computer languages, data processing, operating systems, and the analysis and application of computer systems. At present 1,000 students are taking the subject at the junior colleges. By the end of the year, more than 50 teachers will have been trained to teach the subject.

Computer clubs are being set up in secondary schools to generate interest and awareness amongst students in computer science. Microcomputers are installed for use by members of these clubs. Teachers who will act as advisors to these clubs are undergoing computer appreciation courses, and they will, in turn, impart their knowledge to their students. It is hoped that such great emphasis on computer technology in schools will gradually induce more students to take up computer-related vocations.

## Educational Software

As teachers, we can explore the use of computers to assist us in teaching. In some countries, research in computer-assisted instruction has shown encouraging results, and we in Singapore can perhaps begin by developing software material in this area.

The development of educational software is a long and tedious process. It requires the services of experienced teachers, subject experts, reading specialists, programmers and educators. The teachers with long teaching experience are in a better position to sequence material in such a way as to effect maximum learning; the subject expert will be able to present correct material, the reading specialist to use appropriate vocabulary and sentence construction suitable to the students' level of comprehension, the programmer to translate the material into computer language for acceptable input, and educators to provide advice on approaches and methodology. The instructional material is carefully designed to provide learning from the simple to the complex. It takes time to develop such material and it has to be revised from time to time for improvement.

Educational software may be divided into two types: the

practice programme and the tutorial programme. The practice programme is merely a supplement to the teacher's instruction in the classroom. After the lesson by the teacher, students are led to the computer laboratory to run the practice programme. The programme consists of sequences whereby the students receive exercises and questions, the answering of which strengthens the students' ability in skills involved in the computation of problems. The tutorial programme is a self-learning programme and the instructional material is complete in itself without guidance from the classroom teacher.

The purpose of educational software is to assist teachers in instruction and to enhance learning by students. It should be realised that teachers can never be replaced by any instructional material which can only perform a subsidiary role. Educational software is used for the purpose of enrichment, reference, review and remediation.

### **Advantages**

The application of principles that educators have been advocating in educational theory is what makes the computer-assisted instruction programme so desirable for incorporation into our instructional system. First of all, every student receives individualised instruction as it is a one-to-one correspondence between the computer and the student. The branching feature in the programme helps the student in achieving a fuller understanding of the material and in eradicating the errors and misconceptions that might have been formed earlier. Each student works at his own pace. He works by himself responding continuously on the learning task. There is an immediate feedback to his responses and such immediate reinforcement is seldom provided to a great extent by a classroom teacher who has many students in his care. Instruction, therefore, is subject to the student's individual needs.

The student works on a level commensurate with his ability. Programmes of material are classified under different levels of depth of understanding and difficulty. Students enter the programmes suitable for their level of ability. In this way, the good students will not be frustrated by the "easy" material in the programme and the not-so-good students will not be discouraged by the difficulty of the programme.

If computer-assisted instruction is used as a supplement to classroom teaching, it provides a necessary review of concepts already introduced and taught by the teacher. In this way, it serves as a "workbook" for the students. This "workbook" is then scored by the computer, thus saving the teacher the tiresome task of grading and the accompanying clerical work. The time saved may be used for planning and research in improving his own teaching techniques.

The computer acts as a record-keeping device which provides the teacher with the performance of each student, and the already computer-analysed weaknesses can then be located. Remedial work is then planned for the individual needs of each student. The computer also serves as a source of information and provides remedial work for those students who want to be competent in particular areas.

## **Problems**

The launching of a new project is generally accompanied by many problems. This is especially so during the initial stages of implementation.

One of the main problems is the financial aspect of implementation. Computers and the peripheral equipment are expensive, and therefore a huge capital outlay is involved. Another obstacle to smooth implementation is the problem of staffing. Finding the proper personnel to administer the project and to develop educational software is a task which requires careful planning, patience and time.

## **CONCLUSION**

Singapore is moving towards a higher plane of scientific and technological development. The preference for high value-added products to labour-intensive ones is the right decision. In order to succeed in this endeavour, we need to produce a generation of good workers with the necessary knowledge and skills. As teachers, we must be constantly aware of new scientific and technological knowledge and be brave enough to take part in any innovation. In my opinion, computer use in instruction is one area worth exploring.