Title	Research report RECSAM: Computers in education project, Singapore study
Author(s)	Wong Khoon Yoong, Lim Yoke Seng and Low Khah Gek
Source	*Singapore Journal of Education, 10*(1), 66-70
Published by	Institute of Education (Singapore)

Research Report
RECSAM: Computers in Education Project, Singapore Study

Wong Khoon Yoong
Lim Yoke Seng
Low Khah Gek

Introduction

From 1986 to 1988, Regional Centre for Education in Science and Mathematics (RECSAM) at Penang organised the Computers in Education Project with financial support from the Australian Government. The aim of the Project was to provide information on the use of computers in education among SEAMEO countries. Such information, it was thought, could be useful for educators who needed to formulate sound policies regarding the introduction, management, and use of computers in schools and the roles of computers in education in general. Six countries took part in this project including a team from Singapore.

The Project began with a pilot study of some educational institutes in Penang. Results from the pilot study were discussed at a regional seminar in November 1986. Plans for the main study were finalised and submitted to various ministries of education for approval. In Singapore, the main study was conducted from March to August 1987. A second regional seminar was organised in April 1988 to report on results from various countries and to submit recommendations for the consideration of various ministries and RECSAM. Proceedings of these seminars (see references) are already available while reports from the various countries will be published by RECSAM in the near future.

The Singapore Study

The Singapore study comprised three parts.

The first part consisted of a survey of computers in education among a randomly selected sample of 38 secondary schools and three Junior Colleges. The survey provided information on availability and use of computers in the schools and the perceptions of 335 teachers on computers and computer education.

The second part involved case studies of two of these schools and one Junior College to obtain more detailed information about the management of computer education in the schools. In addition, 239 pupils were tested on the Minnesota Computer Literacy and Awareness Assessment (MCLAA).

In the third component, information was gathered from 55 lecturers of the Institute of Education on their perceptions about computers in education.

Summary of results

From 1981 to 1983, the Ministry of Education supplied to each secondary school three sets of computer systems to set up its Computer Appreciation Club. About 70% of the sampled schools have fewer than 11 computers and 20% have a computer laboratory with at least 20 computers. Over 60% of the 412 computers are either IBM or IBM compatibles.

There was a sharp increase in the number of computers acquired from 1984 (44 computers) to 1985 (104 computers). Data from 32 of these

schools showed that, from 1985 to 1987, a total of $869,381 was spent on computers, with 46.5% of the monies coming from a Government grant.

In general, secondary pupils acquire computer literacy through joining the Computer Appreciation Club or taking the Computer Awareness Course offered by the schools. Only 11% of the pupils were club members. In 12 schools, the club was open to all interested pupils, while the other schools used various criteria to select pupils to become members, such as setting for a test, or used mathematics or science results. On the average, three to four teachers took charge of each club. Each member spent about 2.6 hours per week on club activities and each teacher spent about 5.1 hours per week supervising these activities. The main activity was teaching the two-year course on computer literacy: simple programming in BASIC and/or Logo and the use of application software (more than 90% of the time on word processor and graphics).

Only 14 of the sampled schools had implemented the Computer Awareness Course. This course covered a minimum of 20 hours of lectures and hands-on experience. In 1987, about 200 pupils per school had the opportunity to attend this course. There was a trend towards starting pupils early on computer literacy: the number of Secondary 1 pupils taking this course increased by 40 times while the number of Secondary 4 pupils decreased by 50% for the 1985 to 1987 period. The average class size was 22 pupils. Each teacher spent about 48.5 hours per year in teaching the Awareness course.

Although the programme on computer literacy has been quite successful, only limited usage of computer - assisted instruction was reported by three of the schools. None of the schools developed its own courseware.

Tables 1 and 2 show the results on the MCLAA. On most scales, club members performed significantly better than non — club members. This shows that the computer club has been successful in promoting computer literacy among secondary pupils.

The schools mentioned the following benefits (see Table 3) that had resulted from computer education programmes.

The schools faced several problems in implementing various computer education programmes, as shown in Table 4.

There was a wide spread of number of computer literate teachers in the sampled schools. Out of a total of 436 such teachers, 56% of them gained computer knowledge through in-service training, 34% through self — study or private classes, 10% through pre — service training. Only three had a degree or diploma in computer science. Among the 36 computer coordinators in these schools, 58% were mathematics teachers and 22% were science teachers.

Although there was, on the average, 11 teachers in each school who were computer literate, only about three to four of them could be deployed to take charge of these pro-

TABLE 1: MEAN SCORES ON AFFECTIVE DOMAINS OF MCLAA

	SCHOOL 1		SCHOOL 2		Junior College	
Scale (Max score)	NC (40)	C (40)	NC (40)	C (40)	NC (41)	C (39)
Enjoyment (25)	20.7	22.2 (*)	20.7	22.8 (*)	19.3	21.7 (*)
Anxiety (25)[1]	18.0	19.1	17.8	20.0	17.6	20.0 (*)
Efficacy (25)	16.5	17.4	16.4	18.1 (*)	15.9	18.2 (*)
Educational support (25)	20.6	21.0	20.3	22.7 (*)	19.8	21.7 (*)
Overall (100)	75.8	79.7 (*)	75.1	83.6 (*)	72.7	81.6 (*)

TABLE 2: MEAN SCORES ON COGNITIVE DOMAINS OF MCLAA

	SCHOOL 1		SCHOOL 2		Junior College	
Scale (Max score)	NC (40)	C (40)	NC (40)	C (40)	NC (41)	C (39)
Hardware (10)	4.8	6.2 (*)	5.9	7.7 (*)	6.8	9.1 (*)
Software (8)	4.3	5.0 (*)	4.0	5.9 (*)	5.1	7.1 (*)
Applications (15)	9.5	10.0 (*)	10.0	11.7 (*)	11.1	12.6 (*)
Impact (13)	7.3	8.2 (*)	8.2	9.3 (*)	9.2	10.4 (*)
Programming (7)	1.4	2.9 (*)	2.3	4.4 (*)	2.6	5.7 (*)
Overall (53)	27.4	32.2 (*)	30.5	38.8 (*)	34.8	44.9 (*)

NOTES: NC = Non — club members, C = club members,
* indicates significant difference at .05 confidence level.

TABLE 3: BENEFITS OF COMPUTER EDUCATION PROGRAMMES

	Benefit	No of times
1.	Pupils become aware of the use & limitations of computers in society and daily life	16
2.	Reduce paper work, greater efficiency in administration	16
3.	Pupils learn to use software which may be useful for their future careers	6
4.	Pupils learn programming	4
5.	Others	9

TABLE 4: PROBLEMS ENCOUNTERED IN IMPLEMENTING COMPUTER EDUCATION PROGRAMMES

	Problem	No of times
1.	Lack of manpower	11
2.	Lack of time	9
3.	Not enough computers	8
4.	Frequent breakdowns of computers	4
5.	Limited software	2
6.	Others	13

TABLE 5: PERCEPTIONS ON COMPUTER EDUCATION BY PERCENTAGES

	Perception	School	JC	IE
1.	Need for a compulsory computer course for all secondary pupils	75	63	80
2.	Need for an elective computer course for upper secondary pupils	53	48	76
3.	Need for computer — assisted instruction	60	81	NA
4.	Need for computer as an admin. tool	90	100	93
5.	Willing to attend in-service course	80	70	85

grammes. Besides handling computer education programmes, some of these teachers were also involved in using the computer as an administrative tool: 73% of the sampled schools reported using computers in evaluation, 68% for keeping pupils' records, and 35% in general office work.

The perceptions of computer education from the sample of school teachers (n = 335), Junior College (JC) teachers (n = 27) and Institute of Education (IE) lecturers (n = 55) are summarised in Table 5.

The Future

In April 1988, the Ministry of Education announced that every secondary school without a computer laboratory will have the number of computers increased to six. All secondary pupils will have computer lessons within the next four years. (Straits Times, 21 April 1988). Under this scheme, the pupils will prepare their work on a computer and can learn at their own pace. This scheme will help to alleviate somewhat the problem of inadequate hardware. On the other hand, the lack of computer literate teachers can be met to a certain extent by Institute of Education's pre — service and further development programmes which require all participants to take a 30 — hour course on Information Technology in Education. However, further training is required to prepare competent teachers who can integrate computers into the school curriculum.

For computers to be used effectively in the teaching and learning of academic subjects, there is an urgent need to address the lack of suitable software for use either as CAI or tool for creative learning. This calls for financial support for software development from the Government or interested commercial companies.

We need to understand better the kinds of classroom variables that may promote or hinder effective learning with the use of computers. Several Master of Education dissertation and studies (see SJE, Vol. 9, No. 1) have shown positive results, but a more concerted effort is required before substantive claims about the efficacy of computer — based learning can be justified.

The present study is concerned about use of computers in the secondary schools. At the primary level, the Computer-based Learning Team of the Curriculum Development Institute of Singapore is conducting a 3-year longitudinal study on the effectiveness of CAI in mathematics in a primary school. The results of this pilot study are likely to affect the Government policy on supplying computers to primary schools. In the meantime, several primary schools have raised their own funds to set up computer laboratories. In several countries such as the United States, Japan and Australia, the primary schools are beginning to buy computers for various activities. For instance, Sully (1987) states that emphasis should be placed on the use of the computer as a learning aid integrated into the normal classroom activities, as a

motivational device, and as a means to promote problem solving via the use of Logo. There is a need to conduct a similar study among primary schools in Singapore to ascertain their needs and problems. A policy statement on a computer education programme for the primary school will link up with the current progamme for secondary schools.

Finally, the following note of caution was inserted into the Recommendations at the second RECSAM seminar in April, 1988:

> While recognising that computer in education is becoming important, the implementation of any computers in education programme should consider the following factors:
> (1) It must not undermine continued efforts to improve basic literacy and skills among all students in such other disciplines as language, mathematics, social sciences, etc.;
> (2) It should consider the realistic roles that computers can play in the cultural, economic, social and educational development of the country.

Indeed, a balanced perspective on computer and non — computer programmes can best serve the needs of education of our pupils.

REFERENCES

SEAMEO RECSAM (1987). ***Computer education and the use of computers in Penang Educational Institutions: A pilot study.***

SEAMEO RECSAM (1987). ***Experiences of some developed countries: A publication of the Computer in Education Project.***

SEAMEO RECSAM (1987). ***Regional seminar on Computers in Education Project, Final Report: Vol. 1 & 2.***

SEAMEO RECSAM (1988). ***Second seminar on Computers in Education Project, Final Report.***

Sully, J.H. (1987). Computer education — The Western Australian Experience. In SEAMEO RECSAM (1987), 16-29.

Wong, K. Y., Lim, Y.S. & Low, K.G. (1988). ***Computer education and the use of computers in Singapore schools and Institute of Education.*** RECSAM. (in press).