The Computer, A Facilitator of Learning

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Computers and computer methods are beginning to play a significant role in today's education. Despite the spectacular achievements of computer application, such as the control of air and space travel, it is the educational role which will be the main reason for having to become familiar with the use of computers. Anyone living in the latter half of the twentieth century needs to know something about the technological advances, their uses and misuses. This is also true of computers. As computers and computer concepts can augment our thinking, it is desirable for everyone to have some understanding of them. To achieve this end, it behooves us to make computer education available to all people, especially our youth. This can be justified by the contributions which computers are bringing and will continue to bring to education.

What, then, are the objectives of education which can be used to develop the body, mind and personality so that one may have a broad and clear view of the world around, may live a full and satisfying life, and may make as valuable a personal contribution to society as possible? Some of the objectives are:

1. the development of perception and knowledge;
2. the ability to apply knowledge through skills;
3. the ability to analyze and form judgments, to develop a sense of values and make decisions;
4. the ability to explore, to adapt, to ask questions, to recognize and face problems;
5. the ability to express oneself creatively.[1]

How can the computer be used to facilitate learning and in the process aid the fulfillment of these objectives?

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[1]*Computer Education for Teachers in Secondary Schools - An Outline Guide* (revised edition, September 1971), Photospeed, London, and *Computer Education for Teachers in Secondary Schools - Aims and Objectives in Teacher Training* (October 1972), Photospeed, London.

The computer is capable of storing a vast amount of information, retrieving it quickly, and of sorting and ordering with extremely great speed. Consequently, it can help us to perceive pattern and structure of knowledge more exactly and meaningfully than ever before. Without the computer, the sorting and ordering by man would be, in many instances, an impossible task.

The ability to analyze and form judgments can be aided by a sophisticated use of the computer known as simulation. To illustrate, let us consider the question of population explosion. A student can enter various parameters which affect the human population. Some of these are life expectancy, sex ratio, and fertility. Not only can the student see the results of his parameters on population, but through his own initiative he can also ask questions, analyze the responses and form judgments.

To further illustrate, the Canadian government recently used a computer to predict the developments in Canada during the next 25 years. The predictions were formulated on assumptions that certain trends in the Canadian society would continue. They suggest a continuing inflationary spiral, economic problems, and unemployment. Some of the more drastic changes which will affect us are the massing of people into cities with populations in the millions and the upward shift from the current 62 percent white-collar employment to 80 percent. *It was further predicted that by 2000 A.D. a computer terminal will be a standard home appliance and will be used in many different ways.* After a recent computer-assisted learning demonstration to school trustees, a number of people expressed an interest in obtaining a terminal for their homes. We asked, "Why?" The response was, "We want to provide our children with computer learning experiences." If the home terminal prediction carries any modicum of truth, it behooves today's society to provide computer learning opportunities for our youth preparatory for tomorrow.[2]

Furthermore, a computer model developed by the Club of Rome was used to project world population growth and future status of the natural resources.[3] Models and simulations, corresponding to those used by governments, can be used in the high school disciplines. Using the models, students usually play the role of an important person and make decisions which could influence the lives of many people. By entering information into the computer, various problems are raised which need to be faced. A sense of values is developed through the discussion with teachers and fellow pupils about the decisions which are to be made and the reasons for making them.

The *Programme Library Users' Manual* (PLUM) developed by the Computer Services Branch, Manitoba Department of Education, contains models and simulations which are being used in this manner by the teachers and students of schools who have computer terminals.

A student's creative ability is fostered when he reaches a stage of

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[2]*Winnipeg Free Press*, Thursday, December 12, 1974, Final Edition: Vol. 82, No. 66.

[3]*Ibid.*

wanting to construct his own programs and simulations. Such a student will be able, with or without help, to analyze the situation and to construct a model which can be used. He can then test the validity of his analysis by comparing the results of his program or simulation with further observations.

The computer can be used in other ways to facilitate learning. If we were to look with discretion at the impact computers are beginning to have in education, we would have to accept the fact that some of the educational developments, which began before computers were introduced, have been greatly accelerated by their coming. There has been a shift of emphasis from problem-solving to the formulation of solutions to problems. This formulation is an activity which needs to be clear and precise, and is facilitated by the use of a computer. Why? Because the computer obeys instructions explicitly and blindly and it can be a valuable aid in testing whether the formulation is correct. This new emphasis can be incorporated into learning in various disciplines. What is being underscored here is that problem definition and solution formulation should be emphasized as opposed to the straightforward learning of facts, and the computer is a significant facilitator in this respect.

As an aid to classroom lessons, a teacher may use the computer to enhance the presentation of a topic. For example, he may wish to show the distinction between different numerical methods in mathematics, to calculate quickly the results of a demonstration experiment, or to call on a data bank of information in the course of a special topic development. To illustrate the latter, R.D. Parker Collegiate at Thompson, Manitoba, has developed a program for storing in a computer file the academic record of each student. A student record file can then be accessed from the computer in an efficient way. Approximately 5,000 marks are entered into the student record files at the end of each trimester. According to the administrative staff, the entry, retrieval and updating of student academic records, using a computer, is now a pleasant and time-saving experience.

The computer can be used to match individual students with learning materials, resources and activities which fit their requirements as closely as possible. It can keep material and resource files which would include course packages and inventories of human resources and materials. This is commonly referred to as computer-managed instruction. In the direct involvement with the process called computer-assisted learning, the computer can be used to present instructional sequences wherein the computer serves as a tutor, analyzing the student responses to questions and branching according to his achievements.

In the drill and practice mode where the computer presents exercise after exercise for solution, the student's ability and confidence are quickly raised. This is being experienced in the Manitoba project for handicapped children and slow learners. With the computer's ability to sort, classify and analyze students' work, it can branch into remedial work when it recognizes a pattern of consistent errors. Such immediate remediation is difficult for a teacher to provide. In a classroom situation of 30 or more students it becomes an impossible task.

The computer can be used to facilitate for each high school student the opportunity to obtain an education that is best suited to his needs. By using

the computer to schedule school timetables, individualized programs of study can be programmed which allow the students a wider range of options from which they may choose. The administrative tasks associated with individualized scheduling in the schools with larger enrollments are more complex and the workload is overwhelming when using the manual methods.

It was Sigmund Freud, the founder of psychoanalysis, who once said in answer to a question: "My purpose is to help people love, work, and play, and enjoy all of them." Using Freud's thought, Edmund C. Berkeley, editor of *Computer and People*, had this to say: "... the computer, I believe, can help a person work, can help a person play, and can often give him so much enjoyment that he can fall in love with a computer." People who understand the computer and its potential for facilitating, accelerating and enhancing the learning processes agree for the most part with Mr. Berkeley.[4]

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[4]C.E. Berkeley, *Computer and People*, Vol. 23, No. 3, March 1974. Berkeley Enterprises.

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