

The information revolution

Science column by Alexander Dorozynski

Before the advent of writing, human knowledge was transmitted orally, from neighbour to neighbour and from one generation to the next. In the process, the wastage must have been considerable.

The written, and later the printed word, each represented leaps in man's capability of storing and transmitting information, and building upon it. Knowledge could be deposited outside the human mind that had created it, and thus become part of the collective heritage of mankind.

Now, another revolution is taking place rapidly, although it goes almost unnoticed in the sound and fury of everyday life. It is the information revolution, made possible by the rapid development of electronics and computer science.

Consider the solid state integrated circuits that started being incorporated in computers in 1960 or so. One "chip" then contained one component of a circuit. In four or five years this number had quietly risen to 10, and in 10 years, to about 1,000. Now, so-called large-scale integration (LSI) technologies have made it possible to produce digital elements with several tens of thousands of components on a single semiconductor chip less than 1 centimeter square in area. Physical and theoretical limitations have not yet been approached, and it is possible that by the end of the century, a single circuit may contain as many as one million elements.

Computers have become smaller in size, larger in capacity, more flexible, and faster. At the same time, computer functions are among the few things that have become cheaper.

In the industrial world computers have become everyday tools to carry out engineering and scientific calculations, and to play the more prosaic role of keeping financial, production, sales, and other records.

What about the developing world? It is true that the computer is a capital-intensive, labour-saving device, and

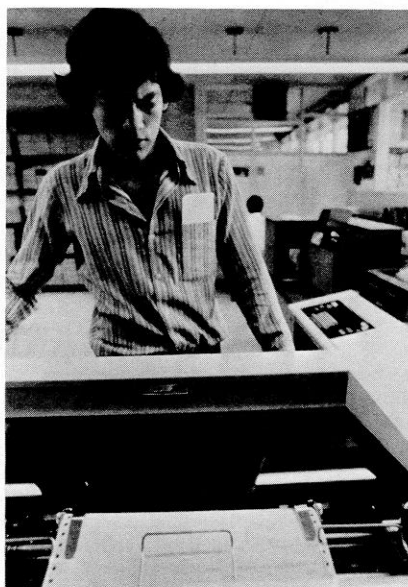


Photo: Jack Redden

that as such it does not appear to fit into the pattern of capital-saving and labour-intensive "intermediate technology" generally considered as appropriate to tackle many problems in non-industrialized countries.

But there are several aspects of computer science and technology that set it apart. Computers are the instruments of the new information revolution. They can multiply "brain-power", as the machines of the industrial revolution have multiplied muscle-power. It can be argued that in our increasingly information-based world, the mastery of information sciences is a key that opens the door to all other scientific and technological developments. Thus, while developing countries may find it inappropriate to invest heavily in overly specialized and costly science and technology, computer science may well be in an exceptional, privileged position.

Several arguments can be advanced to support this priority. One is that while the computer is a highly sophisticated electronic device, the principles underlying its capacity for processing

symbols are simple, and the cost of training "software" specialists is small in comparison to the return. Another is that the spectacular progress accomplished in electronics over the past few years is making the computer capital-saving as well as labour-saving. (For example, a single unit of mass storage can store the equivalent of millions of pages of text; its cost is below that of the paper and ink required for the printing of this information; and the cost of retrieving a specific item of computer-stored information is far below that of recovering the appropriate item of printed material).

Another argument is the desirability for developing countries to be able to select and control the information they need. Studies by UNESCO and other organizations show that the bulk of information reaching the South comes from, and is largely controlled by, the North. It is evident that more "horizontal" information flow is required, and this will take place only when the South has its own information scientists and technicians.

There are ways to effect this transfer of computer technology. Recently established or projected information systems are among the most accessible, and least costly means of doing it. One such system is AGRIS, established by the FAO with IDRC support as a kind of "world agricultural information fund". Another is DEVSIS, the projected Development Sciences Information System, which the IDRC has supported in the design stage.

An attractive aspect of such systems is that they help participants achieve several goals simultaneously: that of obtaining specific information required to carry out their own development projects; that of organizing their own internal information systems; and, last but not least, that of training their own information specialists.

It is only then that a country will be a participant, rather than a mere spectator, in the information revolution. □