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Personal Computing in Education and Research

In universities, time-sharing has never been a satisfactory system for using computers. Increased education produces more people who want to use the computer; more users, in turn, produce slower response time and greater waiting time for access. Thus, for any organization that encourages use of the computer, time-sharing becomes unsatisfactory. The development of the microcomputer stimulated thoughts for constructing an alternative system to time-sharing for effective use of computers. A personal computer, or work station, would solve the access problem and would provide uniform response time regardless of the number of users.

At Carnegie-Mellon University, this thinking has led to plans to develop a distributed computer system consisting of small computers connected with each other as well as with larger computers, specialized output devices, and the library—that is, an integrated computer network. This will enable faculty members to have computers in their homes for personal use and for communication with students and colleagues. With such a system, the main computer will be used primarily for problems that require more capacity than is available at the individual work stations. The ultimate aim is to have a personal computer for each student, for all administration and staff members who need one, and for each faculty member who wants one.

Unfortunately, no network exists that can handle the number of computers that we envisage—approximately 8000. A study done jointly with IBM indicated that it would be feasible to construct a network that could handle the expected number. Carnegie-Mellon and IBM have now launched a joint project to develop this network. IBM will have the ownership of the software defining the network and will be able to make the network available to other colleges and universities. Carnegie-Mellon will gain perpetual use of the software. However, no university should be committed to a single company, and although the computers in the Carnegie-Mellon network will be predominantly from IBM, it is our objective that computers from all major vendors be able to coexist within the system.

Since we consider a distributed system to be the computer system of the future for all educational institutions, we have applied to the Carnegie Corporation for a grant to form a consortium of schools that would be involved in the development of software to make effective use of the system. We are optimistic that the consortium will be organized.

In making the transition to the new system, we have deployed a number of the current personal computers throughout the university. Some 550 of these computers will be in use by faculty and students by the end of the academic year and will employ the current time-sharing system for communication. The response from the faculty in fine arts and humanities has been enthusiastic, and they have shown tremendous ingenuity in using the personal computer to help achieve their educational and research goals. Our experience does not justify the fear expressed at many institutions that faculty from these disciplines will reject the computer.

An environment that is densely populated with computers represents a new type of world. We need to know the impact of such an environment on social interactions. We also must study the effects of decisions made by the process of communicating over a network, as opposed to face-to-face meetings. There are, in fact, a large number of issues that require study at the inception of the radical change we are making. As a result, we have created a committee of social and computer scientists to study these and similar important questions as the environment changes.

I believe that this system will have consequences that one day will be looked upon as a revolution in higher education. The key to making this revolution successful is the development of the proper software. The intelligence and ingenuity of all educators will be called upon in the attempt to realize the educational potential of a network of individual work stations.—RICHARD M. CYERT, *President, Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213*