Soviets Launch Computer Literacy Drive

High school students are now being taught the basics without machines; a serviceable domestic PC is yet to be produced

ONE of the early results of Mikhail Gorbachev's assumption of power in the Soviet Union has been a dramatic new emphasis on computer literacy in the general population, which is to be spearheaded by the school system.

Last March, the Politburo announced that the goal was to have 1 million microcomputers in the nation's 60,000 secondary schools by 1990. At present, there are no computers in the vast majority of schools, but that has not deterred the Soviets from preparing a basic course on "informatics" which was introduced into secondary schools in September.

The literacy drive coincides with the latest educational reform, designed by a commission headed by Gorbachev before he became premier. The reform will increase the total number of years devoted to primary and secondary education from 10 to 11 and is directed toward beefing up secondary education and improving the training of future workers by mandating new ties between schools and industry.

The new revolution has been trumpeted widely in the Soviet press. The particulars are vague, and Western observers regard the program so far as very inefficient and of dubious practical benefit. Nonetheless, it is being promoted by two increasingly visible individuals: Evgeny P. Velikhov, vice president of the Soviet Academy of Sciences and an influential adviser to Gorbachev; and A. P. Ershov, head of the computer center of the Siberian branch of the Academy, who is the chief designer of the school program. According to William McHenry, an expert on Soviet computers at Georgetown University, the campaign signals a reassertion of the Soviet Academy in computer matters—a field that was largely taken over by ministries related to defense and heavy industry during the 1970's.

The obstacles to progress are significant: the Soviets have no microcomputers to speak of and apparently do not yet have the capacity to produce them on a large scale. Then too, the task before them is immense—there are 90 million elementary and secondary students in the USSR, which is almost twice the school-aged population in the United States. And, in contrast to this country where the education system has been the last major sector to undergo computerization, Soviet schools are being called upon to lead the way. This is a society where computer applications are largely confined to the military and certain segments of industry. There are no hackers in the Soviet Union. The technical schools of higher education have low priority when it comes to distribution of computing equipment. Computers are virtually unknown in the commercial sector, where business is still commonly done with abacuses. There are no electronic toys in the stores; even typewriters are hard to come by. The Russians do not have personal checks, much less electronic funds transfer.

Evgeny P. Velikhov

Encouraging computer literacy in Russia.

Nonetheless, Soviet officialdom has now come to recognize that a broad base of computer literacy must be developed or the technology gap with the West will continue to widen rapidly. One sign of their seriousness has been the proliferation of departments and offices concerned with informatics in the schools. A major development has been the creation of a new body in the Soviet Academy of Sciences, the Department of Informatics, Technology and Automation, headed by Velikhov, which is to oversee and coordinate related activities in a number of the academy's institutes. Velikhov, a physicist who heads the USSR's magnetic fusion program, has his fingers in many pies and is regarded as the closest thing Gorbachev has to a science adviser.

The Soviets regard the literacy program as enormously significant. Last summer, they claim to have trained 60,000 9th and 10th grade teachers in a program run by Moscow University. The new introductory course is based on a textbook composed under Ershov's direction, called *Basics of Informatics and Computer Technology*. There are two versions of the text, one for use with computers and one without. The book, parts of which are now being translated at the Carnegie Corporation, describes the uses of computers and explains algorithms and rudimentary programming. Training is being supplemented by films, but for the most part, neither teachers nor students have had the opportunity to lay their hands on a computer.

At present, there are some pilot teaching labs equipped with computers in Moscow, Leningrad, and Novosibirsk, according to Ross Stapleton of the University of Arizona. The earliest avenues for the introduction of machines are likely to be vocationally oriented training centers, known as "interschool production and study combines" that have been proliferating since the 1970's. Set up by local industries, they are the Soviets' version of the "adopt-a-school" programs being organized by American companies.

Conservative educators in the Soviet Union, as elsewhere, are said to view computer training as primarily a vocational matter. But the innovators are looking eventually to getting them into elementary schools. According to Stapleton and Seymour Goodman of the University of Arizona, Ershov believes "there is practically no lower age limit for beginning to become familiar with the computer." And he predicted to an interviewer from *Business Week* that "children entering college in two years will be clamoring for computers." This, in turn, he said would spawn a demand for PC's in the production sector.

Where all these PC's will come from is still an unanswered question. Soviet computer production has always focused on mainframes and minicomputers (mainly copies of IBM machines), and efforts to produce a respectable PC have so far been unsuccessful. What the Soviets would like to do, according to observers, is purchase an entire manufacturing facility for domestic production. But American export laws forbid the sale of turnkey projects to the Soviet bloc, as does COCOM, the trading coalition made up of NATO countries and Japan.

The department headed by Velikhov has been working on specifications for school computers, and a number of British and American firms have been actively seeking to do business with the Soviets (technology export controls do not restrict the sale of the kind of 8-bit machines they seek). The only foreign purchase the Soviets have made so far has been 4000 Yamaha microcomputers from Japan.

It seems unlikely that the Soviets will try to stock their schools with foreign computers, given their shortages in hard currency. Besides, says McHenry of Georgetown, "for anything put into wide use, they almost always opt to build their own." This remains to be done. There has been limited production of a domestic educational computer, the Agat, but this machine, regarded by outsiders as a pretty poor specimen, was never mass produced. No one seems to know just why the Agat fizzled, although Sovietologist Loren Graham of the Massachusetts Institute of Technology speculates that the computers were made with a limited supply of foreign parts that ran out. Graham said that when he visited Moscow electronics stores in November, there was one Soviet-made PC for sale at one store: for 600 rubles (about $750) a citizen could buy a central processing unit with a modest (32K) memory, no external memory, and no monitor (the unit can be hooked up to a television set). Psychologist Michael Cole of the University of California at San Diego says Velikhov recently showed him a good quality prototype PC that he said would be able to be sold for the equivalent of less than $300, but observers are skeptical about that claim.

Stapleton and Goodman, in an article in *Abacus*, estimate that the Soviets have only produced about 50,000 microcomputers of all types since 1980. They don't seem to be able to make good disk drives and have been importing them from East Germany, Hungary, and Bulgaria. Their software, says Stapleton, is "abysmal." Equally troublesome is the almost complete unavailability of parts and services.

On a larger scale, the infrastructure does not exist to encourage the spread of PC's. Telephone lines are too poor to use for data transmission, and modems, networks, bulletin boards, and publicly accessible data banks are nonexistent.

There is obviously no way microcomputers could be fully integrated into Soviet society as it is presently structured. For one thing, as Graham says, every PC is a potential printing press. Sovietologists point out that the pattern of adopting microcomputers is and will probably remain entirely different from the way the phenomenon has

evolved in the West, where it has been more or less a grass roots affair. At present, the leaders are not interested in promoting computers for commercial transactions, and use of the machines is likely to be tightly controlled. This is not difficult given their high costs and the extreme centralization and compartmentalization of information in Soviet society. "The government will be able to call up anyone's files and review what's on the system," says Thane Gustavson of Georgetown's Center for Strategic and International Studies. Printers, like photocopying machines, can be locked up in places of employment. In teaching labs, they are linked in closed networks, with disk drives and printers only on the teachers' machines ("the collective use of personal computers" is a current catchphrase according to Stapleton).

The situation is now very much in a state of flux and Soviets are becoming increasing-

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ly eager to make contact with Westerners knowledgeable about computers in education. Frederic Mosher of the Carnegie Corporation says that when a delegation from Carnegie was in Moscow recently, Velikhov met with members of the group on four separate occasions. The Carnegie group came away with a new agreement with the Institute on Problems of Informatics which would involve pilot experiments in Soviet and American classrooms. It also calls for an exchange of visits by experts next spring to discuss computer-based instruction, primary school software, curriculum design, and teaching methods.

The American Council on Learned Societies, parent organization of the International Research and Exchanges Board (IREX), also broadened their long-standing exchange agreement with the Soviet academy in a November visit to Moscow. Among various other joint cultural projects, the 5-year agreement calls for cooperative research on communications technology and its effect on society.

Cole reports that the Soviets are also keenly interested in international communication by computers, which is fairly easy to facilitate on international systems once they get outside their own borders. He is working on the creation of a new IREX subcom-

mission on communication which would explore, among other things, the use of interactive video meetings, computer conferencing, and how written materials are translated between Russian and English.

Indeed, it may be through international networks rather than domestic systems that the Soviets become fully aware of the potential of modern communications technologies. Although government involvement has fallen off with the collapse of détente (the intergovernmental agreement on cultural exchanges was renewed in Geneva after a 6-year lapse), there has been a good deal of activity among private organizations. For example, in October, the Ark Communications Institute in California established an ongoing computer link with Moscow, using the New Jersey Institute of Technology's Electronic Information Exchange System to converse with the Soviet academy's Institute for Automated Systems. Joel Schatz of Ark has met with Soviet academy officials and has ambitious plans for joint projects, including linkups between Soviet and American high schools, and joint research on alcoholism, on planning a global peacetime economy, and even on magnetic fusion. Cole also reports that the American Academy of Arts and Sciences is involved in a proposal for a joint teleconference on acid rain.

At present, says Gustavson, the Soviets "are universally worried about computers." They are "dazzled and frightened by what's happening in the West," says Graham. The fervor will undoubtedly wane for, as Gustavson observes, "Moscow is extremely fad-prone." But the Soviets do appear to have become sufficiently aware of the economic importance of computers to be ready for a serious new effort. Experts differ on the ultimate role of computers in the USSR. Gustavson, for example, contends that the Soviets will be able successfully to capture the "essence" of the computer revolution's benefits without compromising social controls. Certainly, at this point, the technical obstacles far outweigh concerns about a runaway information explosion. Just as the massiveness of the country has foiled invading armies, the cumbersomeness and inertia of the system could well subvert any computer take-over. Graham, however, believes the society may eventually arrive at a critical juncture. "They can control computers almost indefinitely," he says, "but in the long term they will pay such a heavy price" in terms of the growing gap in economic growth and labor productivity that they may question the value of clinging to their old ways. "What hasn't dawned on them yet is the heaviness of the price." ■
CONSTANCE HOLDEN