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# Computers May Change How Students Learn

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*Knight-Ridder Service*  
SAN JOSE, Calif. — Computer software being created at top-flight universities may radically change how students learn.

A far cry from today's classroom software for calculations or writing, future software will be

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losed heavily with animation and be capable of complex simulations of real-world problems.

If one proposal at the Massachusetts Institute of Technology is successful, students could practice French by strolling Paris streets in search of an apartment without budging from a computer at the dormitory.

MIT's experiment, called "Project Athena," and a similar

"Project Andrew" at Carnegie-Mellon University are expected by computer makers to influence strongly the design of advanced computer work stations for the commercial market by 1987.

A new class of software and natural price erosion for work stations are expected to send demand for computers by colleges soaring.

Universities anticipate the day when powerful work stations, which now cost roughly \$20,000, will be affordable for college students. In 10 years, some educators say, most major colleges will require students to buy an advanced work station for daily studies.

Manufacturers that split today's \$4 billion university market drool at the prospect of an ever-ballooning market.

Each year, 2.5 million freshmen enter U.S. colleges, accord-

ing to government statistics. Companies want to sway students' buying decisions in the hopes of continuing to influence them when they buy business computers.

International Business Machines Corp. and Digital Equipment Corp. have donated millions of dollars in equipment and personnel to university software projects to stay on top of developments.

Apple Computer Inc. co-founder Steven P. Jobs is a regular visitor on campuses where these projects are under way as he sets the course for his new company, Next Inc. Other computer-makers, including Sun Microsystems Inc. of Mountain View, Calif., work closely with colleges, so that upcoming computers will fit the universities' needs.

Universities have a "wish list."

They want the next generation of computer work stations to be very powerful, but cost only \$3,000. This dream computer is called a "3M" machine because it would have the following features:

—One million instructions per second (mips), which is many times faster than today's personal computer.

—One million bytes of memory, equivalent to 500 typed pages, or double the storage of the Macintosh 512K computer.

—One million pixels, or dots, or a screen resolution that's at least twice as sharp as the Macintosh.

The technology of the "3M" machine exists today in expensive, powerful minicomputers, such as Digital Equipment Corp.'s MicroVax II. But the MicroVax II's price of \$20,000 is six times more than universities want to

pay for a "3M" computer.

"We don't expect manufacturers to meet the \$3,000 price in 1986, but certainly the price will hit \$6,000 to \$7,000," said James Morris, director of Carnegie-Mellon's Information Technology Center in Pittsburgh, where Project Andrew is based.

Universities are gearing their software projects toward very powerful computers for two reasons: They expect prices for work stations to drop steadily and, typically, the easier a program is to use, the more computing power it takes to run it.

"We didn't want to beat our brains out squeezing software into small machines when we think the big, cheaper machines are around the corner," said Morris, a former research scientist for Xerox' Palo Alto Research Cen-

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ter. "Every major computer manufacturer in the next two to three years will have a machine that fulfills our needs," said John P. Crencine, Carnegie's senior vice president for academic affairs.

Apple Computer's Bud Corrigan, who is responsible for selling to universities, said that by September 1987 "it is totally within the realm of possibility that several manufacturers will have a '3M' machine at the price universities are requesting."

Wayne Rosing, Sun Microsystems' vice president of engineering, expects that by the fall of 1987 "3M" computers will flood universities and make that market "ultimately bigger than the personal computer market."

Jack McCredie, who directs Digital Equipment's external research program, oversees his company's work at MIT. Digital has donated \$25 million in computers and staff to MIT's Project Athena simply to get a head start

on new ideas for work stations and software.

The work going on at MIT "will have tremendous impact on the way we produce computers in the future," he said. "I don't think massive growth of the university market is the focus for us. How to build a better product for the commercial market, that's where the money is."

In fact, given the stringent budgets within which most colleges and, for that matter, most students must operate, advanced work stations are expected to trickle onto campuses in the next 10 years, not flood the market all at once, Carnegie's Crencine said.

IBM's Les Comeau, who oversees IBM's \$25 million project at MIT and \$20 million project at Carnegie-Mellon, declined to speculate how much of what is being done at the universities will find its way to the business market. While the universities hope that the business market shares their desire for a "3M" machine, no one is sure whether the mar-

kets will have the same needs.

As with any computer, a "3M" machine's value will be in its software.

MIT's Project Athena and Carnegie-Mellon's Project Andrew focus on inventing software that will allow hundreds of work stations to be connected on a network so they can communicate and share information.

Leading the way for other colleges, MIT and Carnegie-Mellon are at the early stages, preparing to string cable for networks for the day when computers are commonplace in every dormitory and college classroom.

The other and possibly more important thrust at universities is creating applications software — programs that could change how teachers teach and students learn.

Universities are beginning to coordinate their efforts so that they collectively write "portable" software, or programs that run on any "3M" work station, regardless of which company makes it.