

Colleges: The next computer bonanza?

By Mary A.C. Fallon
Mercury News Business Writer

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 heavily dosed 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 com-

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— Wayne Rosing, Sun Microsystems

puter 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 that 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, according to government statistics.

Companies want to sway students' buying decisions in the hopes of continuing to influence them in future years

when they buy business computers.

Giant 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

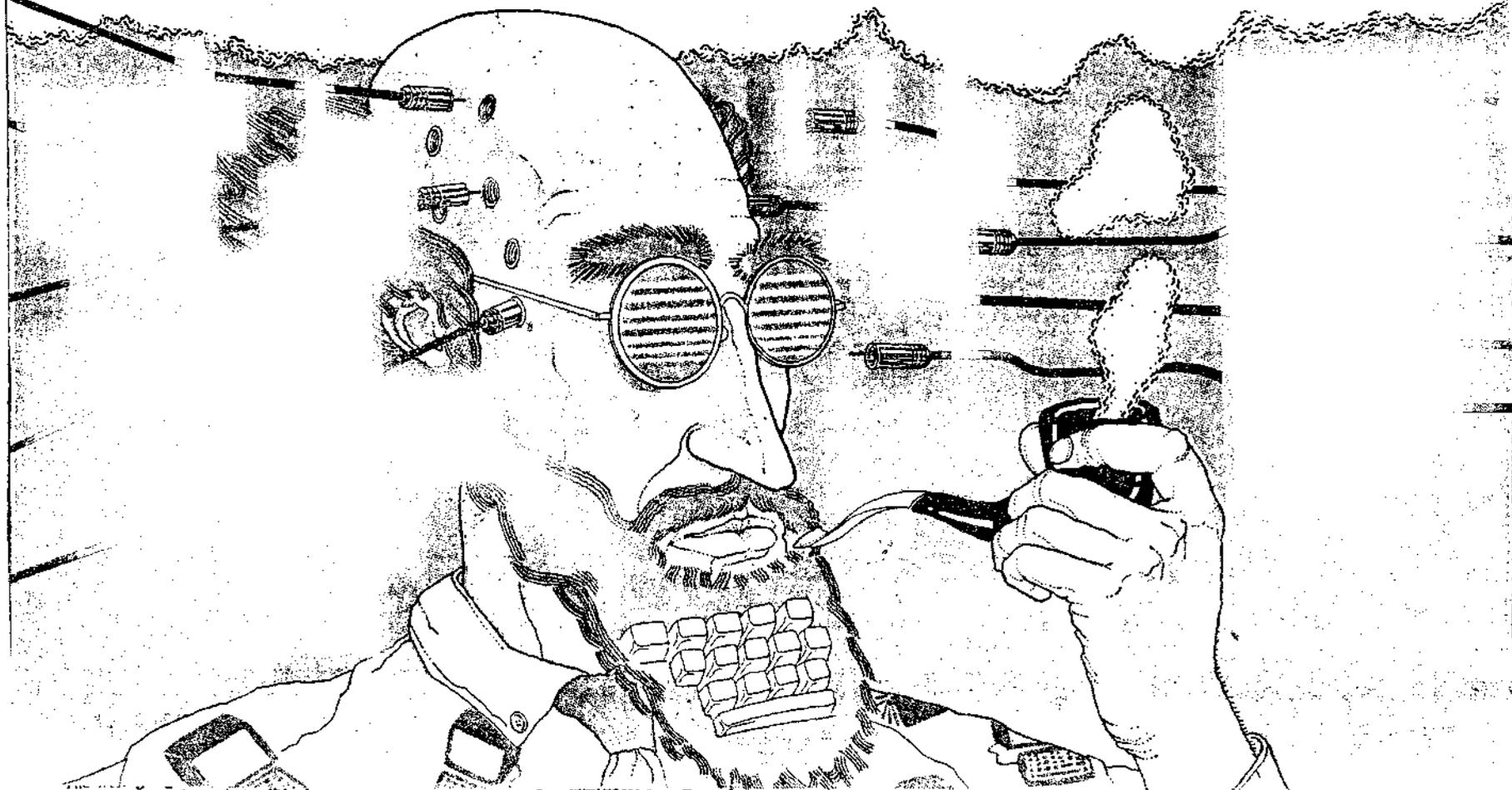
new company, Next Inc. Other computer makers, including Sun Microsystems Inc. of Mountain View, work closely with colleges so that upcoming computers fit the universities' needs.

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:

- ✓ 1 million instructions per second (mips), which is many times faster than today's personal computer.
- ✓ 1 million bytes of memory, equivalent to 500 typed pages or double the storage of the Macintosh 512K computer.
- ✓ 1 million pixels, or dots, or a screen resolution that's at least twice as sharp as the Macintosh.

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Colleges hope projects will prod commercial market

SOFTWARE, from Page 1E

The technology of the so-called "3M" machine exists today in expensive, powerful minicomputers, such as Digital Equipment Corp.'s MicroVax II. But the MicroVax II's current 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 Athena 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's Palo Alto Research Center.

"Every major computer manufacturer in the next two to three years will have a machine that fulfills our needs," said John P. Cregine, 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 point universities are requesting."

Wayne Rosing, Sun Microsystems' vice president of engineering, expects that by fall 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.

"Lead time on ideas is the whole game," McCredie said. "How we internalize depends on how smart we are."

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Innovative software: from theater to finance

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Despite all the hullabaloo about colleges requiring students to buy personal computers, few colleges — possibly as few as 10 out of more than 3,000 in the United States — expect students to own computers. And few universities are regularly using computers in classrooms.

A major barrier to computers in every classroom is the lack of software programs, according to educators and computer manufacturers.

"There is very, very little teaching software on the market today," said Les Comeau, who oversees International Business Machines Corp.'s participation in computer research at universities.

There is a wide gulf between software on the market today and the programs being dreamed up at the Massachusetts Institute of Technology, Brown University, Carnegie-Mellon University and other colleges.

At Stanford University, software being written by students and teachers for a variety of courses is among the most advanced available at universities.

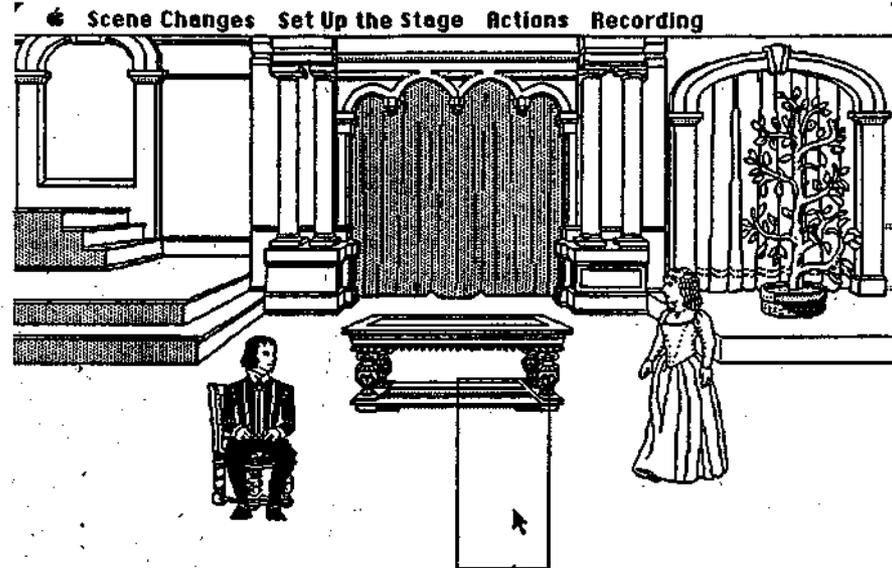
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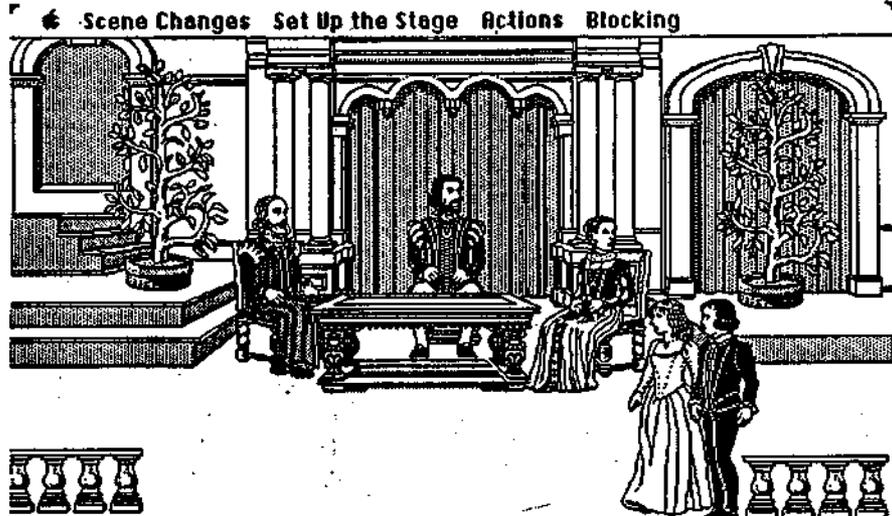
Scholars of the economics of France during the reign of King Louis XIV usually study all sorts of tables about grain imports and other businesses to examine how the system worked.

But studying seems a lot more fun when "The Would-Be Gentleman" pops up on the computer.

An idea of Michael Carter, director of Stanford's Instruction and Research Information Systems (IRIS) and Carolyn Lougee, associate dean of Humanities and Science, "The Would-Be Gentleman" is a game where stu-



No Selection	Ready	Make Menu Selection or Practice Blocking	Speed-Normal
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Stanford University Faculty Author Development Program

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Department, gives every student a chance to direct a play — something time and resources don't permit.

"Simple animation allows the students to block out movements just like a director would on stage," Charles Kerns of the FAD

University. "The point of the programs was not to end up with exemplary software... that's a

five-year project to write college curriculum software.

The universities are making a stab on a question that has puzzled educators for centuries: What is the best way for students to learn?

"What Project Athena did for us humanists is open up a world-class toy shop we can exploit," Murray said. "What we've got here — artificial intelligence technology, laser (computer) memories and interactive audio/video — is a new medium for structuring education in a new way."

A software program that puts a student on the cobble streets of Paris in search of a place to live is part of that work.

To teach French, the program — now just in the design stage — would display a typical newspaper's classified ads, then visually move the student through the city. At each private apartment, the computer would come to the door and speak with the student, who would respond appropriately to see a flat.

Conversation, rather than standard drill and practice common in today's language software, "would expose a student to native speakers in a cultural environment instead of the teacher being the only person the student hears speaking French," Murray said.

Another proposed program, one in German, would let a student talk to a poltergeist who floats across the screen and messes up a room when the student pronounces commands correctly.

Software that universities today doesn't offer that level of sophistication. The programs are geared to doing tasks such as calculations or letter-writing.

"What we're trying to do with Project Athena is going beyond (what's available now) to get at the essence of what learning is about and what it could be with a computer, rather than some narrow definition of what it is," said William F. Hogue, assis-

tant director of MIT's Project Athena. Hogue anticipates that software, because it will be heavily on artificial intelligence technology, will be "intuitive" that sense, the software operate much like a human because, after a student with it for a while, the program would recognize the student's learning patterns and re-

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

IBM's Les Comeau, who oversees IBM's \$25 million work at MIT and \$20 million at Carnegie-Mellon, declined to speculate how much 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 markets will have the same needs.

Comeau believes that the university projects "will have a tremendous impact on education."

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

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Another program, "The TheaterGame" by Larry Friedlander, a professor with the English

Department, gives every student a chance to direct a play — something time and resources don't permit. Using a Macintosh computer, students can call up an Elizabethan stage and assemble a wide variety of chairs and other props. As characters appear on the screen, students can easily move them around and have them appear sitting, standing or lying down.

creating applications software — programs that could change how teachers teach and students learn.

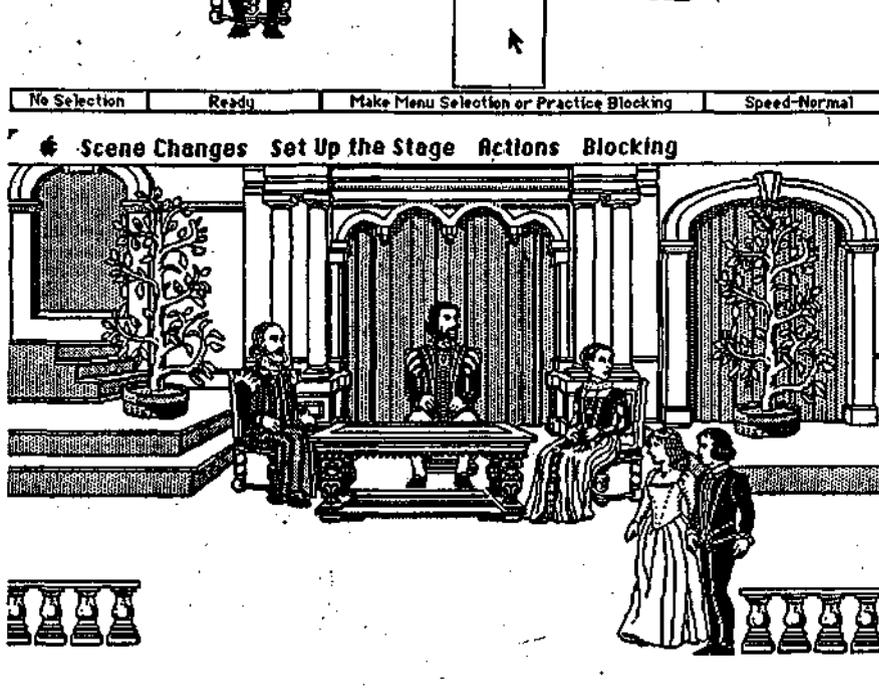
Universities are beginning to coordinate their efforts so that they collectively write "portable" software, or programs that run on any "3M" work station regardless of which company makes it. Many hope that the chief result of projects at MIT, Carnegie-Mellon and other colleges will be a standard way for work stations to hook into a network and run programs.

If the universities create these

networking and operating systems standards along with their own applications software, manufacturers will have to fight for customers on the basis of price.

"It is a brilliant strategy on the universities' part," Rosing said. However, the prototypes under development are just that — early test models — and there hasn't been enough time to create a real commercial product yet, Morris said.

"There are a lot of rough edges in (Project) Andrew," he said. "There's potential. It depends on



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"The program is simple enough so students don't have to spend all their time learning how to use the computer," he said.

"The TheaterGame" is being tested at several elementary and high schools, as well as at Stanford and San Francisco State

University.

"The point of the programs was not to end up with exemplary software... that's a bonus," Jasinski said. "We ended up with software that's a lot more than anyone bargained for."

"The goal was to acclimate the faculty to having computers in the classroom so they could turn around and set the direction for the way Stanford should integrate computers on campus."

Carnegie-Mellon's Crepine believes strongly that the software under development is vital if a "revolution" in computer-aided education is going to occur. He is lobbying universities to cooperate in software development so that as a group of customers they can influence manufacturers and textbook publishers that are branching out into educational software.

"We want to make computing such an essential tool in all areas of the university, not just in engineering and science, but in liberal arts and fine arts, that it will seem as naturally important as libraries," he said.

Computing power at every student's fingertips could drastically change education, not only at colleges but at high schools as well. But the revolution will be slow. Always tight for dollars, most schools are expected to lag far behind the commercial market in turning today's experimental software into tomorrow's homework assignment.

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Software that universities buy today doesn't offer that level of sophistication. The programs tend to be geared to doing tasks such as calculations or letter-writing.

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Hogue anticipates that future software, because it will rely heavily on artificial intelligence technology, will be "intuitive." In that sense, the software would operate much like a human tutor because, after a student works with it for a while, the program would recognize the student's learning patterns and modify itself.

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