Dartmouth's Time-Sharing System Captures College, Creates Confidence

John G. Kemeny, computer genius, Ivy League college president, mathematician, philosopher, and football nut, sat down at the teletypewriter console in his office. Dartmouth College was in the last stages of its capital fund drive. The trustees were coming the next week. Kemeny needed some projections: How well was the drive going? What would Dartmouth's financial position be in five years?

Kemeny punched away at the teletypewriter and, moments later, he had the answers to his questions. "I just don't see how an American executive can get by without a computer," Kemeny told a recent visitor in describing how he uses the Dartmouth Time-Sharing System.

It is perhaps easy to understand Kemeny's use and enthusiasm for the system, since it was all his idea. But what is not quite so easy to understand is that nine out of 10 of Dartmouth's 3,000-plus undergraduates use the Dartmouth Time-Sharing System (DTSS). Furthermore, Kemeny has a sneaking suspicion that at least some of the one in 10 students

Thomas E. Kurtz

who do not show up in the user statistical tables learn to use the time-sharing system on the sly. Kemeny claims that Dartmouth students far and away have more experience with computers than students from any other college anywhere. And this in spite of the fact that Dartmouth is primarily a liberal arts college and not a technical institution.

"From the start in 1963, Tom Kurtz and I thought that instead of training computer scientists, computers would make a fine learning tool for students at a liberal arts college," says Kemeny. "Instead of worrying about 100 students who would get computer jobs, we worried about thousands who would be able to use computers." Dr. Kemeny founded the DTSS along with Dr. Thomas E. Kurtz, who is professor of mathematics and director of Dartmouth's Kiewit Computation Center. In addition Kemeny and Kurtz are the co-authors of BASIC.

Slow beginning

It all started in 1959 when Dartmouth obtained a Bendix LGP-30 computer with just 4K of memory and a cycle time in the millisecond range. Kemeny and Kurtz quickly discovered that Dartmouth undergraduates could be extremely adept at programming. "In that way, that little computer had a great impact on us," recalls Kemeny.

Once the decision was made to build a time-sharing system, the whole project moved quickly. The hardware — a GE-235, a GE Datanet-30 communications computer, and a disc file — arrived in early 1964. Undergraduate programmers were writing programs for the equipment even before it was installed. In the fall of 1964, the system was available for general use by Dartmouth undergraduates and a terminal was installed for high school student use at nearby Hanover High.

"We trained more than 85% of our freshman class that year," says Kemeny. "The time-sharing system was an absolute instant success with the students."

However, the system was not exactly an instant success with the Dartmouth faculty. Kemeny recalls that one "distinguished humanist" at Dartmouth delivered a lecture attacking the "machine age" when the computer system was installed. Other faculty members resisted the computer installation, but even the staunchest holdouts among the faculty finally had to learn how to use the DTSS in self-defense, Kemeny says. Now, the computer installation — housed in the large and modern Kiewit Computation Center — is used

J. G. Kemeny

heavily by the faculty.

The center's hardware is now configured around a Honeywell 635 (formerly a GE 635), and the equipment has handled more that 19,000 jobs in a single day. More than 100 undergraduate courses at Dartmouth make significant use of computing and the Computation Center. Students at Dartmouth's graduate business school, the Amos Tuck School, make the most extensive use of computers.

Kemeny, who before he became president of Dartmouth taught both mathematics and philosophy, likes to tell one interesting anecdote about the system. He is an intense football fan, and in 1965 when Dartmouth won the Lambert trophy — for being voted the best football team in the East — Kemeny commemorated the achievement by writing a football program on the DTSS. The game, which has since been further sophisticated, has been a great favorite of students and alumni, and stories abound about famous visitors to Dartmouth who are lost for hours in the Computation Center playing football. But there is an

educational advantage to the football game, too. The game helps remove the mystique that, for laymen at least, often surrounds computers. "After you have played football with the computer, you don't fear it," notes Kemeny.

Easy did it

Dartmouth has made it easy for its students to use the DTSS. BASIC, the simple programming language, was one way — a typical student learns BASIC in two hours. When a freshman arrives at the New Hampshire college, he is given a student indentification number, which is also his computer number. Further, the some 150 Teletype ports at the Kiewit Computation Center are readily accessible, much like library carrels.

DTSS' data bases are not limited to areas of technical, engineering, and commercial interests. For instance, there is a program called Project IM-PRESS that provides students with data in the social sciences. In peak usage periods — usually towards the end of academic terms — there may be as many as 200 daily and 750 weekly IMPRESS runs. For example, one student was observed recently querying the data base on "faculty attitudes to coeducation." He found a substantial amount of raw data and enough information to point in the direction of finding additional information on the subject.

On the other hand, there are always a few students who turn out to be brilliant programmers. Most of the systems programming on DTSS is performed by undergraduates.

"We never know what to expect from our undergraduates," says Kurtz. "We just open our doors at Kie-

wit and we always get a couple of very bright programmers. I know of one programmer here whose talents are such that he is worth $100,000 a year." Ironically, Kurtz points out that most of the best programmers don't go into the computer industry per se, but into one of the more classical scientific fields, although they tend to use computers heavily in their later work.

Some Dartmouth graduates are finding that they can demand more pay and better jobs because they know how to use computers. In particular, graduates of the Tuck Business School are finding that they are more in demand because of their computer backgrounds. Conversely, many Dartmouth students are asking prospective employers where their terminals are when they interview for a job. As another indication of the spread of computer know-how by the DTSS, Kemeny notes that his high school daughter, who has been interviewing colleges, has been inspecting the computer facilities offered by various schools. "She has been using computer terminals since she was in the sixth grade," says Kemeny. "She wouldn't dream of doing a laboratory experiment without using a computer."

The Kemenys have a terminal at home, but they are not exactly privileged in this regard. The Dartmouth Time-Sharing System is on-line to 15 colleges and 35 secondary schools that make terminals readily available to their students. The secondary school students are putting pressure — subtle pressure to be sure, but pressure nonetheless — on colleges to upgrade their computer facilities, while Dartmouth graduates are helping encourage more busi-

nesses and professions to improve their computer facilities.

Horrors

In spite of the gains at Dartmouth and in spite of the fact that a few other colleges are beginning to emulate the Dartmouth program, Kemeny says he is "horrified" that the time–sharing concept hasn't spread among colleges more rapidly than it has.

One problem, he feels, is the headlong rush many in education circles made into the so-called field of educational technology and the dismal results the push in the area produced. The failure of the "teaching machine" to approach its goals has tended to give the whole educational electronics industry a black eye, Kemeny feels.

Future dating

And what does the future hold for time-sharing? First of all, Kemeny believes there will be more regional computation centers in colleges patterned after the Dartmouth experience.

"And the long range has to belong to time-sharing, too," says Kemeny. He doesn't see minicomputers invading the home in significant numbers because minis don't have the sophistication to provide a simple language, as time-sharing can, nor can minis provide access to the large data bases that will be essential for successful home use. Nevertheless, Kemeny doesn't see time-sharing terminals as commonplace items in homes—like tv sets today—until 1990.

When asked why so few commercial time-sharing companies have been profitable, Kemeny paused a moment, then presented the idea that he felt too many companies jumped into the field too soon, creating a price-cutting environment in which practically no company makes money.

Whatever the future may hold for time-sharing, Kemeny no doubt is warmed by the sight of the stream of Dartmouth undergraduates who, on big football weekends and at winter carnival time, take their dates to the computation center. That is something of an accomplishment. Nothing against libraries, but who ever heard of college men taking their dates to a library on a big weekend?

— **David Gardner**
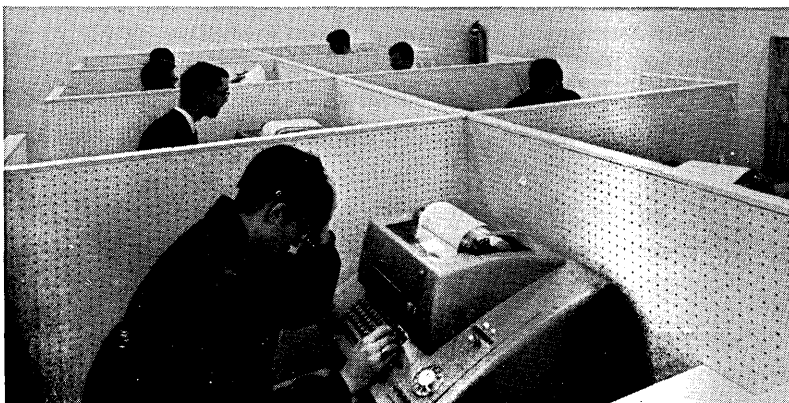
Kiewit Computation Center: Great place to take a date on a football weekend.