The College in a Computer World

Dr. Lilly Rappaport studied computer science at the University of Virginia . . .
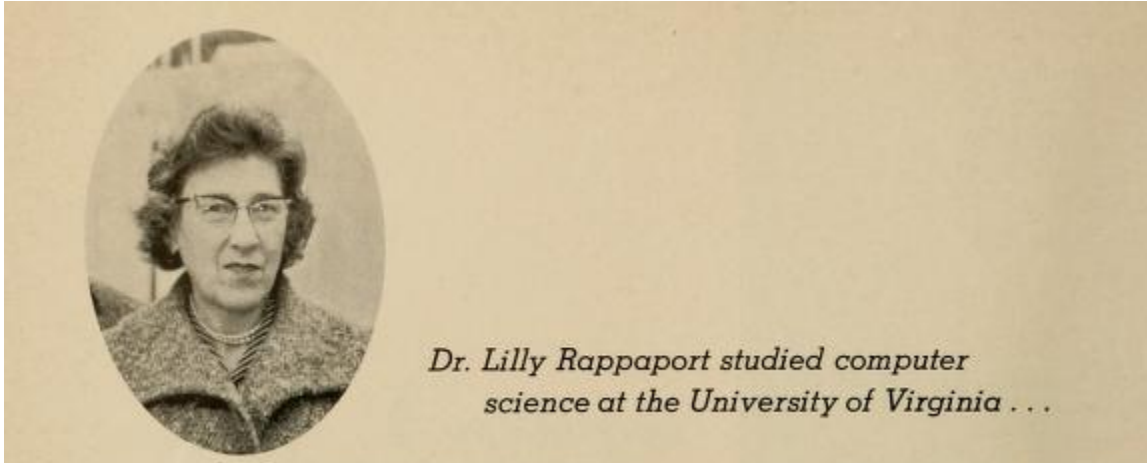
NEXT semester, Sweet Briar initiates a course in the computer and computer programming, and in January student records will be kept by data processing. By September 1967 many college records and all administrative bookkeeping will be computerized. Data processing will be available for faculty research, and mathematics graduates will not have to answer "no" to the question that is becoming standard to job applicants, "Have you had any experience with computer programming?"

How can a small liberal arts college like Sweet Briar embark upon such a new, and surely expensive, undertaking? And why should it? The answers to these two questions concern the whole college and are of great interest to alumnae, for data processing at Sweet Briar is revolutionary in many ways.

The "How" is one of the ways. For to make data processing feasible, Sweet Briar has joined with Lynchburg College and Randolph-Macon Woman's College to establish jointly the Educational Computer Center. Located in the Lynchburg Transit Company Building in Lynchburg, the Educational Computer Center (ECC) will begin the first of January the operation of an IBM 1401 two-tape, two-disk computer, under the direction of Donald G. McCants of Lynchburg. Mr. McCants is a former account representative with the date processing division of IBM Corporation. Responsible for the development of ECC has been a three-man coordinating committee: John Woodroof, assistant business manager at Lynchburg College, Russell R. Picton, director of development and public relations at Randolph-Macon Woman's College, and Peter V. Daniel, assistant to the President and Treasurer at Sweet Briar. Mr. Daniel is chairman of the committee.

DATA processing has been under consideration at Sweet Briar for six years, according to Mr. Daniel. A few small colleges converted to data processing early in computer history, but at

great expense, and since the question, "Should Sweet Briar do so?" was one that no one in the administration felt compelled to decide, the College joined with the two others to retain Systemation, Inc., to conduct a feasibility study for all three area colleges. Should each college work alone toward data processing? Should each college go into a service bureau separately? Should the three colleges pool resources and purchase or rent equipment themselves? Systemation, Inc.'s affirmative answer to this last question is unique. No other three liberal arts colleges in the nation have joined resources in this manner for data processing. The Systemation report was approved by the trustees of all three colleges, and the company was retained further to aid during the implementation period.

For administrative bookkeeping in the areas of admissions, student and alumni records, and business office records, data processing will undoubtedly prove more and more useful. But is it necessary that small liberal arts colleges teach data programming and make data processing available for research? Is this not a job for larger centers of learning? Dr. Lilly Rappaport, professor of physics at Sweet Briar, was somewhat skeptical about such necessity. "I took myself to the computer center at the University of Virginia, during a Sabbatical leave second semester of last year, and I found out," she said, her eyes shining with amusement and enthusiasm. "The answer is yes."

TO EXPLAIN, Dr. Rappaport brought out a list of statistics. In 1950, there were ten to fifteen computers in the United States. This year, there are some thirty-five thousand, twenty-five hundreds of them costing more than a million dollars. It is predicted that by 1975 there will be eighty-five thousand computers in use in the United States, four thousands of them costing more than a million dollars.

This year, two hundred thousand persons are employed as systems analysts and programmers. In 1970 – only four years from now – the number will be five hundred thousand. Clearly, data processing is becoming our way of life. To quote a current corporate advertisement, "It's a computer world."

Into this world Lilly Rappaport stepped, somewhat furtively, when she enrolled at the Computer Center in Charlottesville last winter. The University of Virginia has two computers. One, a Burroughs 600, is used purely for scientific research. Anyone at the University may use it free, when there is a grant, and outside groups – for example, an institutional research institute – may rent computer and programming time on it from the Computer Center. The second computer, made by IBM, handles administrative procedures. It also grades multiple choice tests, and many professors use it. "This computer grades papers between a million and a billion times faster than a professor can," Dr. Rappaport said. "You cannot conceive of how fast a computer works, especially the big ones.

A COMPUTER is an information machine. Information is programmed – put into a code that the machine can work with – and fed into the machine, and the machine gives out the

answer. It can store, or "remember," information, too. The computer uses the binary system, which is based on two and involves only the manipulation of zero and one. A computer bit, or unit of information, Dr. Rappaport explained, may be in one of two positions (as, on and off, conducting and non-conducting, and so on) and all the letters of the alphabet, plus some punctuation characters like those on the standard typewriter, may be realized. Seven bits, she said, is the basic unit in computer construction. More units are added to make words and bigger numbers, and to create more "storage" for memory. The bigger a computer, the more commands it can carry out. One of the largest, at Massachusetts Institute of Technology, has a million computer words in storage.

DR. RAPPAPORT had hoped to take several courses in computer theory and usage, but because most of them began in the first semester, and she was free only for the second, she found herself somewhat on her own. "Besides a regular computer program, the University of Virginia offers an intensive short course, three evenings a week for two weeks," Dr. Rappaport said. "They teach the fundamentals. Then they tell you to go over to the computer, make your program, feed it in, get it back, correct it, feed it back. In the beginning I felt as dumb as dumb could be. What I got was error, error, error – one mistake, you see, multiplies in a computer. But I got better."

In Charlottesville, information was fed to the computer by punch cards and the out-put was received by typewriter. Typing takes more time, so for one computer five typewriters were necessary. The next information might return typed as from a typewriter, or in punch card form, or in graph form. "The current trend is toward time-sharing of large computers, with distant teletype machines feeding information into a central computer," Dr. Rappaport said. "The local console types directly into the machine from magnetic tape. Like teletype, it is hooked through the telephone lines: the answer comes back in the same form it is transmitted. If you make a mistake, you know it in five minutes. At MIT, there are now eighty consoles feeding into a tremendous computer. You can teletype from New York, from Washington – eventually perhaps from Sweet Briar – by telephone line to MIT and back. Since everybody is going to use computers, there will probably be a number of large computers into which smaller ones will feed."

FOR research purposes, what does a computer accomplish? "To give you an example, you know that you can take a molecule and make an X-ray diffraction pattern which defines it," Dr. Rappaport said. "With laborious work you can figure out the configuration of the molecule. It took years to ascertain the configurations of the complicated molecules. Now a computer can ascertain such configurations in seconds. Because of computers, research will progress at an immeasurably faster rate.

"During the Second World War, there was a certain set of conditions – I never knew what the practical application was, although I have suspicions that it had to do with mechanical impact and explosives, like a torpedo – and they wanted to know the answer. Even von Neumann of

Brown – who was the authority and who developed the proposal for the first universal computers – couldn't figure it out mathematically. Mechanical objects had to be made to see what they could do. Today, the computer could find the answer easily.

"My last project in Charlottesville was programming differential equations with ten variables. To work equations with a calculating machine would have taken me months. The computer could figure them out in ten seconds."

The theoretical and practical applications of the computer are limitless. It has been predicted that within ten years a computer console will become household equipment comparable to the electric light, the telephone, the radio, the television. The only obstacle to such consumer use today is cost, and that is expected to diminish radically before 1975. A computer will pay household bills, prepare income tax returns, schedule social events, medical appointments, and even menus and the preparing of meals. It may help us design our own tools, our own furniture, our own houses. It will find programmed references while we read a book the subject of which we wish to augment from another source; thus the computer will become an everyday aid to learning like the dictionary and the encyclopedia. In schools, it will be a teaching aid – indeed, in many schools is already a teaching aid – for drilling and tutoring.

"But a computer can do nothing unless it is directed properly," Dr. Rappaport cautioned. "In teaching, it can drill, but it cannot explain the concept being drilled. There is a professional expression: G-Go. It means Garbage-In, Garbage-out.

A computer can be misdirected on purpose. When you begin work with a computer, you feed in your name, the project, and a code word. The code word is never printed. Nobody can monkey with the project unless they know the code word. This is not because information may cross within a computer, which is not the case, but rather because a jealous scientist or a stupid prankster could wreck a project."

"WHAT Sweet Briar will offer next semester is a very simple course in computer understanding. James H. Laird, from the University of Virginia, will explain the hardware of the computer, which means the machine with its input-output-memory devices, and the software of the programming you put into it. Essentially the software is you."

"Such a course in computers must be taught at Sweet Briar because computers are becoming a necessary tool for scholars and for workers. Girls going out of college are assumed to know something about them."

The IBM 1401 computer on which students from Sweet Briar, Lynchburg College and Randolph-Macon Woman's College will be initiated into the mysteries of data processing and programmed learning has 12,000 positions of memory and is second generation computer equipment. (The largest of the machines in current use are third generation equipment.) Mr.

McCants, the director of the Educational Computer Center, has hired programmers and a secretary-receptionist for the Center, and the computer will be delivered in late December.

In January, the addressing system, the payroll system and student records will be operational, In February, accounts payable programming will be underway. In March, the admissions system will begin modification. In June, the admissions system will begin modification. In June, accounts payable conversion will be complete, and accounts receivable will begin. In September, when admissions and accounts receivable are operational, conversion to data processing in the administration of Sweet Briar will be accomplished.

 Peter V. Daniel heads a coordinating committee for member colleges of ECC (Educational Computer Center)

THIS schedule is not the only complexity with which Peter V. Daniel became involved during the change-over. "There has been a tremendous amount of detailed cooperation between the three colleges," he said. "All those systems to be converted to programming had to be converted simultaneously and in precisely the same manner. Individuals from each college have met on a weekly basis with Mr. McCants and the representative from Systemation, Inc. to coordinate the undertaking.

"When ECC begins working, there will be three or four key punch machines at Sweet Briar, and several at each of the other colleges. Cards will be transported to Kemper Street, which is right off the turnpike – it is interesting that it takes us twenty-five minutes to get there but it takes Randolph-Macon, much closer, a little more than fifteen minutes because of traffic. At ECC, material will be sorted on magnetic tape and *discpac*. The Center will become another research tool for faculty and students, comparable to the library or the laboratory.

"It will give us more information than we could have formerly, and more quickly," Mr. Daniel concluded. "to allow us to run a better college."