Table 6. Student Response by Class Rank to the Question "Compared to All Other Courses You Have Taken at Ohio State How Would You Rank 'Computers in Agricultural Decisions' as to Its Utility in Preparing You For Your Future," Autumn Quarter 1979.

Rank	Overall		Sophomores		Class Rank Juniors		Seniors	
First	12	(12)	23	(23)	05	(05)	05	(05)
Second	20	(32)	19	(42)	22	(27)	18	(23)
Third	35	(67)	27	(69)	43	(70)	36	(59)
Fourth	11	(78)	19	(88)	05	(75)	09	(68)
Fifth	8	(86)	04	(92)	17	(92)	05	(73)
Less Than Fifth	14	(100)	08	(100)	08	(100)	27	(100)

a Percentages are accumulated in parentheses.

25 students. Small subject matter groups create good rapport between instructor and students and also among students. They also aid learning by allowing students more time to concentrate on areas of specialization. Second, provide adequate equipment for almost unlimited "hands-on experience." This can be accomplished at relatively low cost by using programmable calculators. Third, anticipate and prepare for increased demand for the course. As the need for this type of education is felt by students and educators in the various agricultural disciplines, demand will increase for the course and for additional subject matter discussion/laboratory sections.

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A CASE HISTORY

Developing A Computer-Oriented Program

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In the years leading up to 1974, the College of Agricultural Sciences at Colorado State University became increasingly aware of the importance of the computer in agriculture. Some faculty were, of course, using the computer, but no centralized effort was being made to help faculty and students assess the challenge, the opportunities, and the implications of this new tool. That year, as a result of conversations between the Director of Resident Instruction in the College and the Director of the University Computer Center, the College made a formal commitment to computer-oriented agriculture.

As a first step, a committee with representation from each of the College's departments and the Computer Center was established and charged with advising the College on matters relating to computer utilization. Shortly thereafter, on the Committee's recommendation, a member of the Computer Center staff was assigned to the College on a joint appointment to assist faculty in the use of the computer and to provide more effective communication between the College and the Center.

From the beginning, the program operated on the philosophy that no staff member should be compelled to use the computer. Rather, a climate was provided for faculty to examine a variety of computer applications and then to encourage and support those who wished to become involved. Action was concentrated in three areas: workshops, course work, and laboratory space.

The first thrust was a series of workshops and seminars held in the spring of 1975. Since the Committee felt it most important that these be conducted by a faculty member whenever possible, an inventory of College computing usage was compiled and reviewed. The resulting seminar series included presentations on test preparation, test grading, simulation, and optimization. These in turn generated interest in the FORTRAN programming language and, as a direct result, a ten-week introductory FORTRAN workshop was held the following fall.

In the area of course work, after much careful study the Committee recommended two new offerings. The first, A320 with no prerequisites, was for students with no computer background and had as its objective the identification of the types of problems arising in agriculture which are amenable to computer handling, including (a) simulation and optimization of problems in management, plant and animal processes, and mix formulation, and (b) data storage, retrieval, and analysis. The second of the new courses, A420, had a programming course prerequisite and was for students whose commitment to agriculture was coupled with a natural interest and aptitude in computing. Such students had little opportunity to further their assimilation of computing

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within agriculture and could not make those unique contributions which depend on a blending of disciplines. Students in this course would extend their programming capability in an agricultural context.

The courses were first offered experimentally in the spring of 1976 and have since been regularly offered. A320 includes several "black box" assignments, i.e., students supply data to existing programs and then examine the results. A420 has as an option the development of a program on an approved problem reflecting a student's area of interest. Both courses are offered only on a pass/fail basis. A320 is now required in several of the college majors, and starting in the fall of 1980 will be offered each semester. A420 attracts a smaller audience and is offered once a year.

A resource laboratory was considered essential for two reasons: (1) while the university provided student computing facilities, these facilities were overcrowded; and (2) a college computing laboratory would serve as a focus for the new awareness in computing. Planning began in the summer of 1975 and a laboratory, equipped with resource material, work tables, a keypunch, and one interactive terminal, became a reality in the spring of 1976. Since space and equipment were both in short supply, success in this area was another indication of the full support of the college administration. Use of the laboratory has steadily increased and the college has since acquired four additional terminals. The laboratory is presently open during the school day. While graduate students and seniors may request keys for access outside working hours, it is likely that soon regular evening and perhaps weekend hours will become necessary. The university student computing facilities meanwhile have become even more overtaxed.

These three areas — the workshops, new course offerings, and the laboratory —made the college commitment highly visible, and their success provided a basis for additional innovations.

The College now offers a concentration of courses under the label of Agricultural Systems Management, which give interested students not only the necessary background to respond to present uses of the computer but also the opportunity to make new contributions to agriculture through the use of the computer. The concentration is built on a firm base of technical agricultural courses enhanced by smaller blocks from mathematics, statistics, computer science, business, and economics. Because each of these smaller blocks represents prerequisites for further work within the block, the program has much flexibility and enables students to work in those areas of most interest to them.

Several other regular course offerings have incorporated a computer component. While some have necessitated the writing of new computer programs, our philosophy has been continuously to inventory, review, and publicize existing programs and packages, since programming is a highly labor-intensive, and consequently, expensive activity. In a number of cases programs written for research purposes (irrigation scheduling, summaries of breeding tests, feed optimization) also have been used in the classroom. Several CONDUIT programs have been acquired, and one is currently being used in a genetics class. CONDUIT programs are transportable, i.e., they will work on different computing systems with a minimum of conversion difficulty; in addition, they are well documented. Also emerging is another source of programs. Two of our graduate students with strong interests in teaching have difficulty; in addition, they are well documented. Also emerging is another source of programs. Two of our graduate students with strong interests in teaching have developed programs which have both classroom and practical application. One of these is a prototype for nursery management by computer and the other is a simulation of scheduling product supply for a commercial pea canning operation. These programs differ from those written strictly for research purposes since they incorporate pedagogical elements.

Statistical packages such as SPSS and MINITAB are widely used in the college. Both have the added advantage of being generally available at other computer installations, and we expect many students to continue to use them after graduation. Faculty and students are also encouraged to use computer utilities such as the SORT/MERGE routines. Such packages and utilities do not require a computer background and are easy to use.

Wherever possible we stretch our resources by using what is available and by making our resources do double duty. For example, workshops have continued, but in most cases are offered in conjunction with a current topic in A 420.

Most of our students interested in programming take a course through the Computer Science Department. However, two videotaped courses (BASIC and FORTRAN) are available for students and faculty who wish to take a self-paced, non-credit course. During the 1979 Christmas break three faculty members and one student were taking the FORTRAN course.

The staff position which was originally a joint appointment between the Computer Center and College has evolved into a college appointment as Director of Computer Utilization. The director is responsible to the Director of Resident Instruction and the Computer Utilization Committee. While the position includes teaching and administrative responsibilities, perhaps the most important responsibility in the eyes of the faculty is the director's ready availability for consultation on any aspect of computing.

The college is also fortunate in that the Laboratory for Information Science in Agriculture (LISA) is now based at Colorado State University as a non-academic department in the College of Agricultural Sciences. LISA is an agricultural support group applying the concepts and structure of information science to agricultural research and development, and represents an ideal opportunity for interdisciplinary work in the agricultural, information, and computer sciences.