Computer education at Orange Coast College—Problems and programs in the fourth phase

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The business and industrial growth that has been associated with Orange County (California) speaks for itself. New and relocating firms representing the entire spectrum of technologies are moving into the cities of Costa Mesa and Newport Beach daily. The Coast Community College District, and especially the staff of the Business Division of Orange Coast College have continually developed educational programs to support this environment.

In the past period of shifting technologies, we have been supported by stable patterns of human behavior. As we plan for the next shift, we no longer find these stable patterns of human behavior. Instead we find only revolving fragmentations of the past and undefined forces that may be in the future.

In 1973, we are undertaking the development of viable programs and curriculum in the areas of computing and management information systems. In this we will be continually trying to integrate the experience and intuitive judgment that we have gained during a decade of total submersion in the changing forces of computer technology. We understand that the total environment in which we will make our attempt has the potential for treachery of the senses.

Charles Poore of the New York Times has labeled these times the Karate Age where with one quick and deadly assault, a man, a university, a regime or a nation may be sent writhing in agony.

A review of the technological changes that have taken place in computing quickly reveals that those who have been in the field of computing over the past decade had experienced “Future Shock” somewhat before Alvin Toffler coined the phrase. A brief history of computing at Orange Coast College will serve as a vehicle for reviewing these changes in computer technology. At the same time we may review the continuous process of curriculum re-development and the demands that were made of the instructional staff at Orange Coast College. The history may be seen as comprising three distinct phases.

PHASE I

In 1958 Orange Coast Community College entered into its first phase of data processing. At that time our equipment consisted solely of leased Electro-Mechanical Tabulating Equipment. To this, we added computing power in the form of a General Precision LPG30 with 4K drum memory and paper tape/typewriter input-output devices in 1959. The curriculum was designed around the available hardware to include courses of instruction in Electro-Mechanical Wiring Principles, Basic Concepts of Data Processing, the Electro-Mechanical Application of sorting, collating, reproducing, interpreting, tabulating and calculating. It also included programming in machine language on the LPG30. In addition students were required to study the principles of accounting, cost accounting, and accounting systems.

PHASE II

Phase II was initiated through the acquisition in 1963 of second-generation computing hardware systems in the form of IBM 1401 and 1620 computers with disk storage. The curriculum shifted to keep pace with the hardware. Although the principles of Electro-Mechanical Wiring and Tabulating equipment were retained, additional hands-on experiences were provided in machine language, SPS, and FORTRAN on both machines and COBOL and AUTOCODER on the 1401.

The principles of Accounting, Cost Accounting and Accounting Systems continued to be a part of the program and a new emphasis was initiated in Management Information Systems.

The objective of the two-year vocational program in data processing at this time was to develop qualified entrance-level tab operators and application programmers through hands-on experience.

The California Department of Vocational Education in conjunction with the Federal government provided assistance to the program in the form of grants for the development of curriculum and training of the instructional staff. With the rush by other institutions to provide programs in data processing and computer science, another dimension was added to the program in the summer of 1962.

In conjunction with the State of California Department of Vocational Education, a summer institute program for the intensive training and retraining of instructors in data processing was initiated. The curriculum was designed to meet the needs of a variety of instructional programs in the area of computer education.
processing was initiated. This program was to become an on-going part of the total program.

With the active participation of the instructional staff in the training of others (and also of cross-training themselves) a sense of mastery over conditions developed. The frantic rush to keep up with hardware and programming sophistication seemed likely to be a condition of the past.

That sense of mastery was short-lived when in 1964 IBM changed the game from checkers to chess with their announcement of the System 360.

PHASE III

In 1966-67 the State of California undertook a proposal to defray the costs of training two OCC instructors in third-generation programming and concepts. In return for this training, the staff agreed to the development of a detailed report containing all of the necessary educational ingredients to make the transition from second to third-generation computing.

This report was made available to all institutions. The curriculum by the fall of 1968 presented the concepts of 360 programming through an understanding of the programming languages of RPG, FORTRAN, COBOL, PL/1 and ALC.

The concepts of operating systems, file design, file management, and job control were integrated into the programming classes. Cost Accounting became an elective in the program and a course in Management Information Systems Projects became a requirement for graduation. The latter class was designed to provide students with the background necessary to function in their fast-developing role as staff consultants to line management at all levels.

Through the generous contribution by Hunts Foods of computing time on their 360, we were able to introduce a third-generation curriculum in the spring of 1967. Third-generation computing hardware was available at the college by November of 1968 (IBM System 360/40). In January of 1969 teleprocessing terminals were added using APL as the computer language. There was one factor upon which we all agreed after the hectic year of 1969: one was only kidding oneself if he found security in technological expertise.

The concepts of the third generation increased the need for summer institute programs for the retraining of educators in the field, and the college offered the first summer institute in third generation programming in the summer of 1969.

Quickly we became aware of the fact that where in Phase II we were involved in a simple vocational program, with the sophistications of third generation, higher aptitudes, wider perspective, and greater perseverance would be required of the student. We could no longer provide mere vocational education but had to be involved in providing some measure of professional education and training. The offers that our graduates were receiving from the labor market required them to possess a much keener insight into the realities of the business environment and demanded a strong understanding of the organization and the part the computer played in the organization.

In the summer of 1970 our new facility was completed which doubled our capacity. We now had a designated room for our IBM 029 keypunches and IBM 2741 teleprocessing terminals. We attempted to maintain our philosophy of hands-on training through a student/reader/printer and the addition to our curriculum of a hands-on course in computer operation.

The program for the development of computer-assisted instruction initiated in 1969 necessitated the acquisition of an IBM 360/50 DOS System in the fall of 1970. The college having expanded to two colleges in 1965, changed the name of its district to the Coast Community College District in 1970. Through the foresight of the district administration, a policy of decentralizing computing power was implemented through the placement of the teleprocessing terminals throughout both campuses. This included the use of dial-up teleprocessing terminals. Both the added use of computing throughout both colleges and the additional administrative requirements to implement program budgeting systems allowed the Business Information Systems instructional program to receive the benefit of more sophisticated hardware systems.

The IBM 360/50 DOS system could not meet the demands for the additional computing requirements, and a change was made from DOS to OS with one megabyte of low-speed core in 1971. Through the use of CRT terminals a student file inquiry system became operational in 1972. This necessitated a further upgrading of the system to an IBM 370/155 OS MFT containing one megabyte of main memory.

With the two year program arriving at a somewhat stable position, new emphasis was placed upon developing courses of instruction to service the other disciplines of the college and to integrate all disciplines with the sense of the rapidly increasing rate of technological change. The ability to adapt was emphasized. Two courses were designed to meet this objective. A course of instruction using the language of FORTRAN and APL was developed to integrate programming concepts and applications with the respective discipline of the prospective transfer student to the four year college. Another course was developed using the interactive teleprocessing language of APL to provide instruction to all students of the campus.

With the changing of emphasis in the computing field came requests from the computing community for additional courses in Computer Operations, Data Communications Systems, Management of the Computer Effort, Operating Systems, and most recently Advanced COBOL. In order to further meet the needs of the rapidly-growing business environment, two one-day seminars were held in the areas of Management and the Computer and Data Communications for Management. We also held a two-day seminar for a visiting Japanese top-management
group. The title of this seminar was the use of computing by American managers.

Since September of this year we have been involved in the evaluation of our total curriculum and have attempted to make our program more flexible to the three basic student groups that we serve.

The first group is comprised of an increasing number of students who are transferring to four year colleges to complete their education.

Most of these four year colleges do not have as wide an offering of courses, and those that are offered are at the upper division level. Consequently, students must use much of their course work in Business Information Systems taken at our institution to fulfill elective lower-division courses. We have been able to obtain some relief from this problem through “one-to-one” articulation on an individual college basis, but this is a nagging problem causing a great deal of frustration to the student.

The second group we serve is that of the two year terminal student. These students can be classified into two general categories: those with a good aptitude for programming and systems work and those that have average aptitude and strong desire. We feel that the higher aptitude student would benefit by taking more advanced work in programming and systems. For the second group of students we see very fulfilling careers in the area of computer operations and possibly computer sales and allied fields. We encourage members of this group to take courses in computer operations and to broaden their general understanding of the field.

The third group is comprised of practicing professionals in the computer field, and managers and staff people from various fields of business. For this group we have added courses in Data Communications Systems, Managing the Computer Programming Effort, Advanced COBOL and Operating Systems.

In our attempt to meet the needs of these three basic segments of our student population, we have devised what we feel to be the basic minimum core requirements for our students.

The core requirements are intended to develop the technical base necessary to compete in the dynamic information and computer industry and in addition to provide each student with a macro view of the environment in which the function of computing is performed. We attempt to accomplish this through nineteen units of required courses consisting of Introduction to the Concepts of Information Systems, COBOL and PL/1, Assembly Language Coding, Management Information Systems and a Management Information Systems Projects class. Eight additional units are required in Accounting or in Calculus, and nine additional units are required from a group consisting of: Advanced COBOL, Computer Operations, RPG, Data Communications Systems, Managing the Programming Effort, FORTRAN/APL, Computer Science, Operating Systems, APL, Cost Accounting and Managerial Mathematics.

FACTORS TO BE CONSIDERED IN THE IMPENDING PHASE IV

The manufacturers promised that they would never do anything to us like they did with the complete change in architecture in 1964, but somebody forgot to get it in writing from the usurpers of the industry, that forward and vital mini-computer industry. Will the Volkswagen of the computer industry, the mini, make the big one of the computing field alter its competitive path? We can only wait and see. One thing we are sure of is that the Mini-Computer, Data Communications, Teleprocessing and Data-Based Management Systems are upon us.

We are told that the next major thrust of computing will be in manufacturing systems and the language of computing is going to be eventually reduced to the level of the user through the terminals and CRT. This is the picture of the 70’s and we are told by John Diebold that the 80’s will usher in the Cybernetic System in “intelligent machines,” where Japan has every intention of dominating the market.

Before we attempt to define the problem of developing the curriculum for the last 1970’s and 80’s we might benefit by reviewing our societal framework over the past ten years or so.

The social upheaval over these recent years has shaken our institution to the very mantle of our earth.

The Civil Rights sit-ins in Greensboro, North Carolina, in 1960, were followed in 1963 by Martin Luther King’s “I have a dream” speech to 200,000 civil rights demonstrators in Washington, D.C.

Polarization of social and political values were thereafter punctuated by an infamous series of assassinations and attempted assassinations. The Free Speech Movement at Berkeley in 1964 was followed by the Viet Nam protest from 1967 to the inauguration of the President on January 20th of this year. The energy of dissatisfaction and discontent has been registered through the vast disenchantment with our industrial military complex and the expenditure of great sums of money for space exploration. The result of all this has been that technology has been identified as one of the major sources of our society’s problem.

The War on Poverty Program in the early 60’s and the concern for the environment and health of our citizens brought about a new sense of social consciousness nonexistent in previous periods.

The dethroning of college president after college president because of a total inability to grasp what was taking place and make the required changes drove the point even deeper.

Suddenly in 1969 and 1970 a lionized profession (engineering) of the 1950’s and 1960’s suddenly found itself largely obsolete and unwanted. Thus a profession found itself in the same position that the blue collar worker had been faced with for decades.

Students following the path of success established by our society, acquired the training and education suppos-
edly designed to provide them with the “good life” of the future. The shock they received when they attempted to enter a labor market that could not utilize their skills, and an environment they did not understand destroyed much of their confidence in the ability of our economic system to meet the needs of the people.

The computer industry leaped off of the solid economic base established in 1958, and with the other industries of our economy grew rapidly during the early and mid-sixties. The constant pressure of supporting the war in Vietnam and meeting the unprecedented demands at home finally forced our economy into a heated period of inflation and the eventual recession of 1969 and 1970. The fixed costs of computing were finally registered upon a management that had grown up in years of unparalleled growth.

Hopefully the recent fight for survival experienced by management has provided the necessary insights into what courses of action management is to take if we are not to repeat the mistakes of the 1960’s. Whether management has been able to work through the archetypes of management past and sense the new needs of its employees only time will tell.

One thing seems certain, organizational needs are not yet synchronized with human needs and the pace of technology will only widen the gap. It appears that management does not know how to reward its employees for productive efforts within the framework of the new social consciousness.

To sense a real problem we have only to listen to personnel executives on one side lamenting the fact they are unable to find employees who can fit quickly into the work organization and become productive. On the other side, these same personnel experts are admonishing educators for developing people for a work environment that cannot adequately utilize their skills, thus bringing about employee dissatisfaction and turnover. There appears to be a mutual fuzziness both on the part of the executives defining the specifications of required skills for the near future and the part of the educator attempting to educate with such specifications in mind.

The atrophy that sets in as a misplaced individual exists in a state of unrelieved boredom only furthers the loss of identity and therefore raises frustration to a dangerous level. An impersonalization of organization that grows through a management strategy of merger and acquisition frequently spawns a hostile enemy behind an employee’s mask of acceptance. Management will be using the computer to ever-increasing degrees to eliminate specific human procedures. However, it seems probable that for every problem solved in this too-obvious manner, there may be created a dozen more, for the approach ignores the basic root structure of men’s needs.

All of the foregoing societal events that have transpired over the past decade have contributed two vital factors:

1. There is a definite sense of social consciousness and a definite desire for real freedom. The Civil Rights Movement and the course of events that followed released untold amounts of human energy that is far from being coordinated in tandem.

2. The power of our present and near future technology gives us unlimited capacity for the solution of high priority problems of our world.

Alone this technical competence is useless unless interwoven with the tapestry of human understanding. Such a process undertakes what Warren Bennis has referred to as the process of human revitalization. He identified the following four basic points in the process.

1. An ability to learn from experience and to codify, store and retrieve the resultant knowledge.

2. An ability to learn how to learn, the ability to develop one’s own methods for improving the learning process.

3. An ability to acquire and use feedback mechanisms on performance to become self-analytical.

4. An ability to direct one’s own destiny.

The program and curricula of the late 70’s and 80’s must especially develop the students’ ability to learn how to learn and to direct their own destinies. It is difficult to perceive how such programs and curricula can be successful without the practice and consistent involvement of the business community, in both the development and implementation.

Sharp distinctions between campus and business arenas are already dulling. Work experience programs, on-site educational programs, educational TV and programmed instruction technology and concepts have made significant advances, and have an undeniable future. All we seem to need is the sense of urgency that will cause us to allocate resources toward the realistic assessment of the situation. Effective definition of objectives will require mutual contributions of time and intellectual resources on the part of both business and educational leaders.

Our problem today is one of breaking down our own archetypes and the archetypes of our institutions in order to develop those inner human qualities that men must integrate with future technologies.