

Why industry won't hire your graduates

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Vocational or career oriented education as used in this paper is defined as that type of education, at less than a baccalaureate degree, that is aimed at preparing an individual for employment in industry in a specific occupational area. The remarks included in this paper are directed at instructors, administrators, and other educators concerned with this area of data processing education, whether it is in the high school, the vocational school (public or private), the community college, and, in some instances, the universities. During the past year, while serving as an educational consultant in computer education, I have had the opportunity to contact over 400 schools throughout the United States and Canada with career oriented programs in data processing and frequently the comment was heard "What can be done to improve our program to make our students employable?" "Why won't industry hire our graduates?"

The basic answer to this question is that students in many data processing educational programs are not trained well enough in data processing and computer programming skills to enable them to be hired in industry at the conclusion of their schooling. It is perhaps helpful to explore the history of this phase of education in order to illustrate some trends of thinking and practice which have developed in data processing career education.

Vocational or career oriented data processing education had its earliest beginnings in approximately 1958 when community colleges began offering two year programs in data processing with emphasis upon the operation and control panel wiring of punched card or unit record equipment including the key punch, sorter, accounting machine, collator, reproducing punch, interpreter, and calculator.

In the early 1960's, as industry changed from punched card unit record data processing, to card oriented computer systems, schools attempted to implement vocational training in computer programming by utilizing the IBM 1620 computer system in their instructional programs. Although there were some practical reasons for utilizing the 1620 computer, such as the educational contribution which was made available by IBM and the fact that a FORTRAN compiler was available so that the computer could be used for mathematical programming, the training in computer programming on the 1620 computer did little to meet the needs of industry because the primary business machine

used in this period of time was the IBM 1401 and its related family of computers. The training in computer programming in 1620 machine language certainly failed to stimulate industry's interest in public education and contributed little in meeting industry's needs for 1401 programmers with a knowledge of SPS, autocoder, tape processing, or IOCS. Thus, education failed to accept or even recognize the need and responsibility to provide the type of programmer personnel needed by business in this critical age of expansion within our industry. Industry could not turn to public education at that time to truly meet its need for trained personnel.

Later, in 1964, with the announcement of the third generation of computer equipment, there was an almost frantic search in industry for programmers knowledgeable in Assembler Language, in COBOL, in RPG, in something called job control and operating systems, and in multiprogramming, yet we find many schools as late as 1969 and 1970, and perhaps even now, teaching control panel wiring, 1620 computer programming, or perhaps programming using the IBM 1130 computer.

It should be quite evident from these trends in data processing education that proper up-to-date training has not been available from the beginning. If teachers and schools, in 1964, had the insight, knowledge and ability to react to the immediate needs of industry, and were turning out knowledgeable assembler language programmers with an adequate understanding of job control, or knowledgeable COBOL programmers, I feel confident that the service to the industry would have been invaluable and, in fact, saved industry thousands of dollars in training costs. Educational institutions must react rapidly in order to provide a viable means of career education in data processing.

Educators cite many problems—budget restrictions preventing installation of modern computer systems, no one is available to teach such subjects, etc. I can only reply that if education wants to serve industry, and if industry is going to hire graduates from these programs, then education must be able to meet the personnel needs of industry by teaching "state of the art" material. Anything less is doing a disservice to the taxpayers who are supporting an obsolete program and perhaps even more important, is wasting a tremendous amount of human resources by doing

an injustice to the students who receive training in these obsolete areas. Today, career or vocational programs should be teaching the techniques and methods of programming in a virtual storage environment, programming for data communications applications, teaching data base concepts and methods of structured programming for business applications. How many schools are teaching these subjects now? The answer is very few, and if this does not change, then career educational programs are going to continue to fail industry by not providing the types of personnel which are required to be immediately productive on the job without additional industry training.

Certainly one of the arguments which education will use to justify the fact that their curriculum is not up-to-date is that the personnel are not available to teach the required subjects. Although I know of no research documenting the background of teachers in vocational data processing, my own acquaintance in the field of education tends to indicate that most teachers teaching data processing are former business education teachers who often have had a few college courses in data processing or computer programming. Most of these teachers have had little or no industrial background or experience either as computer operators, programmers, or systems analysts. A recent study by a major publishing company indicated in high schools the majority of teachers teaching data processing had been teaching one to five years. The next highest percentage had been teaching less than one year. The point that teachers are not available to teach required subjects seems to be a realistic appraisal of data processing teaching profession. The only response that I can give to this is that if our educational institutions will not recognize the need for constant upgrading of the faculty in this rapidly changing era of technology, and will not provide time for the instructors to upgrade themselves and to upgrade the curriculum by developing new courses, then there is very little chance that education will be able to train students for the needs of industry. Those in education must inquire as to what can be done in terms of curriculum development and teaching training and must provide the solution.

According to a National Science Foundation report, approximately 1700 institutions of higher education are now spending 500 million dollars annually for computer facilities and their operation. As a member of industry it is difficult for me to understand why a significant portion of these funds cannot be directed to the upgrading of teachers and curriculum, and even implementing curriculum when required, to meet the needs of the business data processing industry. Unfortunately, there appears to be a critical lack of leadership in career oriented data processing education on a national level. In attending computer conferences and reading data processing periodicals, I am constantly amazed at the millions of dollars of private and federal money which is being spent on computer-assisted instruction, terminals so that students can learn BASIC to solve problems in their business classes, and funding from the National Science Foundation to study the utilization of the computer in a variety of disciplines. The following are merely a sample of

some of the fundings in computer activities which have been granted from the U.S. Office of Education.*

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| Development and Evaluation of Computer Assisted Instruction For Instrumental Music | \$48,460.00 |
| Development of a Computer Based Laboratory Program For Library Science Students | \$104,480.00 |
| Teaching Mathematics Through the Use of a Time Shared Computer | \$185,421.00 |

Obviously, teachers in mathematics and other disciplines have expressed their need for funding to further their computer-oriented programs; however in the area of career education in business data processing, I have yet to see any national leadership emerge which has actively pursued, over a period of time, funding to develop curriculums, train teachers, communicate with industry, and perform other functions which are absolutely critical if career oriented data processing education is to fulfill its purpose. If vocational data processing educators are not willing to put forth the effort to attract the attention of those organizations which can be of assistance in these necessary areas, then I see little hope of vocational data processing ever reaching the point where it will fulfill the needs of industry.

This leads, then, to what really is required by industry. Although I cannot purport to be a spokesman for all of the business data processing industry, my experience as a business applications and systems programmer, a systems analyst, and a consultant for a software firm has given me some insights into the requisites of a student who will be successful as an employee in the data processing department of a company as an operator, a programmer, or systems analyst. Perhaps, the most obvious shortcoming of students coming from a career or vocationally oriented program is their lack of any in-depth knowledge of data processing, particularly as related to computer programming.

In speaking with many instructors and in reviewing the catalogs of schools which claim to train programmers for programming positions, the most common curriculum contains some type of introductory course with perhaps FORTRAN programming, a course in RPG, a course in COBOL, a course in Assembler Language, perhaps something in PL/1, finished off with a course in systems analysis and design where the major emphasis is on interviewing techniques, feasibility studies, and the management aspects of the systems study. In fact, one of the earlier studies relative to career education for third generation computers recommended that both COBOL and PL/1 be taught in a single semester course.

Unfortunately, then what industry too often finds when interviewing a student as a prospective employee is that he knows some FORTRAN, some COBOL, some Assembler Language and some PL/1 but does not have enough knowl-

* U. S. Office of Education Support of Computer Activities, January 1969 U. S. Department of Health, Education, and Welfare, Office of Education.

edge of any programming language to perform the duties required of a programmer trainee, such as maintaining programs, or writing relatively simple file processing programs. He cannot write a typical sequential file update program or create and process a realistic direct-access or indexed sequential file as utilized in industry. He does not have the ability to debug a COBOL or Assembler Language program with any kind of expertise by effectively reading the computer listing and related core dump. He has not been trained in the use of utility programs or manufacturer supplied Sort/Merge programs. Thus, when asked to prepare a job stream for a simple sort, the student is unable to do so simply because he has not been schooled in these basic fundamentals required of a productive programmer.

In discussing this problem with instructors, various explanations are heard for this lack of in-depth study. For example, one instructor remarked to me that "We don't teach any programming involving magnetic tape processing because we don't have the equipment . . . but we talk about it a lot." Another comment received was "Oh, if you can program for card input you can learn to program for tape and disk applications on the job." This attitude is one of the reasons education has failed—our educational institutions specializing in data processing should provide the student with in-depth training in a computer programming language which is widely used in industry within the area of the school, if the school is to meet the requirements of industry.

Other instructors have commented "We don't have time for in-depth training." Associated with this problem is the fact that students are often taught a great deal of subject matter that is not useful to them in attaining employment in the data processing profession. The prime example of this is the teaching of FORTRAN programming for vocational or career oriented students. Apparently, FORTRAN was taught in the early 1960's because it was the only high level compiler available on the widely used IBM 1260 computer and because it was one of the well-known languages. It is ridiculous, however, for career oriented business data processing educators to continue to teach FORTRAN because FORTRAN is not commonly used as a business applications programming language. The attempted justifications of various institutions such as it is an easy language to learn, or as indicated in one survey, all of the other schools are teaching it so we should also, is totally without foundation. FORTRAN should not be taught in a limited program which is designed for career or vocationally oriented students.

It is also apparent from examining curriculums and speaking with instructors that they are not aware or are not responsive to the critical needs of industry. Somehow the term computer programmer has become the magic word in career oriented data processing programs in both private and public institutions. There has been little attention given to training in areas where there is a critical need within industry—in training for computer operations, documentation, tape librarians, control clerks and key punch operators.

According to a recent AFIPS survey, there are approximately 210,000 individuals employed as programmers, 200,000 persons employed as computer operators and 440,000 individuals employed as keypunch operators—these people all require training!

Many of the data processing instructors with whom I have spoken have acknowledged that only a small percentage of students entering career oriented data processing programs have the aptitude, intelligence, drive or motivation to succeed in industry as professional programmers. Many will agree, however, that most students could successfully operate a computer or become valuable employees in some capacity within the data processing department. Thus, it seems ironic that schools in their desire to serve industry have failed to realistically appraise the requirements of industry as related to the types of students which are entering their programs and the employment opportunities that are available to them. Certainly there is nothing disgraceful about a school training a computer operator who will earn a salary of \$800.00 to \$1,000.00 per month or a keypunch operator who will earn \$500.00 to \$600.00 per month. Yet there are few schools which are offering any training in computer operations and very few good, comprehensive courses in the area of keypunch training. These people are needed in industry. Why aren't they being trained in career oriented data processing schools!

Today, in industry, hundreds of thousands of dollars are being spent on in-house training. In many installations, this amounts to buying video-tape courses or P.I. courses from one of the many vendors who have come into existence within the past few years. It seems a disgrace to an industry which is striving to be professional that it must turn to video-tape courses costing \$2,000.00 or more as a primary source of education. Yet, industry has no alternative. In addition to the "standard" courses in data processing available in video-tape form, one leading vendor in this area has teaching material and courses in Virtual Storage (VS) Concepts, VS Facilities, VS Job Control, VS Modular Programming, VS Utility Programs, VSAM, VSI Debugging, VS2 Debugging, Designing a Teleprocessing System, and other up-to-date subjects. There are few, if any, schools on any level that have similar courses available *now* to meet the immediate needs of industry.

The data processing industry has turned to in-house training, P.I. Courses and video-tape courses as a method of education because the schools which claim to teach data processing for vocationally oriented programs have not come close to supplying industry with quality students skilled in the knowledge and use of programming languages and data processing techniques who can become contributing employees when hired. Until this takes place, I am afraid that the only answer which industry can give to the question of "Why won't industry hire our graduates?" is "Because through career and vocationally oriented programs in our schools students have not been adequately trained to meet the needs of industry."

