



RELATING COMPUTER SCIENCE PROGRAMS TO THE NEEDS OF INDUSTRY
THROUGH INTERNSHIPS AND COOPERATIVE PROGRAMS

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The purpose of this paper is to discuss some approaches for achieving more meaningful relationships between degree programs at the college level in Computer Science and the needs of industry. Nothing is more encouraging to most students than to know that their academic preparation will enhance their future life styles and future employment opportunities. Also, probably nothing is more depressing to a person than perhaps being a hungry, competent, and unemployed expert in an academic area where employment opportunities are nonexistent.

The balance between knowledge attributed to real world experiences and academic theory is a crucial issue. Either type of knowledge is hollow without the other component. Mr. Jack Jackson, who is an Instructor for the American Airlines Academy amply describes an "experience" as being -- when something is happening to you and you wish it were happening to someone else. Many schemes have been used to simulate real world electronic data processing experiences in the classroom situation. Some of these schemes have proven very successful. However, most employers will not consider this as what they mean when they ask a prospective employee "Do you have any experience?". The remarks in this

paper are directed toward the employer's definition.

The undergraduate degree programs in Computer Science at East Texas State University have been oriented to include a minimum of one full semester of what would be acceptable to most industrial employers as experience. Three semester hours of credit is normally the maximum amount given for the intern endeavors. A Master of Science in Computer Science is offered at East Texas State University. One graduate course, entitled "Internship in College Teaching of Computer Science," is available for graduate students desiring to enter the teaching profession upon graduation. These graduate internships are normally performed on the main campus of East Texas State University. Incorporating acceptable work experience into our undergraduate degree programs has been accomplished by working closely with several industrial organizations in the surrounding area. Participating industries include such data processing shops as those associated with municipal governments, public school districts, aerospace industries, banking, insurance companies, and petroleum industries. Some of the more prominent of these are Electronic Data Systems and E-Systems (Ling-Temco-Vought).

Most educators would agree that at least one semester of work experience is defensible from an academic viewpoint and desirable as well. An undergraduate computer science major at East Texas State University must take a minimum of nine courses in computer science and usually takes eleven or twelve courses in the major area. Since the intern credit is normally limited to three semester hours or one course and the students take the intern course in addition to the minimum of nine courses which are required for a major, the intern experience serves to strengthen the degree program. These educators would probably also agree to granting three semester hours of college credit for such experience in a data processing shop, provided the student spends six or more hours each week for the duration of a semester in a prearranged, supervised on-the-job training program. The maximum amount of college credit that should be given for such experience is a debatable entity which could last indefinitely, and probably would, at most institutions of higher learning. Personally, it is not believed this type of credit should exceed twelve semester hours in any instance and would normally be for three semester hours.

The reason for proposing a maximum of twelve semester hours is to enable some industries to provide a cooperative type program where intensive data processing experience is the only instructional objective during one semester or up to a six month period if the university schedule permits. A cooperative program of this nature would allow the student to spend the entire time period at the industrial site. This

would permit students to select industries remotely located from their university, and the student would not be required to spend an unreasonable amount of time commuting. Also, full devotion to a single task is sometimes much more meaningful to a sincere student.

These types of data processing, experience-oriented or on-the-job instructional programs have attracted a good deal of attention from industries and universities nationwide. These industry-related programs have many side effects which tend to help keep an institution's instructional program aware and responsive to the industries upon which the academic programs are dependent. This statement is made because it is firmly believed that if university degree programs in Computer Science are to be considered viable then they must provide for some type of meaningful activity following graduation. Students, who find themselves independently wealthy or otherwise provided for, may want to take exception to the preceding statements and certainly have every right to study in the area of computer science just to contemplate their own bits if they wish.

Intern and cooperative programs provide an opportunity for industry to carefully evaluate a prospective employee. Intern and cooperative programs are prevalent in various fields of engineering and business administration. Many of these have been very successful and the basic guidelines are applicable to similar programs in computer science. At the same time, these programs provide the student an opportunity to wisely consider a prospective employer.

The participating industries and

institution are naturally drawn closer together in regard to their goals. This provides excellent opportunities to exchange ideas and other resources. Cooperation is enhanced when the participating industries and the university accept the fact that data processing problems are a common concern.

Please do not misunderstand this paper by believing that these statements are implying that intern or cooperative programs are immune to problems. A student may be assigned to a position in a data processing shop under proper supervision, and it may become obviously clear to the industrial personnel that the student is unsuited for the assignment. This information should be freely exchanged with university personnel who are in a position to assume the responsibility for the problem and take the necessary corrective action. On the other hand, there should be an unrestricted channel of communication between the intern student and the university staff. If the student is not receiving any meaningful data processing experience, then the industry should consider this their problem and take remedial actions within their control.

A simple arrangement made in accordance with these guidelines is probably just as useful as trying to anticipate all possible consequences of individual human behavior with the related statements of corrective action to be taken.

It is sincerely believed that an intelligent use of intern or cooperative programs will tend to keep an academic computer science program in close harmony with the needs of the data processing industry and greatly enhance a meaningful placement of students graduating with

degrees in the area of computer science.

Most teachers of computer science at the university level would argue that the experience element being discussed in this paper is presently included in the university programs via university laboratories. However, not all universities have access to satisfactory data processing laboratories while data processing shops in the real world are available to all universities and provide better experience.

If the suggested discretion is practiced in the implementation of these instructional experience programs, then the danger of turning a university into a trade school is probably about as great as the risk of turning an industry into a university.

The selection processes used to properly match the student, the shop assignment and the shop have varied a great deal during the past few years at East Texas State University. Some industries want to make the final selection of their student interns, while others prefer to have student interns selected by the faculty members of the university. In each case the job description is the first consideration and is furnished by the industry. The university staff members, who have worked closely with the students and have identified each student's individual strengths and weaknesses, are the best qualified persons to select the prospective intern. Each student identified is then individually screened to determine personal motivation. If the student is motivated, then additional counseling is given in regard to such factors as dress code requirements, travel involved, and how the internship may affect the student's life in the future.

The selection of the interns is made from the group of students reaching this step in the selection process. If the industry desires to make the final selection, then interviews are scheduled with industry personnel for this purpose. Otherwise, the interns are selected by the university faculty members and assigned to a specified shop on a trial basis.

In summary, these remarks are to suggest that:

- (1) Nothing is new, old, easy or difficult in regard to intern, cooperative or work experience instructional programs in computer science;
- (2) These programs will provide a natural commitment for better relationships between universities and industries;
- (3) These programs will encourage mutual beneficial sharing of resources (hardware, software, and manpower) between educational and industrial organizations;
- (4) These programs will provide additional placement opportunities; and
- (5) These programs will arouse a great deal of healthful educational curiosity among students enrolled in computer science programs at all educational levels.