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ET grads – How'd the transition go?

Michael L. Holcombe
Purdue University, South Bend

Abstract

We in the academic world often wonder about the trials and tribulations experienced by our graduates as they transition from academia student status to full-time industrial employment to begin their careers. Many students leave the university with no experience in industry, some have had co-op experience and others have had internship experience. In addition, many of our ET students are in the category that we call non-traditional students who may have had a variety of experiences during the years between high school and college. Each of these 'student types' may have different views on the transition experience.

This paper reports on the results of a survey of ET graduates which was designed to ferret out the areas in which they felt they were well prepared and also those in which they felt their undergraduate education could have done a better or more complete job. Graduates may have transition difficulty in areas such as ability to perform in a multi-discipline teamwork environment, ability to understand the business case of assigned projects, problem solving skills, troubleshooting, critical thinking skills, project management, working within a budget, reporting to a supervisor, written and oral communication skills, working in a union environment, and learning to use hardware and software different than what was available in school.

In addition to reporting on the results of a survey of ET graduates, the paper reports on the results of a survey of employers of ET graduates. Employer evaluation of the graduates' competencies in areas such as those mentioned above is valuable to ET educators as they shape their curriculums to address the needs of graduates and employers.

Introduction

The first interface with the workplace can be very scary for the new graduate. How harrowing this experience is for the graduate depends upon how well we have prepared them for the transition from academia to industry. The good manager realizes that the fresh graduate is like modeling clay. That is, they have the technical training in a broad-brush sort of way and now need to be molded, shaped and tempered into a valuable asset.

Educators need to be alert to the needs of industry and do their best to tailor the educational experience to make the transition from academia to industry as smooth as possible. Although they receive guidance from industrial advisory boards and go to industrial sites to observe the workplace, the question to be addressed here is, "Are the colleges and universities really meeting the needs of the students, as well as those of industry" and/or "Is the transition really smooth"?

The following material presents the results of a literature search and the results of a survey of technology graduates and industry supervisors. The surveys were aimed at finding the rough spots experienced by the graduate and as observed by the supervisor. The results are analyzed, conclusions drawn and recommendations for improvement offered.

Background

USA Today presented the results of a survey that was similar to the survey conducted for this paper. Their results showed that the graduate felt well qualified except in basic computer skills, but the employers felt they were poorly prepared in communications skills and meeting deadlines.

Studies done at the University of Houston [1] show that the declining enrollment in their program was directly linked to the student's awareness that the program offerings did not meet the local needs. The program was built on a "me too" philosophy, that is, it paralleled other successful programs of the "80"s. The market for their graduate saturated after a few years because the area is mainly concerned with the petrochemical industries and process control. There is limited need for graduates whose knowledge base is RF and other electronic fields.

In addition to technical knowledge and skills, engineering technology graduates are expected to have significant communication and persuasion skills (both oral and written), the ability to lead and work with multidisciplinary teams, and understanding of the non-technical forces that affect engineering decision-making, as well as, a desire for lifelong learning. Schools that recognize these needs have instituted so-called "Teaching in the Factory" programs that bring more of the "soft skills" to their programs. [2]

Through a series of workshops, the Society of Manufacturing Engineers [3] compiled data and identified competency gaps among newly hired engineers/engineering technologists. The report identified a number of areas that the participants felt the new graduates needed more preparation. The foremost gap was the basic communication skills and this was followed by teamwork, personal attitudes, manufacturing processes and several other areas of concern.

The Department of Labor and the American Society for Training and Development researched the skills employers wanted and published their report, "Workplace Basics" [4]. In this report, they identified the following as the most common needs:

1. Learning to learn
2. 3 R's (reading, writing, computation)
3. Communications (listening and oral)

Other needs listed were creative thinking, teamwork, leadership and organizational effectiveness.

The next steps

Knowing that industry desired talents are like the sands of the desert, always shifting, it was decided to survey recent engineering technology graduates and their employers to ascertain whether or not the university provided the graduate with the skills necessary for a smooth transition to the workplace. As always in a survey of engineering technology, the first concern is the level of technical knowledge. In addition to this the survey had to address the areas of needs mentioned above. Communication skills and working with multidiscipline teams are two other important areas that were broken down into several specific categories in an effort to identify very specific areas in which change (i.e., improvement) is needed. To help identify the background of the respondents, the graduates were also polled as to the amount of industrial experience they had prior to graduation.

The employers were also sent a survey similar to the graduate survey in order to get a feel for industry's views. This survey also had a secondary set of question to establish the demographics of the respondents.

The results

As shown in table 1, the top three areas of need (i.e., areas where improvement is needed) are shown in Italic font. It is interesting to note that the graduate's responses' to the choices offered differ rather significantly from what the literature indicated. Approximately 80% of the graduate respondents indicated that they had had some form of industrial exposure to the industry through internship or other avenues prior to graduation.

Table 1. Presents the results of the graduate survey.

	Possible Areas of Difficulty	% of respondents
1	Not enough technical background	4.6
2	Working towards real deadlines	3.4
3	*The emphasis on the economic results*	*29.9*
4	The work environment	5.7
5	*Associating with older engineering persons*	*11.5*
6	Working within a team mentality	2.3
7	Working with union personnel	6.9
8	Interfacing with production workers	3.4
9	Working with non-production workers	5.7
10	*The regimen of daily work hours*	*9.2*
11	Being the only person on a project	6.9
12	Writing reports	1.1
13	Lack of peer support	4.6
14	Lack of people skills	0
15	Other	8.0

The response from the employers more closely paralleled the reports mentioned earlier. Written and oral communications were of high concern (items 4, 7 & 10 of table 2) along with technical knowledge/skills (item6) and discipline at working towards deadlines (item1) close behind.

Table 2. The response of the supervisors

	Possible areas of difficulty	% of respondents
1	*Working towards real deadlines*	*12*
2	Emphasis on economic results	8
3	The regimen of daily work hours	0
4	*Lack of people skills*	*12*
5	Industrial work environment	4
6	*Insufficient technical background*	*12*
7	*Writing reports*	*16*
8	Associating with older more experienced engineers	8
9	Working as a member of a team	8
10	*Working with union personnel*	*12*
11	Interfacing with production workers	0
12	Interfacing with support personnel	0
13	Other	8

Conclusions

The graduate survey shows that the new hires do not have a grasp of the impact of material cost and the need to economize. They do not have a good feel for the impact that small dollar values have on the final price to the consumer nor the impact on the bottom-line.

Another area of concern to the graduate, is dealing with seasoned engineering personnel. This is an understandable concern as they are accustomed to interfacing with their collegiate peers who are, basically, at the same level of development as the respondents.

The third problem transitioning graduates listed was the regimen of daily work hours. This is also understandable since they are coming from an environment of irregular hours due to class schedules and unbounded study times.

From the employer's point of view, communications is the most difficult area for students in transition. The written report, as well as, oral and presentation skills are weak. In today's work place the engineer no longer lives in a hole and develops/creates new and fascinating devices but must interface with customers, both internal and external. The multidisciplinary team approach demands that they communicate with non-technical people. External communication demands the ability to clearly present ideas to a varied audience of technically alert people as well as non-technical business oriented persons.

Recommendations

Engineering technology educators should adjust their classroom material to bring the factory into the classroom. The students need to work on real-world problems and solutions, including the economics of the workplace. Seek out industries who are willing to have students help with the development of projects in capstone courses either in parallel with their own personnel or in conjunction with them. If the students develop a better product, the company is ahead of the game. If the students do not develop anything usable, there is little loss to the company but, it is still a good learning experience for the students.

Some schools have developed extensive communication requirements, but with the advent computer age the aura of the computer doing all grammatical and spelling checking gives the students a false sense of security. At one time, the University of Florida require that all students, including Masters and Ph. D candidates, take a spelling test. If they failed they were required to take remedial classes. Any written report with more than two misspelled words, or grammatical errors, was given a failing grade.

Students should be encouraged to participate in internships or co-op programs to get the flavor of the work environment. This will ease the transition. Associating with people in their field (i.e., with fellow engineers) and the regimen of regular hours will also ease the transition. This approach provides the supervisors with a better feel for the talents the graduating students brings with them and how best plan their on the job training.

Bibliography

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Biography

Michael L. Holcombe
Michael currently holds the position of Assistant Professor at Purdue's South Bend campus. He has an MSEE from Montana State University at Bozeman, Montana and a BSEE from the University of Florida at Gainesville. He has 15+ years of teaching experience at the college/university level as well as 18+ years of industrial experience in aerospace, manufacturing, biomedical instrumentation, process control and environmental recovery. He teaches linear electronics and industrial control in the bachelors program.