Faculty Internships

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Abstract

What is a faculty internship? What is the motivating force for the university, the faculty member and the company to enter into a faculty internship? University faculties have been facing the challenge of maintaining currency in knowledge and skills for decades. This has been particularly difficult for faculty in technical fields. While many colleges and universities have required students to gain hands-on and up-to-date experience through internship and cooperative education activities, this practice has not been widely embraced by faculty members themselves. The need, however, is self-evident for faculty teaching in the applied engineering areas. But how are professional relationships established to enable a formalized internship program for faculty? What are the advantages of internship participation for both the faculty and the corporation? What are the steps in developing a faculty internship program? How can the "real world" experience be incorporated into the classroom setting to enhance education? These questions illustrate the critical issues surrounding the design of such a program. Through careful planning and design, however, the corporate world and the academic world can form a partnership to create benefits for both arenas. A literature search and the personal opinions of several faculty members who have completed faculty internship programs are used to describe how this planning and design can work.

Motivating Forces

As full-time employees of a university, faculty members expressing interest in working in industry for a short period of time might not receive a warm welcome in their dean's or department head's office. Certain questions may be asked. Why do you want to work in the summer when summer teaching is available? Are you putting this internship / co-op experience / consulting ahead of your regular job? Are you trying to double-dip pay and benefits? While these questions may be asked, it is in the best interest of the university to not only allow, but to promote these external activities. Quite simply, those of us interested in **teaching** engineering and technology have to continually be refreshed by **doing** engineering and technology. Since many of us are tenured, and not required to go out and continually re-skill, our deans and department heads have to ask, "What might be done to enhance the vitality of existing faculty in whom resources have been invested and to whom institutional commitments have been made?"[1]. Some older research suggests that encouraging faculty to return to industry for pay helps the university in several ways including:

- "…faculty who earned more supplemental income were more active in research (e.g. published more articles) and no less active in other regular on-campus activities such as teaching"[2], and
- they "…subscribe to more professional journals, communicate more with colleagues at other institutions, and appear more satisfied with their careers and their universities than faculty non-consultants."[2]

The type of internship that a faculty member attempts to find does depend on the institution, however, as

> "...ideal types of faculty and faculty performance emphases will differ according to institutional type and mission. Institutions that emphasize teaching and/or service will need to focus more on faculty development policies that revitalize routine teaching and retrain faculty for shifting curricular emphases, whereas institutions that emphasize the research and scholarly orientation will need to consider more attentively the adequacy of sponsorship and resources to sustain scholarly productivity. [2]"

Professional Relationships

Once the university officials have been convinced of the advantages of faculty internships, there is a need for the professor to build both a personal and professional relationship with industry representatives. There are several ways to foster these relationships. Faculty members with previous corporate experience often have professional relationships with former peers. Although these individuals may not be the decision-makers for the organization, they can help in identifying the key contact people within their companies. Adjunct faculty members are excellent resources for helping to make corporate contacts. They can assist in identifying key decision-makers for their organizations and in establishing the initial contact. They can provide the background information about the organization that will assist in identifying potential advantages for the university and the organization. It's important to look at the university as a whole when developing the list of potential business partners. University advisory committees, donors, grant providers and guest speakers who have established relationships with the university are also good sources for business contacts.

Sometimes the relationship can develop from a shared interest in engineering education outreach. Kevin Taylor, an Electrical Engineering Technology professor at Purdue University, made some initial contacts judging science and engineering fairs for local high schools. Later, a more involved project called VISION (Vision of Schools and Industry in Ongoing Networks)[3] was embraced by local industry. In this project teachers in the local high schools are brought to the university for some additional training. The teachers then spend time at local companies performing the work of science, engineering, and technology graduates. This industry experience is incorporated in the high school curriculum through a series of course modules prepared by the VISION participants. Other similar internship projects include programs such as "U.S. First" or "World in Motion" which offer the same results.[4]

Advisory Committees

In order to insure success of a faculty internship program planning is an all-important step in the development process. One tool used often in the planning phase is an Industrial Advisory Committee (IAC). Some traditional tasks of the IAC would be curriculum and course review, student co-op and internship program review, and the projection of business needs. In addition to these tasks the IAC could also develop objectives for the faculty internship. Tarrant County Junior College in Fort Worth, Texas has had a faculty internship program in place since 1992. Using the Advisory Committee model, they developed goals for the program that included:

- To allow full-time faculty to sharpen, to hone, their technical skills.
- To place those faculty in an environment where they might acquire new technical skills and knowledge.
- To provide those faculty with opportunities for rejuvenation and renewed enthusiasm for their profession and the discipline of computer science.
- To better acquaint the department with local business and industry, thereby allowing the department to better serve their training needs.[5]

The establishment of clear goals showing benefit to both the university and their corporate partners will provide direction for the internship.

A more extensive form of advisory counsel members is a true university / industry partnership such as at the University of Michigan[6] or the University of California San Diego (UCSD). The USCD School of Engineering developed the following statement which guides their partnership program:

> "Through a constant dialogue with executives, we ensure that our curriculum is relevant and prepares students to become productive leaders in the changing global economy. Similarly, through strong research collaborations, our faculty work on fundamental problems and technologies that will form the basis of future products, and professional engineers gain from the cutting edge research coming out of our labs. [7]"

Through use of professional relationships, and by using the advisory council to give direction and blessing to the internship, the contact with the company can be made. A great deal of preparation is needed prior to meeting with the corporate contact for the first time. Background information about the corporation is useful in understanding potential benefits a faculty intern will offer to the organization. It's important to be able to identify the "what's in it for me" issues from the perspective of the corporation. This initial meeting is truly a marketing call that will set the tone for any future meetings that may take place. Another important element of this initial contact is identifying the similar interests and objectives of the university and the organization. Developing a set of common goals will assist in gaining buy-in from the potential corporate partner. Other examples of partnership arrangements can be found in the articles by Zang[8] and Kulesza[9].

Roles of the Faculty Intern

The internship experience offers a number of opportunities to faculty that participate. Often the intern will gain experience in research, instruction, and as a practitioner. Each role has its benefits to both the intern and the sponsoring organization.

As companies are reducing funds for research, developing the faculty internship program offers personnel resources which may be scarce to conduct the much-needed research projects. This is a key element in the U.C. San Diego Corporate Affiliates Program (CAP). According to U.C. San Diego, "Industry can leverage existing university-based centers, offering access to equipment and research teams (faculty and students) that, for an individual firm, may be cost prohibitive." [7] This is truly a win-win situation. The faculty members gain the experience and knowledge from conducting the research, companies gain the expertise of the faculty participating in the research as well as the results of the research, and the cost is shared by the university and the corporation, thus allowing the research to be performed. Another benefit resulting from the "faculty as researcher" role is the mutual respect that develops between the university and the corporation. The partners begin to have a greater understanding of the similar needs and objectives they share. This research experience can often lay the groundwork to greater working relationships for the two organizations. For Professor Kevin Taylor, the successful completion of a first summer internship led to a second summer of employment in the advanced products group of a local engineering facility. This job was to model battery recharging for prototype electric cars, a wonderful combination of applied engineering on a futuristic product. For Professor Kay Laskowitz of the Organization Leadership and Supervision Department of Purdue University, the successful completion of a summer internship led to an entire sabbatical experience.[10]

A second role of the faculty intern is one of teacher. In some situations, faculty members may take their expertise to an organization to act as a corporate trainer. Business organizations understand the need to be constantly involved in the development of their workforce. By partnering with the university they can obtain the services of a university-level instructor for certain elements of their workforce, often at a lessor cost that an outside contract house. The faculty member gains knowledge about the business partner while sharing his or her expertise with that organization. This can also be a great marketing tool for the university as the corporate students see the university as an important resource. For Professor John Minor Ross of Indiana University-Kokomo, this was exemplified in a presentation made at a local company several years ago. His topic was object oriented programming (OOP) principles. In addition to meeting more people in industry and being paid for the presentation, Professor Ross also had the chance to present OOP design and development ideas to over 100 engineers and managers. Many of these people later took his class at the university, thus increasing enrollment, fulfilling a need for engineering continuing education, and diversifying the student mixture into a class with both traditional students and working professionals.

Finally, the faculty intern has the opportunity to perform in the role of practitioner. Participating in an internship which offers the intern hands-on experience can be invaluable to faculty members. They gain experience in concepts they currently teach or want to teach in the future.

They gain an understanding of the how the concept is applied in the business world. Simple things such as programming syntax standards, which students often look upon with disdain, take on new meaning when presented to the student as a requirement by business. Professors who have worked recently in business have more credibility with students when talking about how certain standards help in re-use of code, thus saving the company money. Certain quality issues are also made more relevant with recent business experience. Anyone can talk about how important it is to be certified as an ISO 9000 organization or to obtain the Software Engineering Institute's Capability Maturity Model (SEI CMM) next level. Quite simply, it is needed for the organization's programming groups to obtain and keep business. This talk is heightened, however, if the professor has gone through the audit, or has spoken with a programming manager who spent 18 hours in a meeting with the auditor.

A History

One of the author's personal experiences can exemplify the entire process. Hired originally to work on the VISION service project with Professor Taylor, he was assigned manufacturing test programs. Production problems, however, changed the need date for this programming to "Now". This necessitated a trip to Mexico to install the software for proto-builds at a "Maquiadora" manufacturing site, something that the professor would have never had the chance to do otherwise.

A second summer's work built on the first as part of an initiative to develop products faster by speeding up automatic testing. Budget considerations seemed to close off a third summer of employment. The professor, however, had taken an in-plant graduate course from Indiana University called "Teaching and Learning in the Corporate Environment" with several members of the company's corporate training department. They had a need to develop a new program skilling redundant electrical and mechanical engineers as embedded systems engineers, and the professor was rehired for a third summer to help design the program. This Software Skill Enhancement Program (SSEP) took engineers off-line for four months to complete an intensive set of university courses and in-plant training programs. The program also had the benefit of bringing in laboratory development money to the university as labs were upgraded for the engineers to use.

A paper was written about the program and delivered at a United Nations conference in Melbourne, Australia.[11] This international exposure led to:
- Plant tours and after-hours social meetings with Australian software engineers;
- A meeting with an electrical engineering professor colleague from Colombia who helped establish a bi-national/bilingual joint design and development project for two sets of students; and,
- A new certificate program for working engineers and the development of a concentration for traditional students borne out of the identified need for additional embedded controller programmers with engineering and programming skills.

Conclusions

We have attempted to show in this paper that faculty internships are an excellent method for professional development of engineering and technology faculty. In the teaching area, the relationships developed with industry can bear fruit in instruction, lab development, and curriculum development. Research and scholarly publishing are often a natural product of internship activities. Finally, service to the university in various outreach activities also results.

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