The role of a formal training program in attracting and developing computer professionals

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ABSTRACT

Because of the wide range of career choices that face computer-oriented graduates at the bachelor’s level, a formal training program is often an effective mechanism to attract and maintain a high-powered technical staff. Often the fundamental choice for the new graduate is between full-time graduate school or full-time work. An explanation is given of how a training program can combine work experience and graduate school, and the impact that these development opportunities have on the organization’s recruiting, development and planning efforts. Honeywell Information Systems’ Advanced Engineering Program is used to illustrate a successful training program, and its constituent parts are highlighted: rotating work assignments, graduate education, and practical problems and seminars. Also, the importance of permanent placement for program graduates, and the net result of program training, are discussed.

INTRODUCTION

The individual graduating with a bachelor’s-level degree is today faced with a number of difficult, yet important career decisions. On the most basic level, the choice is between pursuing a graduate degree or entering the workforce on a full time basis. More specifically, the individual who has a computer emphasis in his or her undergraduate program of study has still further choices besides the two mentioned above. If graduate school is chosen, then which program is appropriate? Electrical Engineering, Computer Science and Business are all possible avenues of graduate education. The full-time work environment is just as varied, whether it be hardware or software, applications programming, systems analysis, or systems programming. The choices are as diverse as they are plentiful.

Because of this myriad of choices facing the computer-oriented graduate, recruiting and maintaining a high-powered staff of computer professionals is a challenging task for any organization. This paper will focus on some effective techniques for attracting and satisfying talented computer professionals, with a particular emphasis on the role of formal training within the organization. The use of training, and in particular, a formal training program, has a direct impact not only on the quality of individuals attracted by a recruiting effort, but also on the career these individuals will have as permanent members of the organization.

As an example of the role a training program can play in an organization utilizing computer professionals, Honeywell Information Systems’ Advanced Engineering Program (AEP) will be presented. The experiences and lessons learned in implementing and administering the AEP will illustrate the effectiveness and importance of a formal training program in the computer environment.

BACKGROUND AND ENVIRONMENT

Honeywell Information Systems is the “computer arm” of Honeywell, Inc. Its products represent complete computer systems starting with a line of mini-computers (Level 6) all the way up to some of the largest computers in the world (Level 66). Honeywell appreciably enhanced its computer business (particularly at the top end) through a merger with General Electric’s computer interests in 1971. One of the legacies that GE passed on to Honeywell was several training programs in the engineering, finance, and manufacturing areas. One of these training programs, the Advanced Engineering Program, was started in 1968 in Phoenix to attract and develop top computer talent for the Phoenix Computer Operations. Along with the finance training program and manufacturing training program, Honeywell has continued the Advanced Engineering Program and over the years it has evolved into a vibrant, dynamic, effective source of computer professionals for Honeywell.

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From the collection of the Computer History Museum (www.computerhistory.org)
Today, the Advanced Engineering Program has three facets aimed at developing well-rounded, complete computer professionals: rotating work assignments, graduate education, and internal training/problem solving.

DESCRIPTION OF THE ADVANCED ENGINEERING PROGRAM

The Advanced Engineering Program is a three year program and as such affords an individual a substantial opportunity to see many different aspects of the computer business through the use of rotating work assignments. The work assignments are designed to last between six and nine months, thus allowing the program member to see between four and six different areas. The AEP takes advantage of the fact that Honeywell’s Phoenix Computer Operations provide almost the entire set of computer technology in one location. The assignments are carefully designed by the Engineering Unit Managers to provide challenging work which contributes to overall product development, and are selected on that basis by the program member.

While a great deal of learning is derived through work experiences, continuing graduate education is a key contributor to an AEP member’s development. To facilitate obtaining a technical Masters degree, the program member is given time off from each work week to attend classes at nearby Arizona State University in Tempe, Arizona. The Masters degree programs which program members pursue are either Electrical Engineering, Industrial Engineering, or Math-Computer Science. The technical Masters degree generally takes two years to complete after which the AEP member has the option to continue towards a PhD or pursue an MBA.

The third part of the program—the internal training—allows for a dynamic tailoring of the three year program to reflect state-of-the-art technology. This aspect of the program involves lectures and seminars conducted by experts on the Engineering staff and may cover topics such as compiler or operating system design, error detection and correction techniques, the impact of microprocessor technology, etc. The criteria for topic selection are applicability to Honeywell’s design effort, and susceptibility to rapid change through technology improvements. The seminars are usually followed by a series of practical problems to provide “hands on” experience for the program member and to further illustrate the use of a particular concept or idea.

RECRUITING FOR THE ADVANCED ENGINEERING PROGRAM

If the Advanced Engineering Program sounds particularly rigorous and time consuming, that’s because it is. It takes a very special individual to be successful on the AEP, one motivated enough to spend 50-60 hours a week in work-related activity. There is no “typical” profile for an AEP member, but there are certain characteristics (or accomplishments) each member must have. Recruiting for the AEP is done nationwide through an extensive mailing campaign as well as through a corporate recruiter. As a result, out of a group of 10-15 new program members (hiring is done once a year in June), each one will have graduated in the top five percent of his or her class with a bachelors degree in Electrical Engineering or Computer Science. Perhaps ten different schools will be represented, and the group’s cumulative grade point average will be around 3.7/4.0.

In addition to a very high GPA, program members tend to be very active in social, professional, and honorary societies as undergraduates. Since program members are expected to work in highly integrated design groups dealing with a very complex technology, this “people orientation” is very important. Advanced Engineering Program graduates are targeted to be technical and managerial leaders of Honeywell’s computer business. Thus, the individuals who join the program tend to be very motivated persons and aspire to a high degree of achievement. It is not unusual for program members to publish technical papers and participate in patent developments very soon after joining the program.

ADMINISTRATION OF THE ADVANCED ENGINEERING PROGRAM

Another interesting aspect of the AEP is the manner in which it is administered. As Honeywell has designed it, the program resides in the employee relations (Personnel) function for the purpose of budgeting and headcount allotment. The net result of this is that the program members are budgeted in employee relations, but work on a day-to-day basis in engineering. This allows tremendous flexibility on the part of both engineering managers and the program members in setting up and selecting assignments, free of any budget constraints.

There is a full time administrator for the Advanced Engineering Program who works directly for the Manager, Technical Individual Development in Employee Relations. The Manager of Technical Individual Development is responsible for all development activities for the technical community in the Phoenix Computer Operations. This includes in-plant classes, seminars, etc., in addition to the AEP. The job of the administrator is to insure the smooth operation of all facets of the AEP, and, in fact, the person who fills the job is on the third year of the AEP. The administrator and manager jobs are one year positions filled by a rotation sequence which starts in the administrator’s position and ends with a one year appointment as Manager of Technical Individual Development. This keeps control of the program very close to the program members themselves, with a large amount of support and guidance from upper management. The administrator’s job is filled by the top performer of all those on the second year of the program and, as such, has a tremendous measure of respect and influence.

The program members enjoy the fact that the individuals
who administer the program have experienced their problems and, in fact, have often shared some of the projects on which they have worked. It is much easier to get problems, complaints, or requests out in the open since the program members easily relate to recent graduates of the program. Peer management problems are avoided because the Manager of Technical Individual Development is always a program graduate and upper management lends support and recommendations whenever needed.

THE IMPACT OF A TRAINING PROGRAM ON RECRUITING

The activity which feels the immediate impact from a training program is the recruiting effort. As outlined earlier, the computer-oriented graduate faces a myriad of career choices upon degree completion. A training program, such as the Advanced Engineering Program, which combines practical work experience with graduate education is very attractive to highly motivated graduates. It allows a "dual-path" approach to establishing a career (education and work experience), relieving the graduate of an often difficult choice.

The highly successful individual who is attracted to a program like the AEP is attracted by the "special" opportunity a training program offers. A common sentiment expressed by program members is that the four or five years of hard work that their undergraduate record required has been "rewarded" by such a wide-ranging opportunity.

A company like Honeywell establishes a very progressive image through its training programs. A formal training program is ample evidence that there is commitment to individual development, and a measure of career planning for the new college graduate. Again, an important question which often arises during a job interview is "what type of development opportunities are available for me, both in education and work experience?" The Advanced Engineering program is explicitly designed to answer that question and to allay the fear that the young engineer will "get stuck in a job that I don't like."

A successful training program sells itself. A key aspect of AEP recruiting is the contact that the prospective program member has with engineering managers and current program members throughout the interview day. Neither the managers nor program members are "coached" on what to say, but the obvious positive feeling about the program comes through again and again in a spontaneous fashion. It is impossible to overestimate the value to the recruiting effort of this phenomenon of the position "selling itself."

Now that the AEP has been established for several years, the job of finding potential program members on college campuses has been made easier. Because of the wide variety of schools represented by current and past program members, many Electrical Engineering and Computer Science departments are aware of the AEP and encourage their best students to contact Honeywell. By maintaining correspondence with their undergraduate schools, program members are often able to recommend friends that are a year to two behind them in school—a very reliable and fruitful source of candidates.

With the major emphasis in recruiting now shifting to minority and female placement, the Advanced Engineering Program provides a tremendous advantage in attracting high caliber individuals. Given that the training program is a springboard for future leadership opportunities, this is a natural mechanism for affirmative action.

Additionally, since there is a full-time program administrator, any special problems or concerns that might arise are handled quickly, carefully, and on a personal basis. Since the AEP is very youth-oriented, the assimilation and adjustment process for each program member, and in particular, for females and minorities, is a very comfortable one. It is often these intangibles that are overlooked in the recruiting and placement process, but a training program such as the AEP is very successful in attracting high-caliber engineers because of its stress on personal adjustment and development.

DEVELOPMENT OPPORTUNITIES ON THE ADVANCED ENGINEERING PROGRAM

Although the recruiting effort is appreciably strengthened, the ultimate purpose of a training program is to develop technical and business leaders for the future. The Advanced Engineering Program is designed to provide Honeywell with solid computer professionals, and each facet contributes to a program member's development.

The rotating work assignments allow program members great latitude in acquiring practical skills and work experience. By moving to a different technology area every six to nine months, essentially software-oriented individuals can hone their skills through experience in compiler and operating system design, but still obtain an exposure to one or two hardware areas. The converse is obviously true for hardware-oriented individuals.

In addition to learning the multi-faceted computer technology, the program member is also introduced to a wide variety of work environments through the rotating work assignments. Over the course of three years, an AEP member will have worked for five or six different managers, thus experiencing different managerial styles and project leadership. This experience is invaluable when it comes time to choose a permanent assignment, as the program member learns to recognize the work environment in which he or she is most comfortable.

Graduate education at Arizona State University provides a good measure of the theoretical foundation needed in the development effort. Every program member is required to obtain a technical Masters degree in either EE, IE, or MATH/CS before graduating from the program, and the commitment to this education effort is underscored by the fact that program members are given time off from the work week (up to eight hours per week) to attend classes with all tuition, fees, and books paid for by Honeywell.

The formal educational opportunities provide an additional benefit for those seeking to "cross" specialties or
change career emphasis. It is not unusual for an individual who joins the AEP with a predominantly hardware background to discover an interest in software on a work assignment and then decide to pursue that interest in graduate school. Even more gratifying is the Computer Science major who joins the program with little or no hardware background only to discover through classes and a carefully selected work assignment that there are career opportunities in that area also.

The bridge between the theoretical emphasis of graduate school and the practical application of the work assignment is provided by the seminars and practical problems. This technique is used to expose the group to a new technology very rapidly. This also allows the training program to emphasize concepts important to Honeywell as a business, while staying very close to the leading edge of technology.

Because of the wide variety of opportunities that the Advanced Engineering Program provides, each program member can create a development program specially suited to him or her. It is this special feeling of control that each program member has over his or her own career which "turns on" AEP members.

**BENEFITS TO THE COMPANY**

Honeywell derives many benefits, some obvious, some not so obvious, from the Advanced Engineering Program. As mentioned earlier, from a recruiting standpoint, the program cannot be beat. It is an outstanding vehicle through which a large number of high potential graduates are introduced into the company. This periodic influx of new talent not only bodes well for the future, but also reduces the prospects of the engineering staff falling prey to technical obsolescence.

Because the program members continually require challenge, their work assignments usually involve work on critical new products. The payoff here is that the activity contributes directly to a product so that in addition to the program member benefiting via the experience, the company benefits from useful work being done.

The fact that program members rotate throughout the organization provides for rapid technology migration. One of the best communication techniques is to have "living witnesses" for a particular concept carry the word from assignment to assignment. Since there is such close integration between the hardware and software of today's computer systems, it is most advantageous to have individuals who can carry new product ideas from one area to another. It is not unusual to have an AEP member design hardware on one assignment and then write software for that hardware on a later assignment—a close-to-optimum situation.

**THE CHALLENGE OF A TRAINING PROGRAM**

Graduates of a training program—particularly the Advanced Engineering Program—present a challenge to the organization. This challenge is to effectively utilize the skills and the training developed by each program graduate.

An AEP graduate represents a well-rounded computer professional. He or she has had three years of intensive training in both hardware and software areas through the use of formal education and practical work experience. An AEP graduate has learned to lead groups, as well as to cooperate within a group. In short, since the program attracts ambitious, aggressive individuals, there is a potential problem in placing them in suitable permanent assignments.

Expectancy theory postulates that the level of activity towards a certain goal depends to a large extent on an individual's perceived reward upon reaching that goal. This concept is quite evident when dealing with the Advanced Engineering Program. There is continual scrutiny of the opportunities of program graduates by current members of the program. It would be impossible to routinely ask for 50-60 hours of work per week from these individuals if the rewards were not readily apparent. Indeed, the prospects of retaining program members and program graduates in light of their superior credentials would be dim without a concerted effort to carefully place and monitor each program graduate.

Honeywell enjoys close to an 85 percent retention rate for program graduates. (There are no contracts or binding agreements.) Successfully placing each program graduate is probably the most difficult aspect of the entire training process to accomplish and Honeywell's success involves careful human resource planning, along with extensive individual counselling. Each program member chooses a permanent assignment, not forced into a convenient opening.

Thus, the real cost of training, in terms of time, effort and planning is in permanent placement of the program graduates. Unless an organization is willing to commit to providing opportunities of responsibility, leadership and impact for its program graduates, the program could fail. As computer professionals, graduates of the Advanced Engineering Program approach the highest level of Maslow's Need Hierarchy—that of self-actualization. Given the appropriate opportunities to grow into leadership roles, these individuals are a tremendous resource for the organization.

**SUMMARY AND CONCLUSIONS**

A formal training program such as the Advanced Engineering Program presents a "no lose" situation for both the corporation and the individual program member. From Honeywell's standpoint, for the dollar investment represented mostly by tuition, fees and book costs for graduate school (assuming the positions must be filled anyway), the return in increased recruiting effectiveness, work contribution, organization communication and future leadership, is tremendous.

The program member enjoys, of course, the benefits of free graduate education and flexible job mobility. The accelerated development that the AEP member enjoys is a natural outgrowth of experiencing several different learning
environments. Through the "timesharing" of activities throughout the work week, a program member does not have to sacrifice practical work experience for graduate school, or vice versa. In fact, the general consensus is that each of those experiences is complemented in a synergistic fashion because they do occur simultaneously. In addition, there is a tremendous advantage in a career with Honeywell by being associated with a winner—the Advanced Engineering Program.

This concept of being associated with a winner is what makes a training program so effective. Recruiting is made easier because both program members and managers alike will sell the opportunity. However, success like this does not happen overnight. The support of the entire organization stems from the "small" successes achieved on a day-to-day basis over several years. Since 1968, each facet of the Advanced Engineering Program has provided tangible proof of its success. There have been over 50 graduate degrees awarded to AEP members, 50 patents, and over a score of papers published.

While these statistics alone do not provide the raison d'être for the AEP, they do reinforce the feeling that it is "working." Combined with consistently high performance appraisals for work assignments, the patents, paper and degrees make it very easy to fund the program year in and year out.

Based on the experience with the Advanced Engineering Program, it is safe to say that a formal training program can play a key role in resource planning in an EDP-related organization. Computer technology is very complex and computer design and usage requires a good understanding of the relationship between the constituent parts of a system. Honeywell uses the Advanced Engineering Program to insure a steady supply of technical and business leaders who understand the total computer environment to support a growing, dynamic business.

A growth-oriented organization will find that a formal training program provides a return on human investment worthy of the most lucrative financial investment, particularly in the computer environment.

REFERENCES
