Training Programs for Engineering Consulting Firms

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Abstract: Engineering consulting firms heavily use and support in-house training programs. The objectives of these training programs are (1) To supplement the graduate engineer's educational training; (2) to keep the professional engineer current and knowledgeable in the emerging engineering and management techniques and methods; (3) to prepare the engineer for a professional career in the firm; and (4) to satisfy the firm's personnel, technical, and organizational needs. The transition from professional development in the individual's area of expertise to that of managing people (e.g. projects, departments, offices) is of particular importance and is discussed. However, the development of people-skills cannot be at the expense of the individual's technical knowledge. This paper presents a discussion of the in-house training programs provided by CH2M HILL, INC. for both field and office engineering and management personnel. The approaches used to develop, assess, and implement these in-house training programs are discussed. Special attention is also given to the types of in-house training programs offered at the various stages of the engineer's or the manager's professional development.

Introduction

A very large number of civil engineers in the private sector are employed by engineering consulting firms. The level to which these people participate in formal or informal continuing professional development and training is, to a large degree, a function of the philosophy of each company as reflected in the respective company's policies, procedures, and practices.

It is generally agreed that graduates of engineering schools are adequately prepared in their technical areas of study for entry-level positions in consulting engineering firms. The graduates of today have been well-informed that an integral part of being a professional is lifelong learning. The entry-level employees look to the employer to be philosophically supportive of their desires for personal/professional development, and they also expect the employer to assist in job-related personal and professional development.

Every employer is desirous of having its professional people at the cutting edge of technical, managerial, and communications skills. Engineers are also desirous of achieving these goals. To do so they must have the opportunity to participate in lifelong learning. It is therefore important that employers provide continuing professional development opportunities if they are to retain excellent personnel and be successful in a very

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competitive recruiting climate. The trend towards mandated maintenance of competency by state registration boards (although somewhat muted in recent years) has also caused some firms to become more concerned with establishing means by which employees may satisfy these mandates. As a result of all of these factors, consulting engineering firms of all sizes are demonstrating an increased commitment to continuing professional development.

THE START OF A PROGRAM

In 1977, CH2M HILL conducted an attitudinal survey aimed at researching employee satisfaction with management, policies, and procedures. The survey results, in part, suggested that even more emphasis should be placed on the continued development of the firm's most important asset, its people. Management took the results of the survey seriously and responded with the development of the existing (and growing) Career Development and Training program.

The firm had been an advocate of a strong program of professional development for its people since its inception. The backbone of the program consisted of a tuition reimbursement program, "brown bag" sessions on varied topics, many positive mentors, and occasional in-house seminars.

Prior to initiating the new Career Development and Training program, management had identified specific training and professional development needs. Our first priority was to address these previously identified needs. Once these perceived needs were addressed, additional needs were identified through surveys, group interviews, or a combination of these and several other methods.

Since joining the firm in 1979, a large portion of my time has been devoted to developing, implementing, and managing the Career Development and Training program. Most of the original concepts have worked quite well, but we have also had many learning experiences, most of which have resulted from being overly ambitious and idealistic.

We also conducted a survey and published the results (Martin 1981) concerning current professional development policies, procedures, and practices of the largest 100 design firms as listed in *Engineering News-Record*, May 22, 1980. The "ENR Top 100" survey also suggested that approximately 1.5% of the gross revenue of a design firm was budgeted (not necessarily spent) for the professional development and training of its employees. That level of monetary support is indicative of serious management commitment for continuing professional development.

THE PRIORITY PROGRAM

The only revenue that accrues to an engineering consulting firm is generated from client projects. Thus the management of these client projects is of utmost importance to the firm, and enhancing the development of project managers was agreed to be the top priority of the Career Development and Training program within CH2M HILL (de Jaager 1984; Martin 1982; Martin 1983).

What was not anticipated, at least to the extent that it has developed, was the enthusiastic desire of experienced project managers to participate

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in the program. These relatively senior project managers wanted to refresh their skills, receive formal reinforcement of the skills they had developed, and stay abreast of what the younger project managers were learning. The infusion of several hundred experienced people into a program that was initially designed for people with little project management experience has changed the character of the program, obviously for the better.

Key to the training programs for our project managers has been the voluntary involvement of some senior, and very dedicated, managers. For example, the credibility brought to the Project Management Capstone Seminar by our Corporate Director of Technology as one of the key instructors, has proven to be invaluable to the success of the program. Further, his continued involvement assures that this training program will retain a high profile.

Once these priority programs in the area of project management training were designed, implemented, and evolving, we were able to devote time to programs of lower priority.

ORGANIZATION OF THE FIRM

CH2M HILL's organization is a two-dimensional matrix that exists to support the execution of projects. The two elements of the matrix are: (1) the administrative structure, and (2) the technical discipline structure. The administrative structure (corporate, district, region, etc.) houses the profit centers (understanding that each project is the basic profit center), is responsible for business development and marketing, and handles the "care and feeding" of the employees assigned to that administrative unit. The technical discipline side of the matrix is responsible for the technical competence of the people assigned to the discipline and is also responsible for the quality of the design, study, or plan accomplished for the client. Every individual in the firm is assigned to both a position in the administrative structure and to a discipline; thus everyone has two "bosses."

TECHNICAL TRAINING

The respective discipline, being responsible for the technical competence of its people, is the focal point for defining the needed technical training. Because the discipline leadership is also active in technical societies and is familiar with the state of the art in their disciplines, they should be familiar with the availability of training resources in their areas of responsibility. On-the-job training is a significant part of this technical training and requires a great deal of attentiveness on the part of all supervisors and managers. The Career Development and Training group acts as a resource to the disciplines in locating specific courses, workshops, and seminars that are sought, but it does not take a lead position in defining discipline training needs.

We instituted an Educational Leave of Absence in 1985, designed such that a person could, while on a leave of absence, be reimbursed (on successful completion) for job related courses. The program was designed for those seeking Master of Science degrees in areas deemed to be of mutual benefit to the individual and to the firm. The program has proven to be quite popular and provides the employee the opportunity to become

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specialized in an area, often making the person more valuable to the firm than a generalist without the advanced degree. Some restrictions apply.

An integral part of the performance appraisal system within the firm is the performance interview (Martin 1984a). The performance interview is conducted after performance evaluations have been completed on each individual by persons on both the administrative and the discipline sides of the matrix. The individual's efforts in career development and training are a discrete part of the employee evaluation. A portion of the performance interview for each individual is dedicated to a frank discussion of professional development and training needs. It is intended that training goals for each employee will be agreed on and that the supervisor will monitor the accomplishment of these goals during the ensuing year.

OTHER PROGRAMS

It is the primary function of the Career Development and Training group to define, design, and implement those training activities that will serve all disciplines (as contrasted with those that will serve a single discipline). Included are programs that will enhance knowledge and skills in subjects such as project management, working effectively in a team environment, effective use of time, stress management, administrative management, loss prevention and professional liability, business development and marketing, written and oral communications, interpersonal communications, negotiating, and employee orientation.

These more general training activities are an outgrowth of the performance interview and discussions with those who serve as mentors through both the administrative and discipline sides of the matrix. On-the-job training is as important in these nontechnical areas as it is in technical areas. These programs tend to prepare the individual to hold greater responsibilities in project management, to make improved client presentations, to respond to a broader body of communicants, and to assume greater authority. It is the responsibility of all employees in CH2M HILL to make themselves of continually greater value to the firm and thereby enhance their value to the firm's clients. It is the firm's responsibility to provide the employees the opportunity to accomplish the agreed-on path to achieving this increase in personal and professional value.

Management Training
We do not recommend that our managers attend management training seminars of short duration and broad coverage (Martin 1982). We do recommend that they target their training to specific predetermined needs, even if those needs are only self-perceived.

Management training needs are ideally determined by each manager (or aspiring manager) through the use of *The Management Skills Inventory* (de Jaager 1984). *The Management Skills Inventory* is a comprehensive self-assessment tool that helps managers pinpoint their management development needs. Developed and field-tested at CH2M HILL, this book serves, with *The Best Management Resources* (de Jaager 1985), to provide an integrated, systematic self-development program for managers.

The Best Management Resources is a management reference book with over 1,600 entries, covering annotated, indexed and cross-referenced

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articles and books. Managers and supervisors can easily locate "how-to" references targeted to their specific interests as determined through the use of *The Management Skills Inventory*. Among the twelve self-assessment questionnaires in *The Management Skills Inventory* are the following: Managing Projects, Creating An Effective Working Climate, Planning, Business Development And Sales, Managing Organizational Communication, and Influencing Others.

A collection, containing a reprint or photocopy of every article listed in *The Best Management Resources*, is also available. There are 611 articles in the collection. With this collection, the best management resources are directly available to our managers and professional staff.

Negotiation Training

Our basic training package in negotiation skills is generic in that it is applicable to more than work situations. Succeeding programs in negotiating become more specific to the work place. We anticipate that training in negotiation will become significantly more important, and we will be placing more emphasis on this subject in the coming months.

Time Management Training

The basic element in helping people make more effective use of their time is a videotape series based on Alan Lakein's book *How to Get Control of Your Time and Your Life*. The tapes examine some ideas that can be useful to everyone who learns to accept the noncontrollable and to control the controllable. Not all of the suggestions will be effective in all organizations. There are, however, several excellent time management seminars offered by various vendors.

Stress Management Training

It is needless to say that virtually anyone working in a consulting engineering firm is under considerable stress at times. The five-session videotape series we have selected to use as an introduction to this subject is fast-moving and entertaining, and it includes specific skills for coping with stress. More serious situations are tailored to the needs of the individual or group.

Loss Prevention and Professional Liability Training

As all are aware, the areas of loss prevention and professional liability have taken on new meaning in recent years. We introduce all of our professional employees, during their first six months of employment, to this subject through a self-study course entitled *Untangling the Web of Professional Liability*. This provides a general awareness of professional liability concerns along with suggested techniques and procedures to minimize a practicing engineer's/consultant's exposure. There are many cameo appearances of the subject of loss prevention and professional liability in our other training programs. We will be placing increasing emphasis on in-depth aspects of this very important element of our business in the near future.

Business Development and Marketing Training

There are several elements to our business development and marketing training program, and additional elements went on-line in 1986. Some of

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the main programs address proposal preparation, project scoping, persuasive presentation techniques, interpersonal skills, marketing skills, effective listening, effective public speaking, writing skills, and negotiating skills. Because we do not have a separate sales staff in CH2M HILL, it is not easy to target the in-house people who require marketing training; this makes the process a continually challenging effort.

Written and Oral Communications Training

An engineering graduate is usually considered less articulate in written and oral communication than his or her college peers. Although I doubt that premise to be true, engineering graduates as well as practicing engineers with several years of experience can improve their written and oral communications. Following an intensive fundamentals course, which we offer, there is probably no better learning method than on-the-job training (practice, practice, practice). I think it fair to say that we give our employees unlimited opportunity to practice their written and oral communication skills. I am less convinced that we afford them the opportunity of continuous feedback and positive reinforcement, but we are working at it.

Interpersonal Communications Training

Several of our training programs have elements concerning interpersonal communications, because it is only through using these skills that we gain or execute projects. There are also several programs wherein interpersonal communications skills are the primary subject. For example, we have found that the program entitled "Interpersonal Managing Skills," produced and conducted by Learning International, has served us well. In addition, several elements of our training programs are conducted by a communications consultant who does a superb job for us because he has made the effort to learn how our firm conducts its business. We also use his videotape programs. Some senior managers have attended excellent external programs dealing with hostile interviewers, and they have been pleased with what they learned.

Employee Orientation Training

Introducing new employees to CH2M HILL, its history and heritage, its culture, its method of conducting business, its policies, its procedures, and its practices has probably been our most elusive assignment. It sounds simple enough, but if anyone has found the secret of making a new employee comfortable in a large firm in a relatively short period of time, I would certainly like to learn the formula for success. It is simple enough to inform people of their fringe benefits and certain personnel policies, but to make a new employee comfortable with the method by which the company conducts its day-to-day business is just tough work.

SOURCES AND METHODS OF TRAINING

Our training delivery systems are varied and flexible (Martin 1983). We offer training through college courses, videotaped instruction, vendor training, self-study courses, technical society meetings, specialty conferences, invited guest lecturers, external seminars, in-house seminars presented by external vendors and/or in-house personnel, and many other

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formats. Each of our district, regional, and area offices is equipped with videotape systems as well as with other audiovisual equipment. The firm also pays the dues to at least one professional or technical society for each professional employee and has extensive library holdings of technical and management literature.

Some of our programs are obviously tailored to those people in the entry-level positions, while others require experience with the engineering consulting business for the programs to be meaningful. We have virtually no programs with rigid prerequisites; we tried that, but it simply didn't work. There is the opportunity for progression of responsibility and authority in the firm, and the educational programs sponsored by the firm are there to assist the employees in making that progression as rapidly as possible. We do not yet have educational benchmarks or hurdles that one must complete before being promoted, but that day is certainly on the horizon.

Our goal is to split the training time with the employee, with the employee being paid for half of the training time and donating the other half. There are exceptions in either extreme. In the case of a person taking a regular college course, it is our policy that the employee must make up the work time. In the case of an external public seminar that is scheduled during regular work time, the employee is paid for the seminar time. A two-day in-house seminar is generally held on a Friday and a Saturday, with the employee donating the time on Saturday.

In order to ensure that training is viewed as a positive and controllable factor by our regional managers, the training function is decentralized to the greatest extent possible. Although corporate funds pay for programs, an individual employee's costs (salary, travel, etc.) involved with his or her attendance at a training session (internal or external) are budgeted at the regional level. In addition, the final approval or disapproval of an employee's request for training resides with the regional manager. In that way, we do not have an individual involved in training simply because he or she is not assigned to a client-billable project. It also assures that we offer quality programs, because if the programs do not meet their objectives the regions won't "buy" the programs. Rather, they will spend their budgeted funds on external programs.

In CH2M HILL we offer tuition reimbursement, including fees, books, and materials, for college courses that are beneficial to both the employee and the firm. For job related seminars, short courses, and workshops, the firm will prepay registration fees. Travel expenses and all other direct costs are reimbursed through an expense sheet. The judgment of the course or seminar being mutually beneficial is made by the employee's immediate supervisor and the regional manager. The regional manager is vested with the approval or disapproval of any such request.

There are several methods by which one can learn about which seminars are being offered (just watch your "junk mail"), but there are fewer methods to economically determine the quality of courses, seminars, and workshops offered by various vendors. We have found that Seminar Clearinghouse International, Inc. (SCI) of St. Paul, Minnesota provides an excellent service in this area at a very reasonable subscription cost. SCI offers no seminars. They operate a central database on the quality of vendor offerings on behalf of their subscribers. The annual subscription

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cost is saved either by sending one of your employees to the right seminar or by not sending one of your employees to the wrong seminar.

We have little experience, to date, with computer-based course catalog services, but there seems to be little doubt that it is the solution to the problem of the increasing cost of direct mailings by course and seminar vendors. There are at least two such services now available.

Early in the development of our Career Development and Training program, we made a decision to keep our in-house staff to a minimum. We felt that it would be more economical to select outside professionals (with an appropriate mix of in-house practicing people) to conduct our training programs. We have not regretted that decision, but there have been times when it would have been nice to have had some additional staff assistance. Basically, three people (all of whom have additional assignments) manage and maintain the in-house training program; we do not conduct the training. To have designated trainers on the staff would only make managers and employees suspect that we were attempting to build an empire inside the firm that would eat overhead money at an alarming rate. It is challenging enough to manage and maintain a training program in an engineering consulting firm. One does not need the additional burden of keeping a "training staff" busy. This is particularly true because such a staff would lack credibility in a consulting firm if they were not client-billable.

Because we award the Continuing Education Unit (CEU) for many of our training programs, we subscribe to the practices of, and are a member of, the Council on the Continuing Education Unit. As such we agree to keep a record of the awarded CEU in perpetuity. We have elected to use the National Professional Development Registry for Engineers (NPDRE) as our place of permanent record for the CEU. There are many advantages to such an arrangement. Further information can be gained from the National Society of Professional Engineers (NSPE). Computerized internal records of employee accomplishments in personal and professional development are also maintained, but it is an arduous task that comes at substantial collective cost.

SPECIAL CONCERNS

The transition from the academic environment to the work environment can be very difficult for some entry-level people. The transfer from a competitive environment to a collaborative environment is insidious. As a student, the individual is rewarded for his or her ability to work independently, whereas almost everything that is accomplished in a consulting engineering organization is through teamwork (almost a foreign element in an undergraduate civil engineering program). Recognition of this drastic environmental change is important, and it must be dealt with during the orientation of the individual to his or her new place of work. Special attention and coaching by the immediate supervisor, the project manager, and the employee's peers is most important to make this transition as smooth and as painless as possible.

We monitor the effectiveness of our programs through participant evaluations. Because our employees have high expectations of themselves, they do not condone time-wasters such as ineffective training

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programs. They expect a lot, but they are also willing to work hard during their learning experiences. The evaluations also give us valuable assistance in changing program elements, or, for that matter, in changing facilitators.

Quality assurance in continuing engineering education is a controversial subject. The arguments for and against any formalized system of quality assurance all have validity and the Continuing Education Planning Committee of the Accreditation Board for Engineering and Technology (ABET) is in the formative stages of its deliberations (Martin 1982; Martin 1984; Martin 1984c; Martin 1984d). Is there need for a "seal of good practice" in connection with the offer of professional development programs for the engineering community?

FIELD PERSONNEL

Because our field people (construction inspectors and observers, construction managers, and resident engineers) are often in remote locations and quite mobile, it is very difficult to serve their professional development needs and desires. We recognize this shortcoming, but we have not found a good solution. We are in the process of reviewing several self-study courses that show promise, and we hope to get something implemented soon. If this sometimes-forgotten segment of our employee population has reasonable access to one of our regional, area, or project offices, then the individual has reasonable access to all of the above described programs, at least to the extent that the people in that office have.

FIRMWIDE PROGRAM COORDINATION

Each of our district, regional, and area offices has a designated career development and training coordinator. Of course, they wear these "hats" in addition to their primary functions. This being the case, the level of interest of the individual (and of the individual's supervisor) has a great deal to do with the effectiveness of our firmwide programs in the respective offices. For the most part, however, the appetites of the offices are greater than our ability to serve them with quality programs.

One item that becomes readily apparent after the initial enthusiasm of a program subsides is the necessity for selling the programs internally. We are addressing this issue by distributing "CD&T Newsbriefs," on a somewhat irregular basis, to all of our offices. We are searching for better ways to sell our programs internally.

BACK TO REALITY

There is a great difference between the flexibility of product companies and of professional service companies when it comes to providing training for its employees. CH2M HILL is a professional services company and, basically, we sell the time of our people. Anytime one of our staff is not working on a client-billable project, his or her time is charged to an overhead category. Professional development and training is one of these overhead categories.

If one of our employees who would otherwise be working on a client-billable project is at a seminar for two days, the investment being made in the individual is approximately four times his or her salary for

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those two days, in addition to the direct costs (seminar fee, travel, living expenses, cost of meeting facilities, etc.) associated with the seminar. The individual is being payed for the two days and the lost opportunity for revenue is approximately three times the individual's salary for the two days. With this kind of investment, programs must produce results. Unfortunately, the return on investment of continuing professional development (particularly in non-product businesses) is very difficult, if not impossible, to quantify.

Overhead charges are carefully monitored for good reason; consulting engineering firms are not organized to be nonprofit, philanthropic entities. The dichotomy is that when client work is slower than usual, overhead expenditures are highly scrutinized, yet that is the time when people have a more flexible schedule. When client business is at a very fast pace, with a lot of client-billable work, the overhead budgets are scrutinized less. However, the people do not have time for professional development because their energies are consumed in the press of client-billable work.

Sound management practices would suggest that when things are relatively slow on client-billable work it would be the appropriate time to invest in the enhancement of the capabilities of the people. Unfortunately, it does not happen that way, at least as often as one would like. If business is slow, people stampede their efforts into business development activities, not into personal or professional development activities. This situation may not be the most desirable, but it is a reality. We are working towards the day when our employees will consider personal and professional development in their appointment calendars in the same way that they consider in-house management meetings or meetings with clients.

A PARTIAL LISTING OF CH2M HILL TRAINING PROGRAMS

The following is a partial list of in-house programs available to CH2M HILL employees. Not all of these programs are finely honed yet, but, as is usually the case, all programs are continually being upgraded and updated:

Project Management MGI Self-Study Course
Project Management Capstone Seminar
Professional Liability and Loss Prevention Self-Study Course
Contract Review and Revisions
Marketing Presentations and Interpersonal Skills
Successful Project Execution
Effective Public Speaking and Persuasive Presentations
Effective Listening
Stress Management
The Effective Use of Time
Put It In Writing
The Technical Secretary
General Orientation
Benefits Orientation
Employee Stock Ownership Plan Orientation
Performance Interview Training
What You Are Is . . .

Everyone's a Negotiator
Persuasive Negotiating
Business Development and Marketing Training
Interpersonal Managing Skills
Managing for Tomorrow
Safety: Get Out Alive
Microcomputer Literacy
Professional Selling Skills
MS/PC-DOS Training
Lotus 1-2-3 Training
dBASE III Training
AutoCAD
Effective Supervision
Preventing the Reality of Rape
The Complete Listener
Speaking with Others
Winning Ways
Management Information Systems
Selection Interviewing
Occupational Safety and Health
Termination and Outplacement Policies
Risk Management/Loss Prevention
Division/Department Manager Training

CONCLUSIONS

Training programs are important to consulting engineering firms and are increasing in both quantity and quality. The technical and administrative managers within the organization must be held responsible for the technical competence of their people; this cannot be delegated to a training group. Firms are budgeting on the order of $1\frac{1}{2}\%$ of their gross revenues to assist their people with personal and professional development.

ACKNOWLEDGMENTS

Three other people have played primary roles in developing the current Career Development and Training programs within CH2M HILL, and they certainly deserve much of the credit for making the good things happen. Mary Belle GrosJacques, Judy Styles, and Diane Yensen have all played important roles for several years, and they are to be commended for their fine efforts.

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