

Ethics for Chemical Engineering Teachers

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The title of this essay is not intended to imply that chemical engineering teachers should subscribe to some unique code of ethics; or even that chemical engineering teachers differ in their ethical practices from other chemical engineers or other teachers. Instead it is a recognition that this group, like any other group, has its particular interests and activities, and so differs from other groups in its relationship to a broad and general code that covers all engineers, all teachers, or even all civilized people.

The very broadest code of ethics, for all Christian people, has been laid down in the Golden Rule and the Ten Commandments. Other religious faiths have corresponding statements, generally similar but not identical. Recognition of some such code, and an honest attempt at adherence to it, is one mark of a civilized person. Another mark is respect for the codes of other groups, although such respect need not include approval and emulation in all details.

But, in the complexities of modern civilization, these very broad ethical principles are not enough. Any professional man who takes his responsibilities seriously, be he in medicine, theology,

law, engineering, or something else, welcomes a specific code to cover his own area. The Canons of Ethics for Engineers, prepared by Engineers' Council for Professional Development, present such a philosophy and principles. More specifically, the American Institute of Chemical Engineers publishes a code of ethics as a fundamental part (Article VIII) of its Constitution.

All chemical engineers, including teachers, are expected to guide their professional activities by these rules. In order to keep this code under continuing review, to interpret and clarify it, and to prevent any tendency toward stagnation, A.I.Ch.E.'s Professional Development Committee has established a special subcommittee on the Background of Professional Ethics, under the chairmanship of R. P. Dinsmore. The author has the specific assignment of "University Professors," and will devote the remainder of this paper to that topic. The manuscript has been reviewed by the subcommittee, but has not been formally approved. It is published here in hopes of provoking further discussion and criticism.

Special Features of Teaching

Many professional codes, after general statements on integrity, justice, and courtesy, are subdivided into such sections as relationship to the public, to the employer or clients, to employees, and to fellow engineers. Perhaps a similar classification or interpretation of the general codes is in order for teachers, particularly

An A.I.Ch.E. subcommittee, under the chairmanship of R. P. Dinsmore, is preparing a commentary on ethics for the chemical engineering profession. The first paper, for the teaching group, is published at this time to provoke discussion.

in this exploratory paper. Let us investigate the chemical engineering teacher's ethical relationships: to his students; to his department head, dean, and other officers; to his teaching associates; to other engineers; to the public; and his ethical obligations as an individual. Some of these topics pertain to a broader base than chemical engineering teachers alone; such will be covered but briefly in hopes of inspiring further study and writing by those most interested.

Relationships to Students

The primary duty of teachers is to teach; hence the principal obligation of the teacher is to his students. This is quite apparent for the teacher who does nothing else; it is just as true for those who engage in research, writing, administration, consulting, or any of the other duties usually expected of good teachers. All of these are subordinate to the teacher's responsibility to his students.

The first responsibility to the students is to provide good teaching. Obviously the teacher should know his subject matter thoroughly, and he should use the most effective teaching techniques. He should keep up to date on chemical engineering technology, and on pedagogy, by all possible means including reading, attendance at meetings, responsible consulting, and research. Each time the teacher meets his class, he should be as thoroughly prepared as possible—even prepared to handle the unexpected question or situation which he did not specifically anticipate. Inadequate preparation cannot long be concealed from the student, and is a disservice to him.

A second obligation of the chemical engineering teacher to his students is the courtesy of sympathy. It is frequently the teacher's duty to chastise his students for poor work by low test grades, failing term marks, or even expulsion from the university. Most students, even after severe discipline, are willing and eager to accept advice, even though this may be directed toward the student's future outside of engineering or away from further academic training. It is the teacher's duty to advise, to the best of his ability,

students who need minor discipline, or repetition of a course, or transfer to another field of study or to a job without further study. This form of sympathy and recognition of the student as a fellow human being, though possibly not as a future chemical engineer, may be particularly difficult for the younger teachers who lack experience with other people and who are overly engrossed in the technical aspects of their profession instead of the humanitarian.

A necessary qualification of the chemical engineering teacher is the ability to make decisions, and to stand by them unless they are proved to be in error. In the American manner of education, the teacher must "grade" his students at regular intervals, based on individual papers, recitations, assignments, and a cumulation of all these. Although the good teacher has some degree of personal relationship with each student, his grades must be as objective as he can honestly make them. The grades should not thereafter be changed because of special pleading by the students, or for unrelated circumstances.

This is not to deny that a grade may be changed if the instructor has made an honest technical error. A mistake in grading, particularly if it applies to a large segment of the class, may call for an apology, and usually some correction of the grade. Both younger and older teachers may find this difficult: the younger because they are building their reputation and resent any admission of an error as a slur on their ability; the older because they have made most of the possible mistakes that can be made, and now hold themselves beyond the possibility of error. Fortunately, most teachers fall into neither of these categories.

To the best of his ability, the chemical engineering teacher should strive to impart not only technical knowledge but also some concept of professionalism. The dignity and value of engineering, the competence and integrity necessary in those who practice it, and the obligations and duties associated with it: all these can be brought to the students' attention.

Perhaps better than a formal lecture on the subject is the frequent and casual comment and, of course, the example. The implication here is that each instructor should be thoroughly imbued with a truly professional attitude.

In addition to the broad obligations listed above, the chemical engineering teacher owes special duties to particular groups. Graduate students, even though they are learning to be self-reliant, need advice on choice of courses, conduct of research, acquisition of equipment, preparation of seminars, and almost countless other topics. Seniors need guidance on the decision between graduate study or employment, and on individual opportunities within each category. The poorer students seek encouragement, or help in choosing an easier schedule, or even a different field of study. Personal advice cannot be forced on the students but it is often sought; it should be given honestly and respectfully.

Such subjects as politics, religion, and race do not customarily belong in the engineering classroom. They may be discussed with an individual student if they represent problems on which he is honestly seeking advice. The teacher, as a thinking individual, has the obligation to respect all sides of any many-sided question.

Responsibilities to the University

It is quite apparent that the chemical engineering teacher, like any other teacher, has a very considerable responsibility to the university, which provides his employment, furnishes his working facilities, and pays his salary. Some of the more tangible obligations are really responsibilities to the students, and have already been discussed. Also in the tangible class is the fairly general obligation to do more than teach: most teachers should also be active in research, writing, professional committee work, or perhaps all of these. Research should, when possible, be a balance of both fundamental and applied. The teacher should also expect to attend seminars, to serve on university committees, and to study and discuss all of the usual academic

problems: courses, curriculum, student discipline, laboratories, and the hundred and one similar matters. A less tangible obligation is the requirement of loyalty to his university and to his department and college, and a reasonable amount of school spirit that is sincere though perhaps less uninhibited than that of his students.

Life on the academic campus is generally less rigorous than in an industrial organization. The department head, dean, and other administrative officers are not so much "bosses" as associates with lesser or greater degrees of authority. Nevertheless this authority must be respected, and the teacher's superior must be consulted and obeyed on all matters of administrative concern: office hours, contacts with individuals or organizations outside the department, sharing of facilities with other faculty members, absences from the campus, consulting work, political activities, and the like. Perhaps some of these activities do not require approval by the administrative officer, but the courtesy of keeping him informed is certainly obligatory.

Responsibilities to His Associates

The chemical engineering teacher's responsibilities to his associates are more in the nature of courtesies than obligations. Thus he is not obliged to prepare a "guest lecture" for another's class, but it would be a strange and unsocial instructor who would not gladly do so. Many academic problems can be solved, or at least alleviated, by discussions among the faculty of a department or school. These problems include new or untried teaching techniques, research bottlenecks, criticism of papers, student discipline, student guidance, and many other facets of academic life. The mature professor can be helpful to the younger in problems involving teaching and personalities; the younger can often be an inspiration to the older because of his enthusiasm, more recent technical training, and spirit of venture. It is foolish (not to mention unprofessional) for either to deride or overlook these different attributes of the other.

Research and writing are best conducted in an atmosphere of encouragement. Only part of this can come from the university administration; each faculty member has an obligation of this nature toward his professional associates.

Responsibilities to Other Engineers

All engineering codes of ethics include some discussion of the responsibilities of engineers to each other. The chemical engineering teacher is not immune from these matters of mutual concern; perhaps it needs to be called to his attention that he has such an obligation. Most important is that he should join with nonteaching engineers in their societies and activities, in order that he may be conscious of himself as a member of the profession, and that his fellow engineers may recognize his kinship and his differences.

Certainly any American chemical engineering teacher who takes his profession seriously is a member of the American Institute of Chemical Engineers, and participates in its affairs as actively as time, finances, and his university will permit. Probably also he is similarly active in the American Chemical Society, and most likely in the American Society for Engineering Education. Beyond these three basic associations, there are many others of specific interest. The teacher need not be merely a "joiner," but he should participate with other engineers to a real degree.

The teacher is no different from other chemical engineers in these responsibilities, but perhaps needs special reminding of them lest he hold himself aloof from the nonacademic members of his profession. He has much to offer them, and has much to gain for himself by stepping outside the cloistered walls occasionally.

Responsibilities to the Public

All chemical engineers have certain obligations to the public, the teacher perhaps more so than the rest. The public holds the engineering teacher in high esteem and, rightly or wrongly, holds itself entitled to bring to him its questions on all sorts of personal and business

problems. Perhaps the teacher at a government-supported school receives the larger number of these inquiries, but they come to all. Within reason, the teacher should try to be helpful, thus continuing his teaching duties beyond the classroom. He should be particularly assiduous in this activity when matters of public or private health and safety are involved, when representatives of government request his technical advice, and when the press needs his engineering judgment. He should graciously refuse to answer questions that are not in his domain, or that are in areas in which he is not competent. He may reasonably excuse himself from persistent inquirers who demand unusual efforts or time on his part, perhaps referring such inquirers to a regular consultant, perhaps even to himself on a consulting basis. But it is his duty to be as helpful as he can without detracting from the obligations to his students and university, and without encroaching on the domain of the professional consultant.

Obligations as an Individual

The chemical engineering teacher has all the individual obligations of any responsible citizen in the community. Perhaps he should feel this obligation more deeply than most men, because an educator is looked up to as an example by his students, by other engineers, and by the public. His responsibilities in general are not different, but may be more significant.

Responsibilities of Administrators

The chemical engineering dean or department head has a special set of responsibilities to the faculty members under his jurisdiction. He must act as an administrator, just as the foreman or department superintendent in industry; but he must keep in mind that he is dealing with a different type of person. It is often necessary to refuse a request, but it is usually desirable to explain the reasons for it if possible. The university professor is rarely satisfied with an unreasoned and arbitrary pointblank refusal.

The administrator must give advice

and counsel to his faculty members, especially to the younger individuals. He may suggest teaching techniques and advise on grading policies and discipline. He may appear to be arbitrary at times in assigning teaching and nonteaching duties, but it should be assumed that the overall good of the department and university is in his mind as well as the needs and desires of his faculty. Course content, too, must often be defined rather closely, in order that the entire curriculum can be adequately integrated. Often such matters are debated by a faculty committee or by the whole faculty, yet final decisions must be made by an individual administrator.

Despite the desirability of the administrator's advising his faculty, he must also leave them alone to the degree that they can develop responsibility and initiative. To the greatest possible extent, the individual teacher should be free to plan his courses, choose his textbooks, schedule and formulate his quizzes, and calculate his own course grades.

Conflicts

Only the very simplest code of ethics, such as the Golden Rule standing alone, can be fully free from conflicts of inter-

pretation. When codes multiply and specialize, increasing difficulties are inevitable. In general, the more basic code takes precedence over the more specialized; but each individual must study each problem situation as it arises, as honestly and as objectively as he can. The guidance of older engineers, of more experienced teachers, or even of official committees on ethics may be sought in particularly troubled cases. Journal articles on the subject of professional ethics should be required reading for all developing engineering teachers, in order that they may better judge the relative importance of conflicting (or apparently conflicting) codes.

Conclusion

The chemical engineering teacher has the same ethical responsibilities as other chemical engineers, as other teachers, as other citizens. He has a few special added obligations peculiar to his profession, and he must bear in mind that he is constantly on display to the younger generation as an example of true professionalism. That most of our teachers meet these responsibilities with enthusiasm and pride is a tribute to them and to their profession.
