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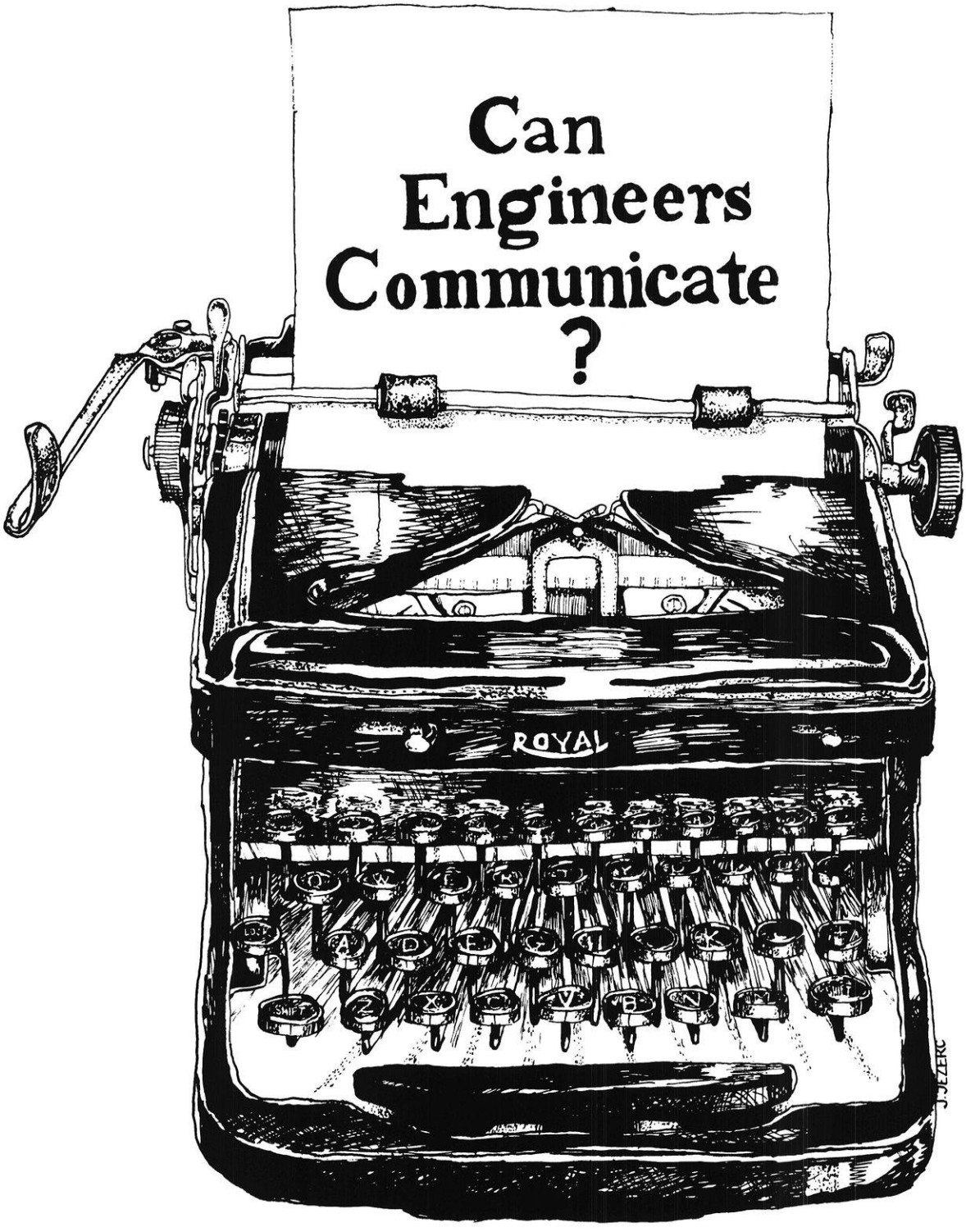
wisconsin engineer



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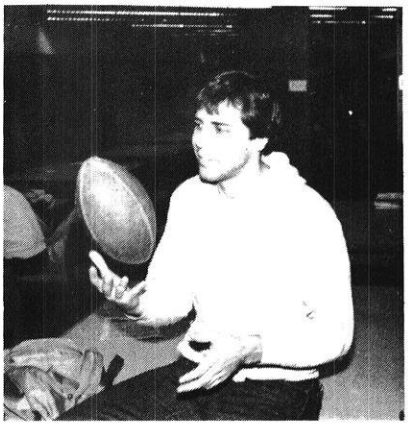
PUBLISHED BY THE ENGINEERING STUDENTS OF THE UNIVERSITY OF WISCONSIN-MADISON FEBRUARY, 1984

COLUMNS



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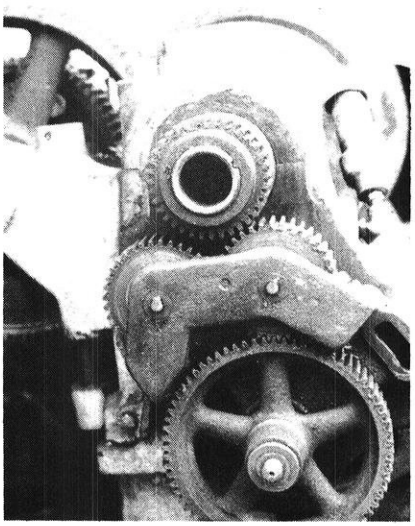
FEATURES



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Editorial

The Prodigal Student

by Scott Paul

During Christmas break I ran into a number of my old high school classmates at a certain local establishment. The ones who had decided not to go on to any more school sure seemed to have grown up fast. They were doing things like buying new cars, getting married, and starting careers. There is nothing wrong with that, but I sure felt glad that I wasn't going to get stuck into a thirty year long rut where I got a job and didn't really get to enjoy myself until I retired and was an old man.

Wait a minute! Just what exactly am I doing? Could it be that my path of going to college and then beginning a career was just trading one dull routine for another one? Sometimes while studying long hours for exams it even seems that I might have chosen the duller of the two paths. There is nothing special about going to college if it only means finding a higher-paying rut to spin your wheels in.

Some people will say that college is good because it gives people a chance to stay young for awhile and enjoy life before being burdened by the pressures of the "real world." In some cases this may be true, but as a rule I have never seen such a career conscious group of people as engineering students. Competition for jobs is fierce, and engineering students wage a constant raging battle with their grade-points. For many people the route to becoming an engineer is a real grind.

A person who does not go to college can still go into a career where he makes a **lot** of money. He can be happy. He can be a well-rounded person. He can be very satisfied with the life he is living. He can have just about everything he wants. Well then, why go to college?

First, you have the ability and ambition to put up with more school for a few more years. You have probably selected a particular career for which a college education is needed. But to simply have received a training from college is to have accomplished very little.

Your college years should be a time when you try different things and see what you like. It is a chance to explore different avenues of yourself and to spend some time doing those things you find you enjoy. The people who start their careers right after high school will limit the scope of what they will do with their lives. By going to college you broaden the range of possibilities that are open to you. It would be a grave mistake to not take advantage of some of those opportunities. What good is that well-rounded education if all you ever do is solve math problems.

I have never seen a college that offers so many different activities in such a wide range of fields. There are so many things to do at the University of Wisconsin and in Madison that one could easily spend four years here without attending a single class if he were to do all of them. Go to a football game. Take in a concert. Visit the art museum. Take up a sport. Join a club. Watch a dance performance. Almost anything, but for goodness sake don't spend all of your time at the library.

I'm not saying that you should try to do everything, (you are going to have to study to become an engineer) but you should do something. Stretch yourself! Live. Don't be a grinder--be a liver. □

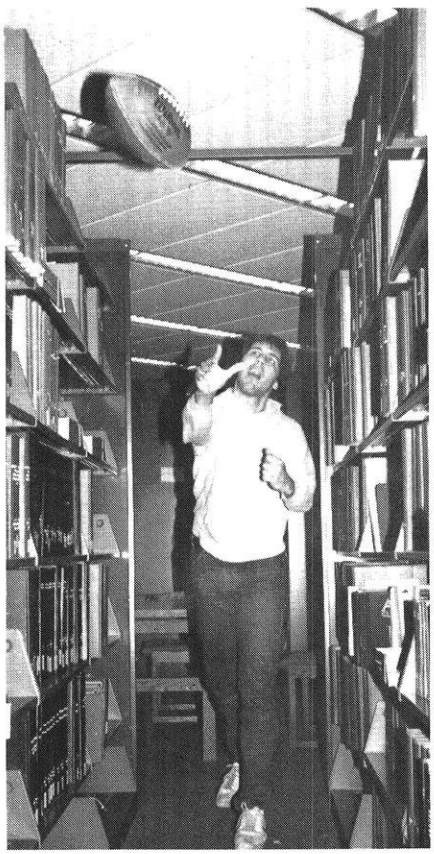

photo by Ron Hillman

Word From Our Readers

Concerning the letter from Kris Gupta and Ms. Priem's response in the December issue.

I don't know about "every other Big Ten University," but the University of Illinois (Urbana-Champaign) College of Engineering does admit freshmen directly to degree-granting programs. However, they are more selective in admitting these freshmen than is UW. Over 90% of the Fall 1982 freshman clas at Illinois came from the top 10% of their high-school class. It is unlikely that these students got to the top 10% by taking "blow-off" courses since over 90% received 26 or higher for their ACT composite score.

As long as our facilities are limited, we must screen prospective students somewhere during their career; whether it is better to do it prior to admission as freshmen or after the freshman year in college is debatable. It would be desirable to measure "learning" as Gupta suggests, or better yet, measure future promise, but until we can do that our best measure is past performance (grades) in similar (school) environments.

Sincerely
Arthur Tiedemann
ECE Department

Lake Water

Bacchus Revisited

by John Wengler

Drinking is among this campus's worst problems. When done to the exclusion of all else, partying becomes a waste of time and money, resources which are better applied to more constructive extracurricular activities.

Don't get me wrong--this is no probationary mandate. It is rather an attempt to put liquor into perspective.

The campus as a whole has seemingly lost its intellectual self-respect. It is no coincidence that the "Bud Song" has become our musical motif.

A number of beers in the Rathskeller is as pleasurable to me as to any. The problem begins when partying becomes the sole option for the student. If it's Friday, get drunk. If finals are over, get drunk. It gets to the point where a celebration is nothing without inebriation.

Exclusionary drinking starts with the freshmen who find no other unifying force other than getting drunk.

A cease-fire of tappers would probably bring most of today's social base to a grinding halt.

Here they are in "Mad City," feeling obligated to live up to its party school rep instead of the older label "Athens of the Midwest." Indeed, the patron god of knowledge, Athena, has been replaced by Bacchus, the wine god.

The champus as a whole has seemingly lost its intellectual self-respect. It is no coincidence that the "Bud Song" has become our musical motif. Instead of working each day to make a better community, campus solidarity is reserved for big, senseless beer bashes like WSA's Halloween party.

Drinking has permeated or replaced many extracurricular activities. Students feel strange at a softball or hockey game if there isn't a keg flowing nearby. Organizations must provide beer to entice its membership to attend meetings. Even then the rosters remain short because students believe bar-hopping is exclusively the way to relax and enjoy.

Weekend warriors do not realize that the hours spent working for groups like Polygon, EXPO, *WE* and others are both socially and professionally rewarding. Working with other students is great fun. Accomplishing something outside of class is equally satisfying. More importantly, (especially with current job market), group involvement shows a company that one is outgoing, commited, and experienced.

A cease-fire of tappers would probably bring most of today's social base to a grinding halt. As it stands, drinking is the easy way to deal with people; it is a kind of liquid brotherhood. Prof. Marks, the placement director, once tried to buddy up with a freshman audience by figuring how many pitchers could be purchased with an engineer's first-year salary (yuk, yuk).

Chi Epsilon, the Civil Engineering Honor Society, has a beer stein as one of its group T-shirt symbols (yuk, yuk). Big Brewers understand this kind of social cohesion via beer and that is why they sponsor numerous campus events. (One wonders if there are "Miller Girls" at MIT?)

Now, with the beginning of another semester, student groups are looking for new members. Everyone can do themselves a favor by going out and getting involved, before having to join the campus AA. □

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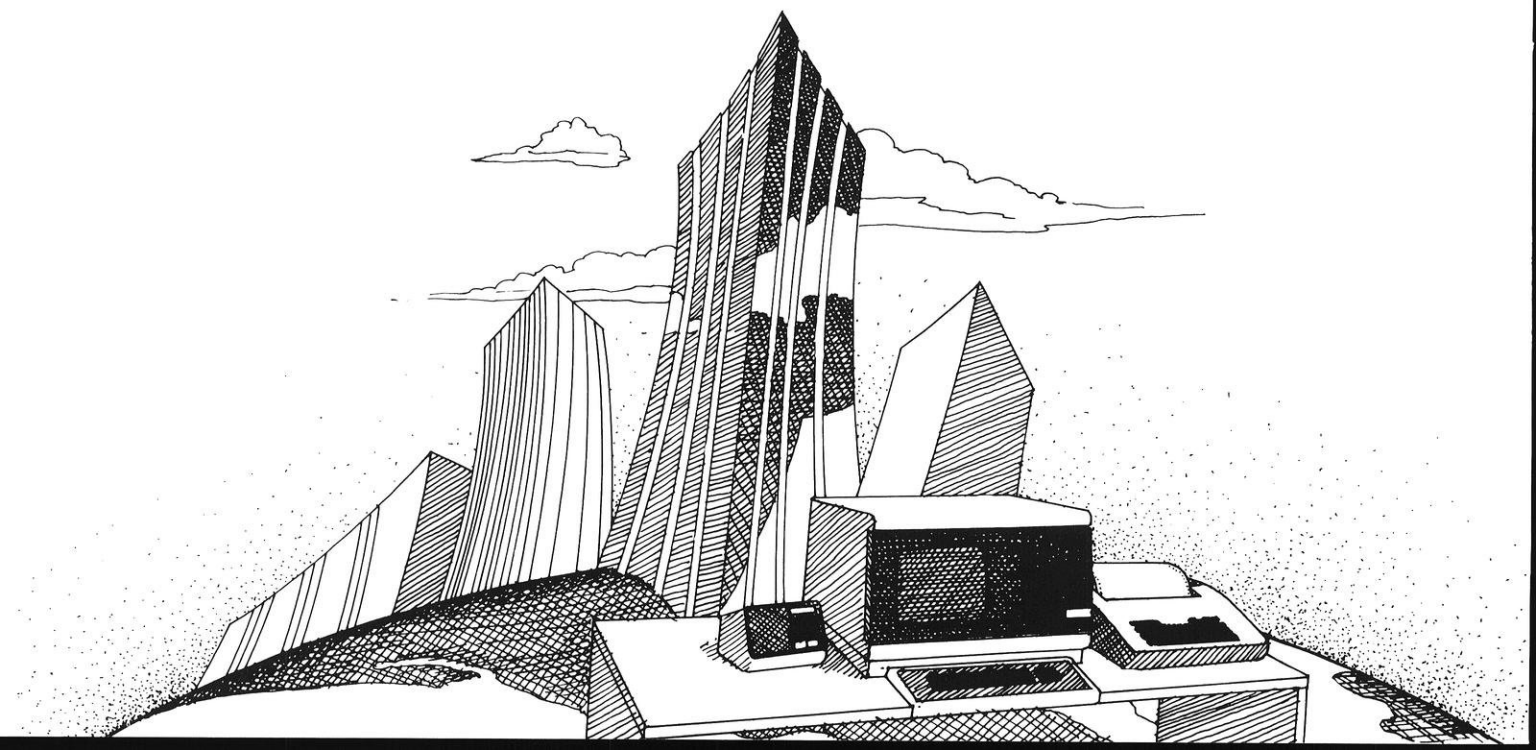

Improve Your Writing Skills

Some helpful pointers that can make you more employable.

by Scott Paul

Throughout your career you are going to need to convey your ideas by use of the written word. Any steps that you take to improve your writing skills will make you a more employable and more useful addition to any company.

The most important thing you need to do in order to express yourself clearly is to think clearly. Muddy thinking leads to murky, hard-to-follow writing. Make sure you know exactly what you want to say before you put a single word down on paper. If your thoughts are carefully sorted out and put in order, your writing will be much easier to understand.

Avoid the use of technical jargon whenever possible.

Never use a ten dollar word when a nickel word will get the job done. And avoid the use of technical jargon whenever possible. Complicated ideas can be expressed using a simple language, and when you do, it will be easier to follow what you are saying. You are not trying to impress anybody with your vocabulary; you are trying to communicate. The use of too many

Muddy thinking leads to murky, hard-to-follow writing.

technical terms will confuse even an expert in the field, and many times the things you write will be read by administrators and managers and other people who may not necessarily have the same technical background as you. It is far more important to be clear and concise than it is to be technical and high sounding.

Have a dictionary around when you have to do any fair amount of writing. When in doubt--look it up.

Once you have said something there is no need to say it again. Do not ramble.

It is not necessary to be an expert on the rules of grammer and usage in order to write well, but you should be aquainted with the basics. *The Elements of Style* by William Strunk and E.B. White is an excellent guide to these basic rules. They have organized a wealth of helpful information into a small (about 80 pages) writing guide. No desk should be without one.

Proofread! Cut out unnecessary words. Examples that don't make things clearer, redundant statements, extra adjectives, and just anything that does not make it easier to see your point should be removed as you look over what you have written. Stick with the meat and potatoes and leave the flowery garnishes for the poets.

As you proofread, look over your organization and make sure you have not missed any of the points you wanted to include. You may also get some new ideas. It may be time consuming, but for most papers of any importance you should do at least one rewrite. Your final result will be more professional. Professional work impresses employers.

Finally, practice your writing skills. They will get better and it will pay off. □

Engineering Grant

Nuclear engineering and ECE departments receive valuable financial boost.

The Grainger Foundation of Skokie, Ill., has presented a $1 million grant to the University of Wisconsin Foundation for use by two UW-Madison engineering departments.

Grainger Foundation President David W. Grainger, a 1950 UW-Madison graduate in electrical engineering, said the grant will be divided equally between the departments of nuclear engineering and electrical and computer engineering.

"We are extremely proud and happy to make this significant contribution to these two important programs at Wisconsin -- a distinguished university with which we have had a long relationship," Grainger said. "We recognize the need to support such worthy educational and research efforts if the United States is to retain its leadership role in these areas of engineering."

In announcing acceptance of the grant, UW-Madison Chancellor Irving Shain said $500,000 will be used to establish a Grainger Faculty Scholars Program in electrical and computer engineering. Income from the endowment will be used for a series of major awards each year to outstanding young faculty members in support of their research.

The other $500,000 will establish a Grainger Fund for Fusion Technology Research to support research by faculty members, staff scientists and students who are working to convert fusion energy into useful forms.

"The scholars program will permit us to recruit and retain outstanding young professors and further the research activities of our most able scientists in this highly specialized field," Shain said.

"Fusion researchers must move forward if America is to meet its energy requirements of the future," he added. "We have a very distinguished program in this area -- one of the best in the nation -- and the financial boost by the Grainger grant will have a very profound and positive impact on our work. We are extremely grateful to David Grainger and his associates for their thoughtfulness in providing such generous support at such a critical time." □

Technical Communications and Your Future

Success in a technical career is strongly influenced by an engineer's ability to communicate.

by David Eiche and Bob Zemke

How important are communications skills to engineers in the "real world"? In a survey of prominent engineers, over 95% of those questioned felt that effective writing was either "very important" or "critically important" in their present positions.[1] Yet, these very skills are found lacking in many engineering graduates. One study evaluated recent graduates of civil, electrical, and mechanical engineering, and although "writing and speaking" ranked either first or second in importance for all three disciplines, half or more of the graduates possessed "inferior" capability in the area.[2] The facts show that writing skills are important, and that many engineering students have not developed them adequately.

Good technical communication skills encompass more than writing alone. In many cases, engineers must communicate graphically by means of sketches or drawings. Here again, many students are having difficulty — nearly one third of mechanical engineering graduates were found to have "inferior" capability in engineering graphics.[3] An engineering superintendent for a paper company expressed a typical opinion

> I agree with you that one year of graphics should be required, but I would extend that to all Engineers. We have Chemical, Electrical, Mechanical, Pulp and Paper Engineers working side-by-side as "Project Engineers". They have an equal need for engineering graphics skills.[4]

Other officials mentioned that more advanced courses in graphics covering such topics as dimensioning, layout drawings and computer aided design (CAD) were particularly important for civil and mechanical engineers.

The accompanying chart shows that half of the departments in the College of Engineering **do** require at least one course in engineering graphics, and all but two (Chemical and Nuclear Engineering) require credits in Communications Arts or Technical Writing for graduation. A course in basic English (English 101) is required of all students, but most students are exempt from the course through placement tests. There are no requirements for advanced courses in graphics or computer-aided design, although there are offerings in both areas. Examples include a section of ME 601 devoted to computer-aided design[5] and General Engineering 441 and 442, Advanced Engineering Graphics I and II[6].

Nearly one-third of ME graduates were found to have "inferior" capability in engineering graphics.

Do engineering programs at UW-Madison give students adequate communications skills? To find the answer, WE staff member Bob Zemke interviewed two professors, focusing primarily on the value of writing skills and engineering students' grasp of them.

There is a common belief that engineers as a group are incapable of writing clearly. Professor Marks of the Engineering Placement Office disputed the claim, stating that engineers need not apologize for their writing skills. According to Professor Marks, engineers did better than the average junior student on a test of general writing skills. He emphasized that technical skills are of primary importance to engineering students and deficiencies there would be more difficult to correct than those in writing skills.

Professor Woolston, a technical writing instructor in the General Engineering Department, stressed the importance of good writing skills to the engineering student. He claimed that writing skills are more important to engineers than to any other group of professionals, with the exception of lawyers and members of the press. Professor Woolston also disagreed with the claim that engineering and writing are opposed to each other, although he did provide some insight on the difficulties engineering students typically have.

There are no plans to raise requirements for communications courses in the College of Engineering.

Some of Woolston's students have had very little writing experience, and some are reluctant to study technical writing because of their lack of proficiency. Another problem is teaching writing arises due to the nature of engineering courses, many of which center on teaching example problems. Students study the examples and then go on to solve similar assigned problems by using the algorithms of the examples. This method has the disadvantage of stifling creativity, since Professor Woolston has found that many students cannot master a given

Many students cannot master a given type of writing assignment unless they are presented with a similar example to emulate.

Technical Communication Requirements (Credits)

DEGREE CLASSIFICATION	ALE	ChE	CEE	ECE	EM	IE	ME	MET	MIN	NE
Communications Arts	2	0	*	*	2	*	0	*	3	0
Engineering Graphics	4	0	3	0	3	0	4	0	2	0
Technical Writing	0	0	0	3	3	3	3	0	2	0

*Elective required in this category

Source: Freshman Facts for Engineering, UW-Madison College of Engineer ing, 1981.

type of writing assignment unless they are presented with a similar example to emulate. Once this is done, though, most students prove to be capable writers.

Woolston went on to say that a new graduate in engineering devotes most of his time to tasks such as computing, but as his career advances, he will spend a progressively greater amount of time communicating. A study by an industrial consultant reinforced this idea. It found that a junior engineer spends an estimated 40% of his time on the job communicating — speaking or writing, formally or informally. Communication time rises to 60% of the workday for a project head and over 75% for a division manager[7]. Good writing and speaking skills are clearly a valuable asset in career advancement.

Engineers did better than the average junior student on a test of general writing skills.

There are no plans to raise requirements for communications courses in the College of Engineering. Funding problems make it difficult for engineering curricula to keep up with the rapidly advancing pace of technology, leaving little time or money for more emphasis on writing and speaking skills. The individual student is largely responsible for assessing his own abilities in communications, and improving his skills where necessary. This is especially important in departments where there are no requirements for courses such as technical writing.

A former chief engineer of International Harvester Company summarized these ideas by saying

> Since success in engineering school does not depend much on communication abilities, you may not have developed your skills and may mistakenly resent the absolute dependence you will have on them for accomplishment in an organization[8].

In short, success in a technical career will be determined not only by an engineer's technical abilities, but also by his ability to communicate. The engineering student who realizes this now and acts has a definite advantage over his peers.

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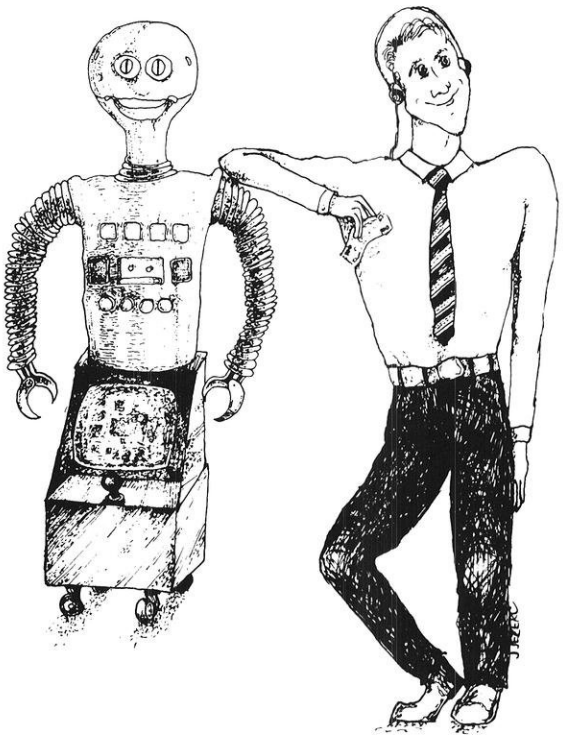
Career Guilt

A satirical essay based on the author's own observations.

by Greg Gorski



Yesterday I walked down State Street. I passed a girl wearing an Iron Maiden T-shirt. I saw young boys eagerly pushing quarters into a video game. I said hello to a friend, but somehow the greeting couldn't penetrate his walkman. *Silkwood* starts sometime next week. Technology. "America the beautiful," I thought, and I smiled.

In Silicon Valley, on a clear day, you can maybe see one-third of the valley. It's just gorgeous. Someday I want to live there. I want to own a Mercedes: a red 450 SL with a convertible roof. "Money is life's report card." I think John Wayne said it.

My calculator talks to me. It reminds me of important dates: Hewlett-packard on Tuesday, General Dynamics Thursday, and McDonnell Douglas on Friday. It tells me not to accept anything under $25,900. I like that. I think I can even program it to add and subtract.

My computer date picked me up in her new car. It told me to buckle my seat belt and comb my hair. After conversation we went to her house and had supper. I don't care what anyone says, microwave dinners beat the hell out of TV dinners any day. We played Pac-Man and then watched Automan. I think I'm in love.

My friend Scotch just bought a synthesized, quartz-locked, laser-rectifying hi-fi. Now he gets MTV in stereo. He can play it so loud I have to turn down my hearing aid. Amazing. Scotch built a robot in his job at Bells Labs. "A robot is man's best friend." I think John Wayne said that too.

Last week I went home to visit my parents. We all sat around and watched some Stewart guy in a movie about having a wonderful life. Boring. I would have jumped if I were him. After that, my father talked about honesty, and love, and values. He seemed so misguided. I felt sorry for him. He only makes $23,700. I thought about my future. I smiled. America the Beautiful. □

Engineering Education

Career opportunities exist for engineers in the university system.

by Scott Knox, Kris Gupta, and Dave Yngsdal

The University system offers many career opportunities for engineering graduates. Research, teaching and administration are the three areas of higher education that employ engineering graduates. In the university environment, the hiring and promotion process reflects the goals of higher education.

photo by Ron Hillman

From left: Dean Bollinger supervises the administration for the entire college of engineering. Dean Coberly and Dean Wuerger oversee university research and industrial relations, respectively.

TEACHING

In the University of Wisconsin-Madison, the process for filling open teaching positions starts when a committee searches out and selects qualified candidates. Representatives of the department interview each candidate. Usually a candidate must also give a presentation based on his area of specialty. The candidates then meet with the Dean. Finally a selection is made and put forth to the Chancellor and the Board of Regents for approval.

Student evaluations are an important factor when an Assistant Professor is considered for tenure promotion.

Candidates for teaching positions are evaluated mostly on expertise and research specialty. A Ph.D. degree is required for most positions. Surprisingly, no formal training in teaching or education is required for the Assistant Professor teaching position. However, student evaluations are an important factor when an Assistant Professor is considered for tenure promotion. Those candidates with poor evaluations are encouraged to improve their teaching skills. Some departments occasionally sponsor programs or seminars related to teaching skills.

Once appointed to his first teaching position, the new facualty member is faced with a probationary period, usually referred to as the tenure tract.

There are three basic teaching ranks: Assistant Professor, Associate Professor, and Full Professor. In most cases the Assistant Professor rank lasts six years. During this time the Assistant Professor must fulfill the tenure requirements to continue at the University. These requirements involve teaching, researching and publishing, and performing other academic activities that attract recognition both for the individual and the University. The quality and importance of work done by the Assistant Professor is evaluated by the executive committee in his department. This executive committee consists of tenured Associate and Full Professors. If the Assistant Professor meets the requirements at his final evaluation, then he is reappointed, promoted to Associate, and granted tenure. If the Assistant does not meet the requirements, then he is not reappointed and leaves the University.

There are similar requirements for the Associate Professor, and if at the end of two or more years the requirements are met, then he may be promoted to Full Professor.

A major purpose of a research oriented university is research and the creation of organized knowledge. To pursue this purpose a university must attract dedicated faculty members who are prepared to pursue this purpose. New knowledge is seldom obvious or within easy reach. New ideas are sometimes controversial or unpopular. Thus a professor wants some form of protection and security that allows him to teach and conduct research without fear that an idea would endanger his job. Tenure provides this type of security because a tenured faculty member would only be terminated with "cause" or with the elimination of the acedemic program, not because he is working on a controversial topic. Under the protection of tenure, more difficult issues can be studied and possibly more new knowedge will be uncovered.

The tenure requirements are designed to be difficult. The University can only afford to grant tenure to those who are capable and can prove their capacity to use the freedom of thought that tenure provides.

ADMINISTRATION

Once a person has attained the status of Full Professor, he is not restricted only to teaching in the College of Engineering. Many positions exist in administration for those tenured professors with strong management skills.

In the engineering college, each administrator has an area of specialty. There is one dean in charge of the entire College of Engineering, and five associate deans, each specializing in a different area. These deans have very different qualifications that make them suited for their individual roles in the administration.

Dean Bollinger represents the College of Engineering. His strong management skills are recognized by many

porporations who consult him for management advise. He is also a competent teacher and continues teaching courses in computer and control systems. Together with his heavy involvement in research, these skills provide an understanding of the different interests that must be served as he sets forth plans for the college.

Associate Dean Ratner supervises Operations. This entails establishing a budget, planning space, and managing staff. His goal is to find the optimum use of scarce resources. He consults on labor arbitration and industrial management matters, and also teaches and performs research.

Associate Dean Maxwell coordinates the Pre-Engineering, SOAR, and counseling programs and high school relations. Associate Dean Dietmeyer of Academic Affairs sets academic programs and policies and deals with student records. He also teaches two ECE courses. Both of these administrators have been heavily involved in student advising for quite a while, and try to see problems from a student's point of view.

Associate Dean Coberly heads the Engineering Experiment Station and oversees all the research conducted on campus. He is a former chairman of the chemical engineering department and has considerable experience in research management.

Associate Dean Wuerger is responsible for Industrial Relations. He has background as an ME in an industrial organization, with focus on cost accounting. Currently he has extensive dealings with industry and manages programs that help the college respond to interests in industry. He also supervises the engineering placement and co-op programs.

RESEARCH

For many undergraduates, engineering research often seems to be the most remote of the three engineering education areas. Obviously everyone has contact with the teaching area and most of us have dealt with administration from time to time, but the research area can still be a bit of a mystery. Research projects are something professors work on when they aren't in class. They often take years to complete, require tens of thousands of dollars, and are given titles the size of paragraphs. But after that, things get a little hazy. Who actually determines what will be researched, who supplies the funds, and who benefits from the research?

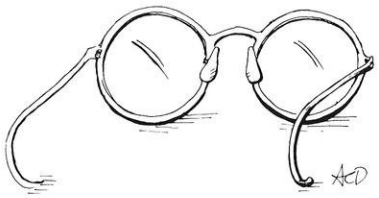
According to Associate Dean Coberly, Executive Director of the Engineering Experiment Station, a research project starts when a professor receives a grant from the government, a science organization, a private industry, or similar group. This could be the result of a professor's project idea appealing to a group, or a group approaching the professor with a project idea. The grant money donated by this group is then used to hire research assistants and purchase material and equipment. The equipment often stays with the University after completion of the project and is used in other research or laboratory areas.

Throughout a project's lifetime, intermediate progress reports are given which can be used to judge the project's worth and hopefully renew its grant. All of the findings generated from a project are available for anyone to look over, not just the project sponsor. This helps keep the University from becoming too closely tied with any single company or business. The professor also promotes his project's results through articles published in different professional journals.

Along with the professor in charge of a project there are usually a number of lower positions in research that are filled almost exclusively by graduate students. In fact, the chances of a person obtaining a full-time position in research with only a bachelors degree is extremely slim unless she is also working toward a graduate degree. There are also certain positions available that do not require the person to be pursuing a higher degree or to be responsible for classroom teaching. These positions are termed "scientists" and are very limited in number.

In a sense, research faculty have jobs that benefit everyone. Professors and graduate students are given the chance to explore in depth their area of interest, grants bring money into the University and help to build its reputation for quality research. Also, government and industry can have research done that they either haven't the time or facilities to perform, and they can also keep in touch with the educational institutions from which many of their future employees will come. □

From left: Dean Ratner manages university resources, Dean Maxwell coordinates pre-engineering programs, and Dean Dietmeyer works with acedemic policies and records.



Engineer's Library

The Soul of a New Machine

By Dave Eiche

"Shall we hire kids, Alsing" said West.

With these words, the project leader of the major computer manufacturer (Data General Corporation) helped to create a group of bright young engineers whose work became not only a success in its own right but the focus of a major bestseller. The book, *The Soul of a New Machine* by Tracy Kidder, outlines the problems and pains faced in order to give birth to a new computer.

One of the strengths of *The Soul of a New Machine* is the insight it gives into engineering in the "real world." One section outlines the interview procedures of two Data General engineers as they sought out the right candidates for their new project. The recruiters were looking for "kids" -- graduate students fresh out of college -- to design a new computer. Granting such responsibility to young engineers is unusual, and Data General managed to attract top talent despite assurances that the job would be long and difficult. The reason lies in one of the older engineer's remarks:

> Engineering school prepares you for big projects, and a lot of guys wind up as tranformer designers. It's a terrible letdown, I think. They end up with some thoroughly known technology that's repetitive, where all you have to do is look the answers up in books.

"There are few computer engineers over 35."

Kidder provides a thorough description of the atmosphere in which the new engineers work along with a layman's view of the technical problems they constantly face. He describes the unspoken but implied commitments, the clash of egos and design philosophies, the constant deadlines, and the uncertainty created by office politices and shifts in corporate priorities. Occasionally, the pressure turned out to be too intense, and a member of the group burned out and quit altogether. Thoroughly exasperated with the nanosecond operating times of the emerging computer, one designer left for a commune in Vermont where he intended to "deal with no unit of time shorter than a season." The author also notes that there are few computer engineers over 35, a fact due not only to the stress of the job, but also to the speed of technological change and the tendency of older engineers to enter management.

Anyone should be able to manage the technical content of the book, which is not extremely high. Some reviewers claim that Kidder explains computers, but he actually explains only the terminology and concepts necessary for understanding the story. The reader may learn a few words of "computeres" yet not truly understand the modus operandi of a computer after finishing the book. There are a few technical tidbits scattered among the chapters for technophiles to savor, though, along with some unexplained jargon. To understand the arcane terms and basics of computer operation, a textbook on digital logic is far superior to this book, but not nearly as entertaining.

"Exasperated with the nanosecond operating times of the emerging computer, one designer left for a commune in Vermont where he intended to deal with no unit of time shorter than a season."

The Soul of a New Machine does provide an in-depth analysis of the characters, complete with anecdotes and aspects of their personal lives. Kidder makes a point of exploring the personalities of the project leaders and their idiosyncrasies. Most of the engineers in the book seem fascinated with tinkering and taking things apart. One remarked that he chose to be a computer engineer in order to understand something very complicated. Nearly all of the characters were consumed by their respective projects, and some voiced concerns about becoming too narrow. One remarked that even at parties, the major activity was talking about computers, and another claimed that his absorption with the new computer was so complete that he sometimes had difficulty forming sentences.

"One engineer claimed that his absorption with the new computer was so complete that he sometimes had difficulty forming sentences."

Money was rarely cited as a motivation for becoming an engineer or putting in the long hours necessary to complete the computer. However, money played a very important role in the careers of the founders of Data General, a group of computer engineers who had left Digital Equipment Corporation in the late '60's to create their own computer company. Through a combination of shrewd marketing and a good product, the company's sales rocketed from nothing in 1968 to over $500 million in 1979. The first chapter of the book is largely dedicated to the business savvy and cunning of the entrepreneurs who created the company.

Yet the theme of *The Soul of the New Machine* transcends the drive for money or prestige. It centers instead on professional dedication and the engineer's desire to understand and create, and in so doing, captures the essence of engineering. □

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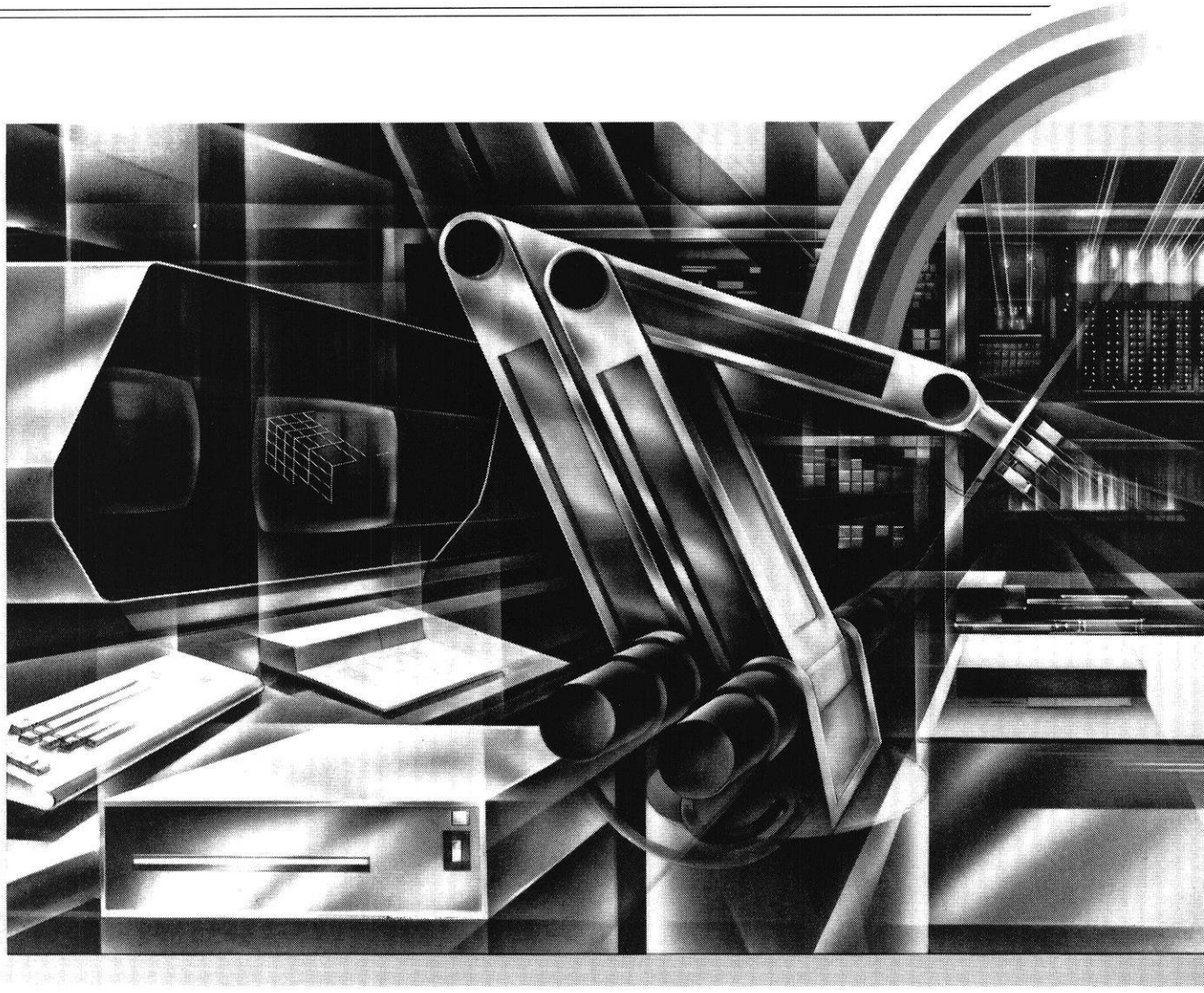

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