

Division newsletter

American Society for Engineering Education

DIVISION: CIVIL ENGINEERING

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WEST VIRGINIA UNIVERSITY

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CHAIRMAN'S REMARKS

As Chairman of the Civil Engineering Division, I have several major concerns that I would like to share with you.

Civil Engineering undergraduate students -- At my own and several other schools where I have looked into the situation, I have concluded that civil engineering is drawing less than their share of the quality students entering the Engineering Colleges. This concerns me, and I wonder if others share that concern? It seems to me that we (civils) need to promote our profession better than we presently are.

One way that I see of promoting Civil Engineering is to take advantage of the micro-computer and to link Civil Engineering as closely as possible with the micro. Many small to medium offices that could not afford in-house computers will utilize the micro in the next few years and, perhaps, more than any of the other disciplines the civils will benefit from this. With some good public relations we could begin to attract that group of high school student that is conversant with the micro.

CHAIRMAN'S REMARKS CONTINUED

As a part of this development we need to be able to utilize the micro in the educational environment. I am proposing that the CE Division collect and distribute (at nominal cost) software that would help the CE educator teach, using the micro, without having to reinvent the wheel by developing software that may already be available. To this end, I am making a mailing to all department heads seeking their interest in a software exchange and attempting to identify the right people to make contact with.

I am also seeking existing software of the type described above to feature in a session at the national convention next June. If you are interested, please call me at (513) 475-3648. Your comments and participation are most welcome.

James McDonough
University of Cincinnati
Chairman
CE Division

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Guest Editorial Continued

GUEST EDITORIALTHE CRISIS IN ENGINEERING EDUCATION --
WHAT DOES IT MEAN TO CIVIL ENGINEERING?

Engineering enrollments have reached historic highs in recent years. The freshman influx rose steadily between 1972 and 1981, from 52,000 to 115,000. The number of degrees awarded rose in a corresponding manner. To the outside observer these statistics imply uniform growth of all aspects of engineering. Indeed, certain periodicals which cater to the civil engineering profession, and which are assumed to be knowledgeable on the educational side of it, project this same image. In point of fact, however, the rates of growth of the component fields of engineering vary substantially from one field to another.

Electrical engineering (including computer engineering) has undergone a phenomenal enrollment rise, from 45,000 in 1972 to 103,000 in 1981, a 130% increase. Civil engineering, on the other hand has, among major disciplines, had the smallest percentage increase (50%). Undergraduate enrollment went from 30,000 to 44,400 in the same period. Recent data on students entering civil engineering programs suggest a future downturn. A number of individual programs have already sustained major declines.

Looking at the difficulties faced by programs that have grown rapidly, and the attendant "crisis in engineering education", educators might look favorably upon enrollment stability or even decline. From the vantage point of recent graduates, a reduction in output might very well help to close a severe (\$4,000-\$6,000/yr.) gap in starting salaries between CE's who enter CE enterprises, and entrants into other fields or CE's who enter such fields. Those who are in the profession meet a similar fate. A shortage of civil engineering graduates -- and our own experience suggests that this has not yet

taken place -- would have the effect of improving salary disparities.

Nevertheless, problems of another kind are on the opposite side of the enrollment issue. Civil engineering, like any branch of engineering, must strive to attract a proportionate share of the best, most highly motivated students. A number will surely be attracted, as always, by a basic affinity towards the role of a civil engineering professional. They will not likely represent the "proportionate share" referred to above, however. Also, civil engineering, again like all other engineering disciplines, must advance with the ever-widening front of technological sophistication. Simply put, this means more faculty, equipment and space. Speaking for the moment as an administrator, the claims for these from a unit that is shrinking in size in the midst of growth will not be strong.

The above comments have a bearing upon teaching as well. Although operating conditions might differ from one branch of engineering to another, civil engineering education is in the midst of its own upheaval of equipment needs that are driven by the computer revolution. Laboratory equipment needs have always been present but obsolescence now occurs much more rapidly. A rather new aspect, however, is in the computational resources needed for instruction in courses which once involved only the pencil and paper. Use of microcomputers and graphics devices, not to mention batch processing at an unprecedented scale, are entering into these courses at a rapid pace. We have in mind the undergraduate environment, but graduate studies must also be encouraged and supported financially to extend the frontiers of knowledge in the respective specializations of civil engineering and to educate those who will engage in sophisticated design practice or in teaching.

Guest Editorial Continued

Overall, there has been a heartening reaction by industry and government to the campaign regarding the "crises in engineering", but hardly any of it has touched civil engineering. The American Electronics Association has announced a program for 200 graduate fellowships in microelectronics. The Semiconductor Industry Association is sponsoring an \$8-\$10 million research effort in this year, with plans for further growth in coming years. IBM is awarding \$30 million for manufacturing systems engineering programs and interactive graphics laboratories. DOD is awarding, in this year, \$30 million for university laboratory equipment. Exxon and other energy companies have made grants of a similar scale. Other initiatives can be enumerated, but it suffices to note that only a small fraction finds it ways to civil engineering education.

It might appear that the outlook is not promising for civil engineering education to enjoy benefits from even future programs of the above type. The civil engineering profession has a very different composition than electrical and chemical engineering. It has some large firms but it also has thousands of small or medium size firms and local, state and governmental offices.

What can be done? In my view, there needs to be a gathering of prominent civil engineering educators to lay plans for a campaign that parallels the efforts that have succeeded in other branches. Admittedly, the latter did not intend to be addressed to specific branches, but that has been the effect. The suggested meeting should identify the major industrial organizations tied to civil engineering, relevant governmental agencies, and such professional groups as NSPE. The latter has been a vigorous advocate of engineering education, as its recently published "Engineering Education Problems" report discloses. A forum needs to be created in which the message is transmitted to these potential supporters.

Guest Editorial Continued

If there were an effort of the above type I would hope that it would have the goal of serving the needs of a relatively wide segment of civil engineering education. There are arguments for strengthening only key institutions, but if funds are limited one would hope that they would be dispensed on the basis of competitive responses. I believe it is timely, and essential, for the CE educational community to marshal support for sorts of programs that have already impacted the other branches. Perhaps the "crises in engineering education" will go on forever, with continued funding responses. Even this scenario has the prospect of largely excluding civil engineering. On the other hand there is a definite prospect that the crisis will have come and gone without measurable effect on the critical needs that CE education will continue to face.

Richard H. Gallagher

Editor's Note: Dr. Gallagher presently serves as Dean of Engineering at the University of Arizona. He received his undergraduate education at NYU and did his graduate work at SUNY - Buffalo. Before joining the faculty at Cornell University in 1967 he worked for Bell Aerospace Company and before that Texaco, Inc. From 1969 to 1978, Dean Gallagher served as Chairman of the Department of Structural Engineering at Cornell University. He moved to Tucson, Arizona in 1978 to assume his present position. He has established an international reputation for his work with the finite elements method of analysis; he has authored two textbooks and numerous technical papers, and serves as editor of the International Journal of Numerical Methods in Engineering.

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**REVIEW OF C.E. SESSIONS AT
1982 ASEE ANNUAL CONFERENCE**

"What's Happening with Computer-Aided Design in Civil Engineering Practice and Education": This session was well-attended

ASEE Conference Continued

and generated a great deal of discussion between the speakers and the audience. Main points of the session are noted below. I can furnish addresses and phone numbers of speakers for those who would like to have additional information or to obtain copies of a particular paper.

The presentation by Charles Hair (Louis J. Capozzoli & Associates of Baton Rouge, Louisiana) served as a good starting point for the session. He described the background and current use of computers in a single office consulting firm. Slides of the firm's hardware were presented along with example applications, including shaft and pile curves, slope stability, and balance sheets. An automated data acquisition/reduction system was described. The presentation concluded with a summary of the savings and benefits achieved through use of the computer.

Clyde Lee (University of Texas at Austin) reviewed CAD in civil engineering education. He described how CAD could be used to advantage in civil engineering education. Some of the problems associated with using CAD as a teaching tool were also enumerated, e.g. having sufficient hardware for large numbers of students and getting faculty involved with CAD. Clyde used, as an example, his own experience in bringing up an INTERGRAPH work station and 4 time sharing CRT terminals to interact with a VAX 11-780 which supports the Roadway Design System (RDS).

Sam Waas (Walter P. Moore and Associates, Inc., Houston, Texas) provided a data processing manager's viewpoint on planning and implementing a CAD system. Considerations in selected turnkey systems versus developing one's own software were reviewed. Main points included costs, hardware, flexibility, support, and programming practices. Sam presented slides of his firm's CAD installation and outlined the physical requirements of typical systems.

ASEE Conference Continued

Tom Wenzel's (Marquette University, Milwaukee, Wisconsin) discussion of prerequisites for effective use of computer-aided design in the classroom provided a fitting closure to the session. Uses of the digital computer in a civil engineering curriculum were classified as programming, computer analysis, comprehension, and design. To use the computer effectively as an engineering tool, Tom recommended that appropriate hardware be provided in a suitable setting. He noted that any software developed should require students to interact with a computer to solve an engineering design problem. He stated that such interaction promotes a better understanding of the problem and provides experience in computer-aided design.

Ron Eck
West Virginia University
Session Moderator

"Computer Utilization in the Civil Engineering Program": This session dealt with how computers are being incorporated in the Civil Engineering Program.

The first paper by Norm Bolyea, University of Lowell, entitled "A survey of Civil Engineering Undergraduate Computer Utilization" presented the results of a random survey of fifty-three schools concerning computers in Civil Engineering.

Some of the results of this survey were (a) about 43% of the Civil Engineering faculty use computers in their classes, (b) the required hours of computer instruction ranged from one to seven with the average around three, (c) most students were using a batchrun process for their programs, (d) 63% of the respondents indicated that their department had their own computer, (e) students in structures were exposed to the most computer utilization followed by water resources, surveying, design, transportation and geotechnical, and (f) about one-half of the respondents were

ASEE Conference Continued

using computer-aided design in their curriculum.

The second paper by Greg Magee, U. S. Coast Guard Academy, entitled "Developing and Maintaining Computer Skills in an Undergraduate Civil Engineering Curriculum" dealt with the utilization of computers in the Coast Guard Academy curriculum. The current objectives and emphasis of the program are (a) awareness of the capabilities of the computer, (b) develop familiarity with the computer in an interactive mode, (c) allow for use of "canned" programs, (d) allow for adoption of "canned" programs in combination with user written codes, (e) develop user confidence, knowledge and desire so that they feel comfortable using computers. The overall plan to achieve these objectives is carried out by developing the base skills, applying and practicing these skills, expanding those basic skills and applying these skills to the users advantage. A detailed analysis of how this was accomplished in specific courses was discussed.

The third paper by Tom Jewell and Francis Griggs, Union College, was entitled "Developing Computer Competent Civil Engineers." The paper described the program developed by the Union College CE Department to maximize the computer competence of its graduates, while remaining within other curricular and institutional constraints. The essential components of Union's approach are introduction of the computer as a problem solving tool early in the student's tenure, presentation of the initial computer programming course in the spring of the sophomore year, utilization of the computer in subsequent engineering science and civil engineering courses, and integration of computer usage into an overall theme of development of communication skills in civil engineers. The paper also addresses the problem of faculty reluctance to computer usage in the classroom.

ASEE Conference Continued

The fourth paper by Leroy Holub, University of Wisconsin, was entitled "The Use of Professional Programs in Civil Engineering Education." Professor Holub stated "I believe the use of professional computer programs significantly enhances the contribution projects and major design problems made to the student's awareness of how problem solving is carried out by practicing professionals." He described various programs that are available in water resources, hydraulics, structures, waste water treatment and geotechnics. Specifically, he gave several detailed examples in water resources that he used in his classes.

Gerald Seeley
Tri-State University
Session Moderator.

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C.E. DIVISION AWARD BEING STUDIED

As you looked through the recent ASEE Profile, October 1982 issue of Engineering Education, you may have noticed that about 15 divisions have division awards, but that the C.E. Division is missing from this list. During the next year or so, your division plans on initiating a division award.

A committee consisting of the current and past division chairmen (Jim McDonough and Marvin Criswell) and the Board of Directors (Gerry Seeley, Colby Ardis and Ed Osborne) will be formulating award criteria and exploring possible funding. We want to have the selection criteria defined before approached possible benefactors. This is where we need your input.

Our division award could recognize excellence in teaching, applied or basic research, academic administration, notable achievement by a young faculty member, teaching of design, authorship of a notable C.E. text, service to the society, and/or other achievements. What

C.E. Division Award Continued

would you like to see as the selection criteria for a C.E. Division award? Please jot down your thoughts and send them to Marvin Criswell, Chairman of the Awards Committee, or to another committee member. Thanks.

Marvin E. Criswell
Colorado State University
Committee Chairman

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REPORT OF NOMINATING COMMITTEE

The Nominating Committee, consisting of the three immediate past chairmen of the Division, Eugene Chesson, Gordon Batson, and Marvin Criswell, have submitted the following nominations to the Division for the offices to be filled in 1983.

Chairman: Ron Eck
West Virginia University

Vice Chairman: Colby V. Ardis, Jr.
University of Toledo

Roger K. Seals
Louisiana State
University

Director,
1983 - 1986: Donald G. Leitch
University of Lowell

Gregory H. Magee
U.S. Coast Guard

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CALL FOR PAPERS
CIVIL ENGINEERING EDUCATION

The Civil Engineering Division will be publishing its ninth issue during the spring of 1983. This is a call for articles and papers on any and all aspects of Civil Engineering Education. The deadline for receipt of manuscripts is February 1, 1983.

Call For Papers Continued

Articles should be submitted to the editor, typewritten and double spaced. Five copies are required. Titles should not exceed sixty characters, including spaces. Maximum length of articles is 3000 words; however in special cases this maximum will be waived.

Illustrations should be submitted as black and white glossy photos or ink lined drawings. Keep in mind that illustrations may be reduced at least one-half.

Footnotes and extensive bibliographic references are not generally desired. Articles on any and all aspects of Civil Engineering Education are requested.

Mail articles and address inquiries to:

Dr. Peter G. Hoadley
CIVIL ENGINEERING EDUCATION
Department of Civil
& Environmental Engineering
Vanderbilt University
P. O. Box 1602, Station B
Nashville, Tennessee 37235
Telephone (615) 322-3518 or 3396

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C.E. DIVISION PROGRAM
1983 ASEE ANNUAL CONFERENCE

"Engineering - Images for the Future"
Rochester Institute of Technology

Planning is almost complete for Civil Engineering Division sessions at the 1983 Annual Conference. Session Topics focus on current and future issues facing CE education. Computers, accreditation, program funding and student communication skills (not necessarily in that order) are four current issues that impact all of us. Jim McDonough (University of Cincinnati) will moderate a panel session, entitled "Civil Engineering Microcomputer Software Exchange," which is intended to facilitate the exchange and dissemination of civil engineering-oriented software for

1983 ASEE Conference Continued

educational uses. Speakers from a variety of areas of civil engineering will briefly describe and demonstrate their programs.

The session titled "Influence of the Accreditation Process" moderated by Fred Beaufait (West Virginia University) should generate a great deal of discussion. Dr. John Breazeale, Vice President for Academic Affairs at Wichita State University, will present his views on what is wrong with the present concept of accreditation and outline changes that might be made to strengthen the influence of accreditation. This session has been designed to maximize interaction between the speaker and the audience.

"External Support for Civil Engineering Education" is the title of a session to be moderated by Steve Abt (Colorado State University). The session is intended to relate how professional societies, e.g. ASCE and NSPE, can influence and/or support civil engineering education through legislative and similar activities. Speakers will present approaches and techniques that have proven successful.

Tom Jewell (Union College) is arranging a session on "Communications Education for the Engineer" which will deal with all aspects of communication education. Topics will include oral, written, graphical and interpersonal communications, use of computers in communicating ideas, proposal writing, communicating concepts of engineering ethics and professionalism, and integration of communication education into the curriculum.

Two other Annual Conference sessions will take a look at education for the future. In Donn Hancher's (Purdue) session "Professional Education for the Future", engineers from the consulting, industrial, and construction professions will present their views on education of engineers for the future. The concept of the educational team and how it should be

1983 ASEE Conference Continued

modified in response to increasing enrollments, decreasing budgets and other factors will be discussed from the viewpoints of a dean, a chairman, and a faculty member in Roger Seal's (LSU) session entitled "The Educational Team--Building for the Future".

In addition to these "technical" sessions, there will be plenty of time for interaction and informal discussions with friends and colleagues. The CE Rap Session Monday night provides an opportunity for informal discussion of current issues in CE education. Beer and munchies will be served. In addition, the Business Luncheon, Division Banquet, and Chi Epsilon Luncheon provide other opportunities to renew old acquaintances and make new friends. Plan now to attend the 1983 Annual Conference at RIT. It's not too early to think about the 1984 Conference in Salt Lake City. Come to the Planning Breakfast Wednesday morning and give us your ideas on session topics for the 1984 meeting. I hope to see many of you in Rochester in June.

Ron Eck, Vice Chairman
CE Division

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EDITOR'S CORNER

I was pleased when Dean Richard Gallagher agreed to write our Guest Editorial and do appreciate his sharing with us his view of the "Crisis in Engineering Education" and his suggestions as to how the civil engineering profession might address the issues facing civil engineering education. Now, if we could hear from you, the reader. What were you thinking when you read the article? Do you agree or disagree with Dr. Gallagher? If not, why not? Do you have any ideas as to how civil engineering education should address the crisis in engineering education? Please, jot your reactions, thoughts and ideas down while reading the article and send them to the Newsletter. READERS, SPEAK OUT.



ASEE-CE DIV. NEWSLETTER
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