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Division newsletter

American Society for Engineering Education

DIVISION: CIVIL ENGINEERING

EDITOR: FRED BEAUFAIT
DEPARTMENT OF CIVIL ENGINEERING
WEST VIRGINIA UNIVERSITY

DATE: MAY 1984

CHAIRMAN'S REMARKS

As the academic year rapidly draws to a close, one might be tempted to reflect on the happenings of the past year. The Civil Engineering Division, however, is looking ahead since the near future holds a number of promising opportunities.

The main event, of course, is the upcoming Annual Conference in June in Salt Lake City. I hope to see a large number of you there since both the program and the location are attractive. Roger Seals has done an exceptional job in putting together the program. As you can see from the conference program sent out by ASEE headquarters and from the CE Division program listed in this Newsletter, there have been some changes in the way we have traditionally run the program. Roger made these changes based on comments and suggestions we received from many of you. We would appreciate getting your feedback after the meeting as to how you liked or didn't like the format. We want to help you get the most out of the annual conferences.

You have probably also noticed in the program a CE Division emphasis this year on microcomputers. This stemmed from feelings of the members of our standing committees that more quality students might be attracted into civil engineering if they realize that civil engineering can be just as much a "high tech" field as electrical or mechanical engineering. To encourage CE educators to incorporate microcomputer usage into their classes, it would be helpful to know what others are doing in this area. Thus, the emphasis on computers this year. If you have developed software suitable for the civil engineering classroom, please consider bringing it to Salt Lake City to share with other educators. If you're just getting started in classroom use of micros, bring several floppy disks to the Conference; this will be a good way to acquire some software to get started.

I'm happy to report that the Division's relationship with the Architectural and Engineering Performance Information Center (AEPIC) continues to evolve. Elsewhere in the Newsletter is a report from Greg Magee on the progress of his work with AEPIC.

I'm sorry to report that Pete Hoadley, Editor of the Division's journal Civil Engineering Education will be stepping down after publication of the Fall 1984 issue. Pete is responsible for getting the journal off the ground and has done an outstanding job as its editor for over five years. Selection of a new Editor will be the main item of business when the Executive Board meets in Salt

Lake City. I would welcome suggestions or nominations for the editor position. Please write or call me (304-293-5580) with your recommendations. This is an excellent opportunity to make a significant contribution to civil engineering education.

I hope to see many of you in Salt Lake City in June. Come prepared to participate and bring your ideas for the 1985 Conference in Atlanta. If you can't make it to Salt Lake City consider preparing a paper for presentation in Atlanta in 1985 or submit a paper for consideration by Civil Engineering Education. I think you'll find the involvement worthwhile.

Ron Eck
West Virginia University
Chairman, CE Division

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GUEST EDITORIAL

RESEARCH IN CIVIL ENGINEERING

INTRODUCTION: University research has long been accepted as an integral and essential component of graduate educational programs. All doctoral programs have a requirement for scholarly achievement that produces a unique and significant contribution to knowledge. Many programs at the Master's degree level also either require or permit some activity in project or thesis research. Faculty involved in research have greater opportunity for professional enrichment that can enhance and improve the quality of undergraduate education. Research has long been recognized as an important element in the total complex of higher education activities. All regional as well as professional accrediting groups have requirements for evaluating research programs because they are an important element in the total complex of an educational environment.

In the United States, university research is a crucial and dominant element in establishing the United States as the premier country for intellectual and technological leadership. It has been estimated that universities conduct more than 80 percent of all basic research activity in this country. Industry, of course, does a far greater amount of applied research and development. This productive partnership between universities, industry, and government has achieved spectacular success. The exposure of students, both undergraduate and graduate, to the newest and best in research provides a unique mechanism for technology transfer. As basic and fundamental research leads to better applications of that research, bright young talent take those ideas and apply them in a broad spectrum of industrial, professional, and governmental activities when they leave the universities and enter professional employment. This complex system, which has developed largely since World War II, has worked amazingly well considering that it was never really planned but simply evolved as the needs and opportunities were accommodated.

The important concept today is that we effectively utilize this unique resource -- university research -- for the continued and effective improvement of professional, educational, and industrial achievements, and better serve the national interest. We should avoid the pervasive tendency to focus on problems and instead concentrate on the tremendous opportunities for continued and increased effectiveness.

In most departments, colleges, and universities, there is some mix of activity in the three general areas of education, research, and service. We have a wide diversity of educational institutions, and each works to optimize its own mix of activities to serve local needs. The skill with which these activities are constructively balanced provides the best measure of a quality program. Of the three areas, research generally has the greatest external exposure and is the least forgiving with respect to failure to maintain quality standards. Research is a rather elite business. Those people paying the bills

generally insist upon first-rate performance. Value tapers off rapidly with respect to quality standards. Second-rate research probably becomes worthless much faster than does second-rate education or second-rate service. The quality stress in research is a continual probe driving faculty and students to new and better achievement. It creates a stressful environment that is rejected by some who cannot or do not want to travel in the fast lane.

FACTUAL BASE: University research activity is a relatively large element of the total pattern of higher education in the United States. In fiscal year 1981, which is the last year for which data are available, organized university research expenditures totaled $6,793,266,000. More than half of this total was in the area of life science relating to medicine and agriculture. The total expenditure for engineering was $957,217,000 or 14 percent. Expenditures for physical science research was $764,008,000 or 11 percent. Other areas that relate to engineering are: environmental science--$547,333,000 or 8 percent and mathematics and computer science -- $220,669,000 or 3 percent. In the total pattern of university research activity, engineering is a fairly small but significant component of the total university research activity. If you consider all university research activity and all students involved in higher education, research expenditures in engineering are about twice as much per student as is the average for all areas combined. The average in engineering is much greater than for humanities and social science. University research expenditures per student in agriculture, medicine, and the physical, biological, and mathematical sciences are far greater than for engineering.

Most university research is funded by the federal government. The next significant but very much smaller source of research funds is institutional and state governments. University research funded by private interests is almost too small to be significant and has never exceeded 4 percent of the total funding. Thus, university research is not a consumer of private capital, but primarily transfers governmental resources to private benefit in the context of an educational environment. Each profession and each constituency has an opportunity to support and enhance the capabilities in university research as a primary mechanism for the intellectual advancement of the profession.

Table I lists university research activity in engineering for the United States during fiscal year 1981. Civil engineering activities amounted to 11.2 percent of the total of all engineering disciplines. It ranked third after electrical engineering -- 20.0 percent -- and mechanical engineering -- 15.4 percent. There is relatively good consistency between the number of students in various engineering disciplines and the research expenditures in those disciplines, although individual institutions may vary greatly.

Table II shows the amount of organized research activity in civil engineering for the ten largest programs in the United States as compiled by the National Science Foundation for fiscal year 1981. The total expenditure of these ten schools was $47,488,000. This amounted to 44.2 percent of the total of all university-based civil engineering research in the United States. Since there are about 300 educational programs in civil engineering and about 100 have doctoral programs, there is clearly an enormous imbalance in the relationship between the numbers of students at specific universities and civil engineering research expenditures. Much of this imbalance is because of focused and specific expenditures for military activities at specific universities and university-related research organizations.

Another reason for the disproportionment distribution of civil engineering research funding is the relationship between excellence and size of program. For example, if it takes 10

TABLE I

UNIVERSITY ACTIVITY IN ENGINEERING RESEARCH BY DISCIPLINE

Discipline	University Research (thousands of dollars)	% of Total
Aero/Astronautical	45,977	4.8
Chemical	80,126	8.4
Civil	107,541	11.2
Electrical	191,883	20.0
Mechanical	147,299	15.4
Other	394,391	40.2
Total	957,217	100.0

$$\frac{\text{Engineering}}{\text{Total}} = \frac{957,217}{6,793,266} = 14.0\%$$

Reference: NSF 83-308 (FY1981 Data)

TABLE II

UNIVERSITY ACTIVITY IN CIVIL ENGINEERING RESEARCH
(TEN LARGEST EXPENDITURES)

8,400	MIT
7,501	Johns Hopkins
7,213	Univ. of New Mexico
5,436	Univ. of California-Berkeley
5,188	Texas A&M
3,453	Univ. of Texas-Austin
3,015	Univ. of Illinois-Urbana
2,618	Colorado State Univ.
2,377	Georgia Tech.
2,287	Purdue Univ.
47,488	Total Top Ten (44.2%)
107,541	Total All Universities

Reference: NSF 83-308 (FY1981 Data)

or 20 research related faculty to achieve a significant effort in some area of research, clearly an institution with 5 or 10 faculty members in civil engineering cannot possibly have enough substance and resources to make a significant impact. Thus, there is a normal inclination for the big to get bigger because they are the only ones that can handle the task.

UNIVERSITY AND SOCIETY BENEFITS FROM RESEARCH ACTIVITY: There are common slogans such as "publish or perish", which emphasize policies of some educational institutions or develop administrative mechanisms for forcing faculty into research activity. Any program can be poorly administered, and there are clearly problems of mismatching between faculty talent and program needs. Tenure policies often reduce flexibility for adaptation.

Some common benefits of university research activity -- and they would vary from one university to another -- are listed: (1) Upgrades faculty and students. Moves them closer to the "cutting edge" of new technology. (2) Provides financial support for faculty, students, and institutional needs. (3) Contributes to economic development of area -- Sponsored research funds create support for new and added tax revenues. This is known as the economic ripple effect. (4) Creates leadership in high-technology industrial development -- Strong research programs are a necessary and essential requirement for highly desirable development of high-quality industry. Every major new industry always reviews the quality of regional educational and research activities before making a location decision. (5) Technical Resources -- The research program increases the size and improves the quality of the technical community. This is a great asset in providing technical advice and support to regional and local government, industry, and individuals.

In summary, university research has great potential for improving both the university and community environments for related industrial and professional interaction. The real challenge is for faculty, students, and practicing engineers to work together to improve the benefits that are possible.

Thomas E. Stelson

Editor's Note: Dr. Stelson is currently Vice President for Research, Professor of Civil Engineering, and former Dean of Engineering at Georgia Institute of Technology, Atlanta, Georgia. During 1980, he was on leave serving as Assistant Secretary for Conservation & Solar Energy, U.S. Department of Energy, directing a program having a budget of 1.7 billion.

He received Bachelor of Science, Master of Science, and Doctor of Science degrees from Carnegie-Mellon University at Pittsburgh, Pennsylvania. He served on the faculty there for twenty years before moving to Georgia Tech in 1971.

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ARCHITECTURE AND ENGINEERING PERFORMANCE (AEPIC)

As has been reported previously here and in several professional journals, AEPIC is well underway in its second year. The data base of cases, documentation, reference and visual materials is growing tremendously. AEPIC is designed for architects and engineers to efficiently retrive information on incidents involving the performance of projects for which they are responsible as conceivers, planners, designers, constructors, operators or investigators.

The information is structured for use in:

1. Planning new projects
2. Reviewing existing projects for rehabilitation, reuse, remedial work or restoration
3. Teaching case studies
4. Modifying codes and regulations
5. Planning research

6. Preparing professional texts
7. Investigating for negotiations, arbitration or litigation proceedings
8. Developing new products for the construction industry.

In order to:
1. Improve professional practice
2. Prevent repetition of poor performance

The range of data type collected.

Computerized Case (Incident) File:

Professional and "informed reporter" reports on actual incidents of performance, such as water damage, masonry disintegration, structural collapse, or air pollution, etc.

Computerized Citation File:

Reference to all published information about the incidents in journals, newspapers, agency reports, investigation reports, etc.

Dossier Library:

Documentation of performance data about the incidents and related information.

Visual Materials Library: Photographs, slides, and other visual materials related to the incident file.

Reference Library: Current and historical codes, standards, and other technical references.

All data can be free of sensitive, personal information to protect the privacy of individuals and firms. The data will relate specifically to performance of materials, elements, systems and processes.

AEPIC is in the middle of its second year of operation. The first two years were funded through NSF grants and significant direct contributions from the University of Maryland. Hereafter the organization must exist through user and search fees. The initial fee structure establishes three grades of membership; Individual, Firm, and Sustaining at $100, $1,000 and $5,000 per year respectively. In addition there is a $75 search fee for each Case or Citation search.

Greg Magee is acting as liason between ASEE Civil Engineering Division and AEPIC. He is working to establish an additional grade of membership for educators or educational institutions. In the interim however, he reports that any visual materials or reference documents which our members may desire can be reproduced and provided by AEPIC at cost. In addition the computerized "Citation" file search, and the "Case" file search (each of which require membership and search fee payment) provide excellent comprehensive data for both research and case study teaching.

If you desire any further information or wish to acquire specific visual or reference materials contact: AEPIC, 3907 Metzerott Rd., University of Maryland, College Park, MD 20742, (301)935-5544.

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THE CANDIDATES

The report of the Nominating Committee was published in the fall issue of the CE Division Newsletter. The ballot for voting is found on the last page of this issue; you are urged to cast your vote and return your ballot today. It is most important that you vote since there are two candidates for Vice Chairman (1984 Annual Meeting Program Coordinator) and Director.

A short biographical sketch of each candidate follows:

Roger K. Seals - Chairman and Professor of Civil Engineering at Louisiana State University since July 1980. Previously, he held the ranks of Assistant, Associate, and full Professor

at West Virginia University, respectively, between the period 1965-1980. Roger has been active in promoting civil engineering education through both the Civil Engineering Division of ASEE and ASCE. In the Division, he has served as Chairman of both the Educational Policy and Teaching Methods Committees. He is currently the Program Chairman for the Division. In ASCE, he is currently serving as Vice Chairman and Secretary for the Committee on Research in Civil Engineering (CORCEE) and the Committee for Curricula and Accreditation (CC&A).

Colby V. Ardis - Professor and Chairman of Civil Engineering at the University of Toledo since 1979. Since then externally funded research in the Department has grown steadily from under $10,000/year to a total of $589,000 over the last three years with $238,000 funded so far in 1984. The number of faculty has grown from 9 to 13 while the number of B.S. students graduated has more than doubled to 53 last year--a class of 65 is expected this year. M.S. degrees awarded have remained steady at 15 to 25 per year; Ph.D. students now number six compared to one in 1979. The Department moved into 20,000 square feet of new office and lab space in January 1984; 10,000 square feet of this was added to the existing Engineering Building for Civil Engineering.

Norman F. Bolyea - Member of the Civil Engineering Department at the University of Lowell, Lowell, Massachusetts. A graduate of Worcester Polytechnic Institute and Rensselaer Polytechnic Institute, Dr. Bolyea specializes in transportation and construction management. He taught engineering at Rensselaer, Union College, The University of Nebraska and the University of Kabul, Afghanistan.

Dr. Bolyea began his association with the ASEE in 1975 as the Young Educator Delegate to the annual meeting from the University of Nebraska. Since 1980, he has been a member, and is currently Chairman of the Civil Engineering Division, Committee No. 3, Teaching Methods and Technical Areas. He co-authored a "Survey of Undergraduate Civil Engineering Laboratories" presented at the 1981 annual meeting and "Computer Usage in Civil Engineering Curricula", a paper presented by him at the 1982 meeting.

Thomas K. Jewell - Assistant Professor of Civil Engineering at Union College since 1978. B.S. from U.S. Military Academy, 1968. M.S. in Environmental Engineering (1975) and and Ph.D. (1980) in Civil Engineering from the University of Massachusetts, Amherst. Research interests are in the areas of stormwater management modeling and civil engineering curriculum development. Won the 1979 Wesley W. Horner Award from ASCE for paper "Methodology for Calibrating Stormwater Management Models". Also won the 1980 Engineering Science/Association of Environmental Engineering Professors outstanding dissertation award. Presently writing textbook on systems analysis for civil engineering students. Professional Engineer registration in New York State.

Paul H. King - Professor and Head of the Department of Civil Engineering and Engineering Mechanics at the University of Arizona. He received B.S. and M.S. degrees from California Institute of Technology and Ph.D. from Stanford University. He has served as an environmental engineer with the U.S. Public Health Service and with Brown and Caldwell Consulting Engineers. Dr. King was on the faculty for two years at the University of Kentucky and for thirteen years at Virginia Polytechnic Institute and State University. He was Charles P. Lunsford Professor of Civil Engineering at Virginia Tech from 1976 to 1979, prior to moving to Arizona to accept his present position. He has been active in research in water and wastewater treatment and is author or co-author of over 90 technical publications. Dr. King has been an active member of the ASEE Civil Engineering Education Policy Committee for four years and currently serves as chairman of that group.

CIVIL ENGINEERING DIVISION
ASEE CONFERENCE - SALT LAKE CITY

Monday, June 25, 1984

8:00 - 9:45	The Gas Tax Inpact on the Infrastructure Moderator: Donn E. Hancher Speakers: Don E. Hancher, William O. Hurley, Noel Gold, Don Wheeler, George W. Bohn
10:00 - 11:45	Mini-Plenary: The Impact of Technology on Society Moderator: Roger K. Seals Speakers: Michael Kagay, Frank Ferrucci
3:45 - 5:30	Preview of the 1985 Civil Engineering Education Conference Moderator: Steven R. Abt Speakers: Glen L. Martin, George Wadlin, Garrett Evans
8:00 - 10:00	Civil Engineering Planning Session Moderator: Roger K. Seals

Tuesday, June 26, 1984

8:00 - 10:00	Civil Engineering Enrollments: Current Trends and Future Concerns Moderator: Paul H. King Speakers: Paul H. King, George Wadlin, Russel C. Jones, Ken Henkel
12:00 - 1:30	Civil Engineering Division Business Luncheon Moderator: Ronald W. Eck
1:45 - 3:30	Computers in Civil Engineering Education Moderator: Anis Farah Speakers: Eugene Chesson, John M. Mason, Hany Jamil Farran, Rusk Masih, J. H. Moore, K. B. Rojiani, Anis Farah, Joseph P. Martin, Mardy Thomas
3:45 - 5:30	Innovative Education Techniques Under Constrained Resources Moderator: Olin K. Dart, Jr. Speakers: Colby V. Ardis, Jack Poplin, Mel Hosain, Pamela Hauer, Olin K. Dart
6:00 - 8:00	Civil Engineering Division Reception Moderator: Ronald W. Eck
8:00 - 10:00	Civil Engineering Rap Session Moderator: Ronald W. Eck

Wednesday, June 27, 1984

7:00 - 8:00	Software Exchange Poster Session and Breakfast Moderator: Mardy Thomas
8:00 - 9:45	Civil and Construction Engineering Software Exchange Moderator: James Lubkin
12:00 - 1:30	Chi Epsilon Luncheon Moderator: Dexter Jameson, Jr., Speaker: Ellis J. Armstrong
1:45 - 3:30	The Academic/Practitioner Interface Moderator: Marvin Criswell Speakers: Nestor Iwankin, T. J. McManus, Kenneth Henkel.

ASEE BALLOT - CE DIVISION

Officers for 1984-85

Place an **X** in the appropriate ( ).

CHAIRMAN: Roger Seals ( )

VOTE FOR ONE

VICE CHAIRMAN: Colby Ardis ( )

Norm Boylea ( )

VOTE FOR ONE

DIRECTOR 1984-87: Tom Jewell ( )

Paul King ( )

RETURN BALLOT BY JUNE 1, 1984, to:

Fred W. Beaufait
College of Engineering
West Virginia University
P.O. Box 6101
Morgantown, WV 26506-6101

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Civil Engineering Department
West Virginia University
P.O. Box 6101
Morgantown, WV 26506-6101

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