

1982 FRONTIERS IN EDUCATION

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1982

Frontiers in Education

Conference



October 18-20, 1982
Columbia, South Carolina

Sponsored By
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Institute of Electrical and Electronics Engineers

Educational Research Methods Division
American Society for Engineering Education

Edited By
Lawrence P. Grayson

Joseph M. Biedenbach
University of South Carolina



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FOREWORD

Lawrence P. Grayson



Joseph M. Biedenbach
Director
Continuing Engineering Education
University of South Carolina
Columbia, South Carolina

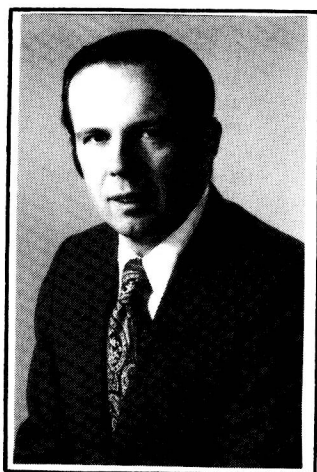
The Twelfth Annual Frontiers In Education Conference is being hosted by the University of South Carolina College of Engineering. Over the years the Frontiers In Education Conference has grown not only in attendance but quality of presentation. This year's meeting being no exception.

The format of this year's conference includes a number of "workshop sessions" which have evolved over time due to the preferences and interests of past attendees. The planning committee is evaluating this approach to programming for future conferences and recommendations to the ERM and IEEE Education Society boards who sponsor the conference. They will determine whether this trend continues.

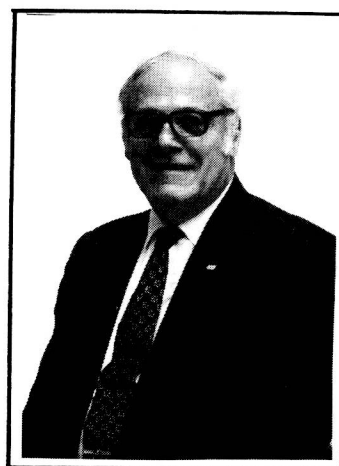
These proceedings are again being made available to the registrants upon arrival at the conference as they have been for the previous eleven meetings. The document continues to serve its function of enabling conference participants to make a better judgement of which concurrent sessions they should attend to meet their educational needs and enables a permanent record to be made for engineering educators in industry and academe.

The editors are indebted to the continuing education staff at the College of Engineering at the University of South Carolina, Mrs. Linda Maynard and Ms. Debra Lindler, for their enthusiastic support in getting this document ready for the printer. A special thanks is due to Ms. Lindler for her organization and leadership role in assembling this document.

The editors feel that these documents have been a positive influence on past conferences and would welcome any suggestions by the readership of these proceedings for their improvement.



Lawrence P. Grayson



Joseph M. Biedenbach



A MESSAGE FROM THE SPONSORING ORGANIZATION

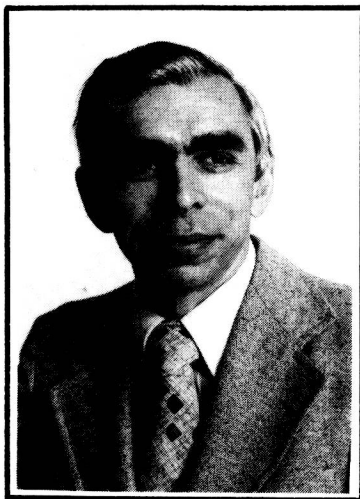
ERM Division Chairman
John C. Lindenlaub
Professor of Electrical Engineering
Purdue University
West Lafayette, Indiana

IEEE Education Society Chairman
James R. Rowland
Professor of Electrical Engineering
Oklahoma State University
Stillwater, Oklahoma

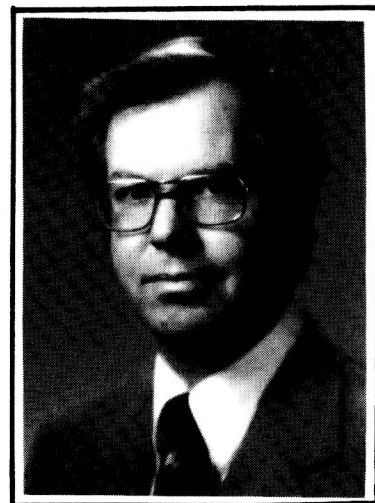
We welcome you to this twelfth annual Frontiers In Education Conference, a highlight among the year's program activities for the Education Society of IEEE and the ERM Division of ASEE. From the very first of these conferences in 1971, the objective has been "to provide a forum for the discussion of new developments in education with special emphasis on the interface between the university and its educational environment". Conference participants over the years have indeed helped to identify the frontiers and new directions in engineering education.

This search for changing frontiers and directions becomes a stimulating venture. The emergence of new topics, together with varying degrees of emphasis on traditional ones, sparks that kind of interaction which can lead to giant leaps in understanding for conference attendees. In addition to the regular paper sessions, an important feature of this year's conference are workshops on cooperative learning, improving technical presentations, counseling methods, writing and problem solving, and engineering ethics. We hope you will take advantage of as many of these opportunities as possible to learn from the expertise and experience of others in these areas.

Once again we congratulate Larry Grayson and Joe Biedenbach for their superb job as Proceedings Editors. Joe also has a second role this year as Conference General Chairman. We join you in expressing appreciation to Joe and his colleagues at the University of South Carolina for their hospitality and hard work in hosting this year's conference.



John C. Lindenlaub



James R. Rowland

WELCOME FROM OUR HOST UNIVERSITY OF SOUTH CAROLINA



UNIVERSITY OF SOUTH CAROLINA

COLUMBIA, S. C. 29208

PRESIDENT

Welcome to Carolina!

We are pleased that you have selected the University of South Carolina as the site for your meeting and we trust that this one will have all of the successful characteristics of your previous meetings.

Please take the time to enjoy our historic old campus which is nestled in the midst of a sprawling campus which serves some 24,000 students here in Columbia. In the fall of 1982, our nine-campus system will touch almost 40,000 students. I am confident that you will find much in common with other major universities, but I hope you will also find a few of our unique and distinguishing characteristics.

We take special pride in our College of Engineering and in its contributions to meetings such as the Frontiers In Education. It is a growing college and a major new engineering complex is in the planning stage. That complex will more nearly reflect the College's present vitality, relieve the overcrowded conditions, and allow for needed growth.

I hope you will have other occasions to visit our campus and I hope that this visit will add to your perspective as you interact with our faculty in the years ahead.

Yours truly,

A handwritten signature in dark ink, appearing to read "James B. Holderman".

James B. Holderman
President

JBH/ss

The University of South Carolina: USC Aiken; USC Salkehatchie, Allendale; USC Beaufort; USC Columbia; Coastal Carolina College, Conway; USC Lancaster; USC Spartanburg; USC Sumter; USC Union; and the Military Campus.

WELCOME FROM OUR HOST USC COLLEGE OF ENGINEERING



UNIVERSITY OF SOUTH CAROLINA

COLUMBIA, S. C. 29208

COLLEGE OF ENGINEERING

Office of the Dean

It is a very special pleasure to welcome a conference which includes so many old friends and respected names amongst its attendees. I have attended the Frontiers In Education conference on previous occasions and know of the well-established and continuing value that it has to engineering education. The University of South Carolina, largely through the efforts of Joe Biedenbach, has long been a supporter of this conference and your meeting on our campus is one more evidence of our continuing interest.

I have had the opportunity to peruse the titles of the various sessions and papers to be presented, so I have every reason to believe that this will be another valuable experience for all of us. Such meetings are always important, but the crisis facing engineering education today adds an extra dimension to each of our get-togethers. The gross mismatch of resources and enrollments in our colleges of engineering is especially ironic when viewed in the context that our per capita production of engineering graduates trails that of other industrialized countries.

The threat of losing technological leadership in many areas is very real and the recently announced decline to ninth place in gross national product per capita suggests still other challenges. Various studies have shown that something on the order of one-half of all gain in productivity is the result of innovation and new knowledge, not fiscal policy and not sociological change. There is every reason to believe that the problems confronting engineering education are inextricably linked with the problems facing the country.

I hope you will enjoy your visit to our campus and I know that we will be a richer place because you were here. More importantly, I hope we will make real progress in defining and probing the Frontiers In Education with the realization that the importance of our task, while always great, has assumed new proportions.

In Columbia you will find a breath of the Old South and you will feel the breeze of the New South. We hope you will enjoy both and have many opportunities to return. If you don't return in person, I hope your thoughts will return often as you remember the steps taken here to further probe the Frontiers In Education.

Yours truly,

A handwritten signature in dark ink, appearing to read "J. D. Waugh".

J. D. Waugh
Dean

JDW/ss

The University of South Carolina: USC Aiken; USC Salkehatchie, Allendale; USC Beaufort; USC Columbia, Coastal Carolina College, Conway; USC Lancaster; USC Spartanburg; USC Sumter; USC Union; and the Military Campus.

WELCOME FROM THE GENERAL CHAIRMAN



UNIVERSITY OF SOUTH CAROLINA

COLUMBIA, S. C. 29208

COLLEGE OF ENGINEERING

October 1982

To The 1982 Frontiers In Education Participants:

The Steering Committee joins me in welcoming you to the 1982 Frontiers In Education Conference and to the Columbia, South Carolina area. We know that you will find your visit stimulating, pleasant, and enjoyable. We hope you will find our Southern hospitality to your liking.

The organization of the 1982 FIE Conference follows the general pattern of previous conferences. The program co-chairmen, Bruce Carlson from Rensselaer Polytechnic Institute and Billie Ball from Mississippi State University, have put together what we feel is an excellent program. The program typically has three parallel paper or workshop sessions except for the opening plenary session and the ever-popular Wednesday morning Autocrats at the Breakfast Table session.

The awards banquet will take place on Tuesday evening, and Dean Waugh of the College of Engineering is planning a reception on Monday evening for all conference participants.

Mrs. Linda Maynard and Ms. Debra Lindler have done an excellent job of organizing the many details of operating such a conference as the 1982 FIE and deserve our gratitude and thanks for a job well done. Ms. Lindler has done an excellent job in organizing the Frontiers In Education Conference proceedings and deserves a special thanks for that job well done.

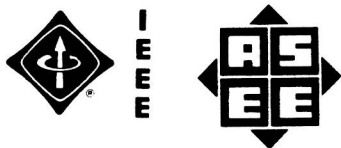
Members of the host committee here at the College of Engineering will be available during the conference to help solve any problems that may arrive. We wish you a very pleasant and worthwhile stay with us.

Sincerely,

A handwritten signature in cursive script that reads "J. M. Biedenbach".

J. M. Biedenbach, Director
Continuing Engineering Education
1982 FIE General Chairman

The University of South Carolina: USC Aiken; USC Salkehatchie, Allendale; USC Beaufort; USC Columbia; Coastal Carolina College, Conway; USC Lancaster; USC Spartanburg; USC Sumter; USC Union; and the Military Campus.



BENJAMIN J. DASHER AWARD

The Benjamin J. Dasher Best Paper Award is made for the best paper presented at the Frontiers In Education Conference annually. Selection is made by a panel of engineering educators based on the significance of the content of the paper printed in the proceedings to engineering education and on the quality of both the written and oral presentation. The award which consists of a plaque will be presented at the following year's Frontier In Education Conference.

1981 BEN DASHER AWARD RECIPIENT

Martha Montgomery
Head, Department of Humanities-
Communications
College of Engineering
Drexel University
Philadelphia, Pennsylvania



Martha B. Montgomery, Head of the Department of Humanities-Communications at Drexel University in Philadelphia, Pa. since 1975, teaches Ethics, Aesthetics, Contemporary Philosophy, and the Philosophy of Science. A graduate of Bryn Mawr College and the University of Pennsylvania, she is invited to speak at university philosophy symposia as well as at meetings of the Society for the Study of Professional Ethics. She has lectured before the American Psychoanalytic Association and has taught courses in the History and Philosophy of Science to practicing physicians and advanced medical students, besides serving as consultant to the PCHIP project "Race and Law" at the University of Pennsylvania Law School, and the National Council of Engineering Examiners Committee to revise the Ethics Code.

THE LITERARY VIEWS OF ETHICAL ISSUES IN ENGINEERING

ABSTRACT

This session has two goals:

- 1) to sort out the factors contributing to moral dilemmas in engineering practice, and,
- 2) to give fresh and challenging material for classroom use.

What has literature to offer in these connections? First, fiction gives a composite portrait of the engineer which shows us how he is perceived by laymen. This portrait squares with that drawn by historians and sociologists of engineering, and with our own anecdotal experience as engineering educators. This composite portrait, from Russian, French, British and American sources, is of a

detached, self-controlled man working with natural forces incomprehensible to the writer and his audience.

With a few exceptions, writing about engineers does not give the reader the feel of his work, or, the work is never described at all, but takes place off-stage. Further, moral dilemmas arising in the course of a man's work, which are at the heart of novels and plays about lawyers and scientists, government officials and doctors, are NOT present in the novels and stories with engineers as their heroes.

These findings--that the engineer is profoundly ignored in literature, and that when he does appear he is morally and emotionally detached--raise the questions of why this is so, and of what this means

for engineering ethics and its teaching. Interesting insights for the engineering educator follow from these findings, and I will develop this theme later on.

To our second goal, fresh and challenging material for classroom use, while literature provides some fine things to use, literature containing an engineer as protagonist does not. This paper will describe research into the engineer in literature, and focus on one classroom challenge, the problem of moral detachment, bringing together insights from moral psychology and years of teaching experience. A short list of especially fine classroom material is included, both literary selections and good non-fiction case material on ethical dilemmas. This list should grow as a result of this conference.



IEEE

HELEN PLANTS AWARD

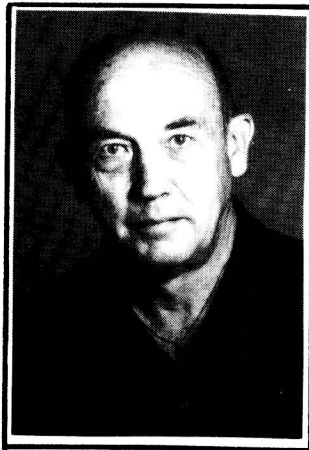
Helen Plants Award

The Helen Plants Award is given to the most outstanding "non-traditional session" which is given at each year's Frontiers In Education Conference. It is normally given the following year at the FIE Conference.

Sponsored by the ASEE Education and Research Methods Division and the IEEE Education Society, it is designed to encourage the use of non-traditional approaches to disseminate information at the Frontiers In Education Conference. It is awarded annually and it consists of a plaque.

1981 HELEN PLANTS AWARD RECIPIENT

Thomas A. Boyle
Assistant Head and Professor
Division of Interdisciplinary
Engineering Studies
Purdue University
West Lafayette, Indiana



Thomas A. Boyle is a professor of engineering in the Freshman Engineering Department, and Assistant Head of the Division of Interdisciplinary Engineering Studies at Purdue University. He holds degrees from Fenn College, Lehigh, and the University of North Carolina. Since beginning as a physics instructor at Fenn, he has taught mathematics, science, and engineering courses at a dozen institutions. This work has earned several awards for teaching excellence and educational innovation. His several periods of employment outside academia have included duty as a NASA faculty fellow and as an E. I. du Pont "Year In Industry" professor. During the summer of 1982 he held a Navy-ASEE research fellowship at the Navy Personnel Research and Development Center. He is a past ERM (EMD) Division Chairman and has been a frequent participant in FIE conferences. His primary interest continues to be better testing in the service of instruction.

PROGRAMMED TEST CONSTRUCTION AND ELEMENTARY TESTING STRATEGY WORKSHOP

ABSTRACT

This session has as its goal better testing in the service of instruction, i.e., obtaining information to help teachers teach better and learners learn better. The essential characteristics advocated were the control of the sequence of test items encountered by the student, and enhanced utilization of a computer for processing student response data. The control of item sequence is achieved

through programming that is built into the test. In conjunction with appropriate computer support this enables savings in test administration time, minimizing information loss through encoding, and optimizing the use of materials.

Each workshop participant prepared a programmed test using sets of supplied items. Following this

initial effort several short cuts were introduced to expedite adaptation of each person's own test items to the prescribed format. Each participant's test was then matched to a scoring program written in Fortran. Next the use of a programmed test to focus on a particular objective was demonstrated. This adaptation precludes a student encountering items of secondary or tertiary concern until after demonstrating adequate grasp of items of primary concern, i.e., adaptive testing. A discussion of the several advantages accruing to the use of the recommended procedures followed. The session concluded with Boyle's Programmed Test about Programmed Tests.



IEEE EDUCATION SOCIETY 1982 MERITORIOUS SERVICE AWARD

IEEE Meritorious Service Award

The IEEE Meritorious Service Award consists of a certificate and a plaque to be awarded for pioneering contributions to the administrative efforts of the Education Society of the IEEE over a period of years. The recipient must be an Education Society member. The basis for judging shall be on the personal dedication, efforts, and contributions of the nominee. The award shall be presented at a Frontiers In Education Conference whenever a recipient is selected. It may be awarded annually.

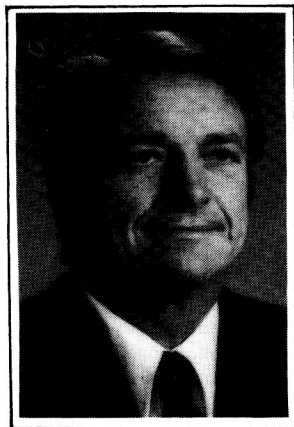
Previous Award Winners

1978 Warren B. Boast
1979 Joseph M. Biedenbach
1980 Edwin C. Jones, Jr.

1982 Recipient

Roy H. Mattson
Department Head
Electrical Engineering
University of Tucson
Tucson, Arizona

ROY H. MATTSON, Ph.D.



Dr. Mattson has been Head of the Electrical Engineering Department at the University of Arizona since 1966. Previously he was Associate Professor at the University of Minnesota 1961-66 and Iowa State University 1959-61, Assistant Professor at Iowa State University 1956-59, and a Member of Technical Staff at the Bell Telephone Laboratories 1952-56. He received the B.S. and M.S. degrees from the University of Minnesota in 1951 and 1952 respectively. He received the Ph.D. degree from Iowa State University in 1959.

Dr. Mattson has published 2 books, a number of papers, and has 4 patents. He has been active in the IEEE as Editor of the IEEE Transactions on Education 1970-73, member of the Education Activities Board 1974-date, and Chairman of the Frontiers in Education Conference 1971.

Dr. Mattson is presently Chairman of the IEEE Validation of Educational Achievement Program.



IEEE EDUCATION SOCIETY 1982 ACHIEVEMENT AWARD

IEEE Achievement Award

The Achievement Award consists of a certificate and a plaque to be awarded for significant contributions in the fields of interests of the Education Society over a period of years. The recipient must be a member of the Education Society. The basis for judging shall be on the quality of contributions of the nominee. Presentation of the award takes place at the Frontiers in Education Conference whenever a recipient is selected. It may be awarded annually.

Previous Award Winners

1979 Lawrence P. Grayson
1980 Demetrius T. Paris
1981 Lindon E. Saline

1982 Recipient

Anthony B. Giordano
Polytechnic Institute of New York
333 Jay Street
Brooklyn, New York

ANTHONY B. GIORDANO



Dr. Anthony B. Giordano is Dean of Graduate Studies and Professor of Electrical Engineering at the Polytechnic Institute of New York. He has contributed to the development of microwaves, waveguide attenuators, network synthesis techniques, and curricula in networks and communications. He served on the national committee to finalize the APOLLO space program. He earned the D.E.E. degree in 1946 at the Polytechnic Institute of Brooklyn. Dr. Giordano has authored over 60 papers and research reports and co-authored a text on Network Theory. Professional projects have involved travels to Egypt, France, Japan, Spain and Venezuela. Dr. Giordano is a Fellow of IEEE, a Fellow of AAAS, former vice president of ASEE, board member of IEEE, chairman of the ASEE Graduate Studies Division. Currently, he serves as chairman of the IEEE Education Medal Committee and the ASEE Senior Research Committee, in addition to other committee activities. Dr. Giordano holds several distinguished awards. His name appears in Who's Who in Engineering, Who's Who in America and Who's Who in the World.

FRONTIERS in education

CONFERENCE

OCTOBER
1983

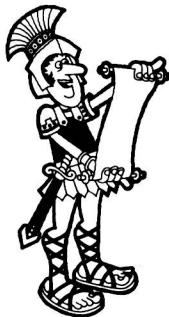
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Fall '82 – Call for Papers
January '83 – Abstracts Due



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or

Prof. D.E. Kirk
Electrical Engineering Dept.
Naval Postgraduate School
Monterey, California 93940

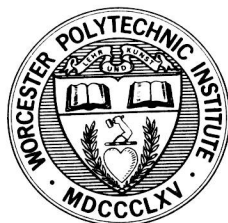




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MONDAY, October 18, 1982
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