Editor-in-Chief: Michael Wald

Dublin Institute of Technology Dublin, Ireland

Special Issue: Assessment Guest Editor: Gloria Rogers

Contents

M. S. Wald	107	Editorial
Gloria Rogers	108–109	Guest Editorial
Jirapan Liangrokapart, Funda Samanlioglu, Michael Leonard, Eleanor Nault, James Harrison, Jr. and D. Jack Elzinga	110–116	Gathering Employer Assessment Inputs from Focused Discussion Group Sessions with Campus Recruiters
Joseph Hoey and Eleanor Nault	117-127	Trust: The Missing Ingredient in Assessment
Mary Besterfield-Sacre, Larry J. Shuman and Harvey Wolfe	128–139	Modeling Undergraduate Engineering Outcomes
John K. Gershenson, Christine E. Hailey, J. Clair Batty and Warren F. Phillips	140–150	Application of Value Engineering Techniques in Curriculum Development and Review
Patricia Brackin	151-156	Assessing Engineering Education: an Industrial Analogy
Jack McGourty, Larry Shuman, Mary Besterfield-Sacre, Cynthia Atman, Ronald Miller, Barbara Olds, Gloria Rogers and Harvey Wolfe	157–167	Preparing for ABET EC 2000: Research-Based Assessment Methods and Processes
Paul Wellington, Ian Thomas, Irene Powell and Brian Clarke	168–179	Authentic Assessment Applied to Engineering and Business Undergraduate Consulting Teams
Robin S. Adams, Cynthia J. Atman, Rie Nakamura, Gretchen Kalonji and Denice Denton	180–192	Assessment of an International Freshmen Research and Design Experience: A Triangulation Study
Joseph A. Shaeiwitz	193-198	Mining Capstone Engineering Experiences for Program Assessment Results
Julia M. Williams	199–207	The Engineering Portfolio: Communication, Reflection, and Student Outcomes Assessment
Daina Briedis	208-216	Developing Effective Assessment of Student Professional Outcomes
Ronald L. Miller and Barbara M. Olds	217-224	Lessons Learned in Developing and Implementing a Program Assessment Plan
Ronald E. Terry, John N. Harb, William C. Hecker and W. Vincent Wilding	225–235	Definition of Student Competencies and Development of an Educational Plan to Assess Student Mastery Level
Dervis Z. Deniz and Ibrahim Ersan	236–244	An Academic Decision Support System Based on Academic Performance Evaluation for Student and Program Assessment
Maryanne Weiss and M. Dayne Aldridge	245–253	Assessing the Effects of the ABET/NSF/Industry Regional Faculty Workshop

INDEXED/ABSTRACTED IN: INSPEC DATABASE Science Citation Index/Current Contents

The International Journal of ENGINEERING EDUCATION

Editor-in-Chief

M. S. Wald, Dublin Institute of Technology, Bolton Street, Dublin, Ireland Tel: (International +353 1) 4023605; Fax: (+353 1) 4023999; E-Mail: wald@dit.ie Website: http://www.ijee.dit.ie. Editor's direct phone: (+353 27) 61400.

Associate Editors

C. Kuo, University of Strathclyde, 100 Montrose St., Glasgow G4 0LZ, Scotland

Tel: (International +44-141) 552 4400; E-mail: c.kuo@strath.ac.uk

L. S. Fletcher, Department of Mechanical Engineering, Texas A&M University, College Station, TX 77843, USA

D. McCarthy, Dublin Institute of Technology, Bolton St., Dublin, Ireland

M. Murphy, Dublin Institute of Technology, Bolton St., Dublin, Ireland

J. Turner, Dublin Institute of Technology, Bolton St., Dublin, Ireland

Board of Editors

C. Y. Lam, School of Mechanical and Production Engineering, Nanyang Technological University, Singapore 639798

S. Malasri, School of Engineering, Christian Brothers University, Memphis TN 38104, USA

R. Natarajan, Director, Indian Institute of Technology, Madras 600-036, India

E. C. Roche, Jr., Chemical Engineering, University of Nevada, Reno, NV 89557, USA

C. S. Slater, Department of Chemical Engineering, Rowan College, Glassboro, NJ 08028, USA

S. Waks, Department of Education in Technology & Science, Israel Institute of Technology, Haifa 32000, Israel

Editorial Advisory Board

Caroline Baillie, Department of Materials, Imperial College of Science, Technology and Medicine, London SW7 2BP, United Kingdom

F. Bodendorf, Department of Information Systems, University of Nuremberg-Erlangen, Germany

E. Eder, Royal Military College of Canada, Kingston, Ontario, Canada K7K 5LO

Nesimi Ertugrul, Department of Electrical and Electronic Engineering, University of Adelaide, 5005 Australia

I. Gibson, Industrial Engineering Department, National University of Ireland, Galway, Ireland

R. C. Jones, World Expertise LLC, 2001 Mayfair McLean Court, Falls Church, VA 22043-1761, USA

Paul King, Department of Biomedical Engineering, Vanderbilt University, Nashville TN 37235, USA

R. Latorre, Naval Architecture and Marine Engineering, University of New Orleans, New Orleans, LA 70148, USA

K. Mallalieu, Electrical & Computer Engineering, University of West Indies, St. Augustine, Trinidad

B. Malys, Lehrstuhl für Kommunikationstechnik, TU Cottbus, 03044 Cottbus, Germany

J. F. Marchman, Aerospace & Ocean Engineering Department, Virginia Tech, Blacksburg, VA 24061, USA

J. H. F. Meyer, School of Education, University of Durham, UK

Etsuo Morishita, Department of Aeronautics and Astronautics, University of Tokyo, Japan

C. Newberry, Aeronautics and Astronautics, Naval Postgraduate School, Monterey, CA 93943, USA

Terrance O'Brien, Department of Curriculum and Instruction, North Carolina State University, Raleigh NC 27695, USA

T. Owens, Dept. of Electrical Engineering and Electronics, Brunel University, Uxbridge, UB8 3PH, UK

S. Pomeranz, Department of Mathematical and Computer Sciences, University of Tulsa, Tulsa, OK, USA

Z. J. Pudlowski, Faculty of Engineering, Monash University, Clayton, Melbourne, Vic 3168, Australia

N. J. Salamon, Engineering Science and Mechanics, The Pennsylvania State University, University Park, PA 16802, USA Sheri D. Sheppard, Mechanical Engineering, Stanford University, Stanford, CA 94305, USA.

2002 Subscription Rates (including postage and insurance)

Annual institutional subscription rate £360. Personal subscription rate for those whose library subscribes £95. For North American institutional subscribers \$525. Subscription enquiries should be sent to TEMPUS Publications, Dublin Institute of Technology, Bolton St., Dublin, Ireland. Tel: (+353 1) 4023605, Fax (+353 1) 4023999.

Back Issues

Back issues available from TEMPUS Publications.

Copyright © 2002 TEMPUS Publications

Published 6 per annum

It is a condition of publication that manuscripts submitted to this journal have not been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publisher if and when the article is accepted for publication. However, assignment of copyright is not required from authors who work for organizations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature and translations. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

Photocopying Information for Users in the U.S.A.

The Item-fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided the stated fee for copying beyond that permitted by Section 107 or 108 of the United States Copyright Law, is paid. The appropriate remittance of \$3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 27 Congress Street, Salem, MA 01970, USA.

Permission for Other Use

The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the publisher for such copying.

The Item-fee Code for this publication is: 0949-149X/92 \$3.00 + 0.00.

The International Journal of ENGINEERING EDUCATION

Aims and Scope

This journal serves as an international interdisciplinary forum and source of reference for engineering education. A balance between papers on developments in educational methods and technology, case studies, laboratory applications, new theoretical approaches, educational policy and survey papers is aimed for. Comprehensive coverage of new education schemes and techniques makes the journal a unique source of ideas for engineering educators who are keen to keep abreast with latest developments in educational applications in all fields of engineering. The journal will cover engineering education news and open debates on engineering education policy related topics of transnational interest.

Some of the areas covered more extensively in recent issues are: CAD, CAE, computer applications in teaching thermodynamics, materials science, electrical engineering, new courses and curricula, engineering management, control engineering, mechanical engineering, engineering design, student evaluation and institutional accreditation.

Features are a series on world educational systems with reference to engineering and a software survey section. Special issues on topics such as computer-aided engineering, engineering thermodynamics and engineering design are published periodically.

Notes for Contributors

Papers for inclusion in the Journal should be submitted in duplicate to the Editor-in-Chief or to the most appropriate member of the Board of Editors or the Editorial Board. The Editor-in-Chief should be informed by the authors of any submission made directly to a member of either Board. The papers should include detailed information on relevance of the material to engineering education. Only papers not previously published will be accepted and, once accepted for the Journal, must not be published elsewhere. Technical Notes, Letters-to-the-Editor and Book Reviews may also be submitted. In addition to the paper in manuscript form papers should also be submitted on a diskette suitable for IBM PC or Apple Macintosh. News items of transnational interest, including courses and workshops, should be submitted to the Editor-in-Chief. Papers and Journal information are available on the World Wide Web on http://www.ijee.dit.ie

Papers must be submitted in English.

A brief summary (not more than 100 words) of the scope of each paper must be sent with the manuscript.

Authors are requested to submit a brief biographical sketch of up to 100 words for each author. Biographical sketches will be published with the paper unless requested otherwise.

The text, and as much of the mathematics as possible, must be typed with double spacing and ample margins on successively numbered pages.

The manuscript and diagrams will be discarded one month after publication unless the publisher is requested to return the original material to the author.

All photographs, schematics and diagrams should be referred to as figures and should be numbered consecutively and not included in the typescript. Name(s) of author(s), figure number and an indication of the orientation should be written on the back of each figure. Line diagrams should be drawn clearly in black ink with open lettering and be of sufficiently large size to allow for the necessary reduction. Photographs should be kept to a minimum and submitted as glossy prints. It is preferred to have graphics on diskette in GIF format.

In the interest of economy and in order to avoid the introduction of errors, tables will be reproduced directly from the authors' manuscripts. In case of difficulty please consult the Photoreprographic Unit of your institution. The following points should be observed during their preparation.

- 1. Insert heavy rules at the head and foot of each table, and fine rules below column headings.
- 2. The type should be clear and even.

Captions for figures and tables must be given on a separate sheet and included at the end of the manuscript.

The journal follows Le Système International d'Unités.

All Greek characters and unusual symbols must be identified by name in the margin the first time they appear.

References in the text to published literature should be given by numbers in square brackets on the line and the references should be listed at the end of the paper in numerical order.

Journal references should be arranged thus:

1. L. A. Pipes, Matrix analysis of heat transfer problems. J. Franklin Inst. 263, 195–206 (1957).

Book references should be given as:

2. P. H. Parkin and H. R. Humphreys, Acoustics, Noise and Buildings, p. 84. Faber, London (1961).

Abbreviations of journal titles will follow World List of Scientific Periodicals.

Proofs will be sent to the first-named author for correction, unless otherwise specified. Corrections must be restricted to printer's errors only. Other than these, any substantial changes may be charged to the author.

Vol. 18, No. 2, pp. 107–253 INT. J. ENGINEERING EDUCATION 2002

A selection of papers accepted for publication

Snyder—Vertically Integrated Projects and the Importance of Organisational Culture Amongst the Student Body

Chang—A New Undergraduate Semiconductor Manufacturing Option in a Chemical Engineering Curriculum

Palmer—An Evaluation of Undergraduate Engineering Management Studies

Craddock, Mandrella, Cook—Developing and Evaluating a Novel Technique for Recording and Asynchronous Delivery of Lectures

Faiz, Ojaghi—Instructive Review of Computation of Electric Field using Numerical Techniques

Karapetrovic—Why and How to Develop a Meaningful Quality Assurance System for Engineering Schools

Schreuders—An Ecological Engineering Project for Combined Undergraduate and Graduate Classes

Kartam—Design and Implementation of Web-based Multimedia Techniques for Construction Education

Hermanusson, Booy—Equal Opportunity in Higher Technical Education—Past, Present and Future

Falsone—The Use of Generalized Functions in the Beam-bending Differential Equations

Stoll, Prisbey, Froes—Advanced Materials—any Ethical Questions? Development of an Undergraduate Course

Uden—The Impact Of Women On Engineering: A Study Of Female Engineering Student's Thesis Topics

Harrison—On Scope and Assessment in Modern Engineering Education

Lee, Li, Cheung—Development of a Virtual Training Workshop in Ultra Precision Machining

Sadiku, Gu, Obiozor—Regional Monte-Carlo Potential Calculation Using Markov Chains

Elshorbagy, Schönwetter—Engineer Morphing: Bridging the Gap Between Classroom Teaching and the Engineering Profession

Gauthier, Benoit—Design for Safety Competencies for Automated-System Design Engineers: A Case Study in the Pulp and Paper Industries