



World Transactions
on
Engineering and Technology
Education

Editor-in-Chief
Zenon J. Pudlowski
World Institute for Engineering and Technology Education (WIETE)
Melbourne, Australia

World Transactions on Engineering and Technology Education

WIETE Partners



Association of Taiwan
Engineering Education and
Management (ATEEM)
Taichung, Taiwan



College of Engineering &
Engineering Technology
Northern Illinois University
DeKalb, Illinois, USA



College of Management
Hungkuang University
Taichung, Taiwan



Commonwealth Science and
Technology Academy for
Research (C-STAR)
Chennai, India



Department of Electrical and
Power Engineering,
AGH University of Science &
Technology, Kraków, Poland



Faculty of Electrical, Electronic,
Computer & Control Engineering
Technical University of Łódź,
Łódź, Poland



K.S. Rangasamy College of
Technology
Tiruchengode, India



Polytechnic Institute
of New York University
New York, USA



Russian Association of
Engineering Universities
Moscow, Russia



Technological Education Institute
of Piraeus
Piraeus-Athens, Greece



University of Botswana
Gaborone, Botswana

Published by:

World Institute for Engineering and Technology Education (WIETE)
34 Hampshire Road, Glen Waverley, Melbourne, VIC 3150, Australia

E-mail: info@wiete.com.au

Internet: <http://www.wiete.com.au>

© 2010 WIETE

ISSN 1446-2257

Articles published in the World Transactions on Engineering and Technology Education (WTE&TE) have undergone a formal and rigorous process of peer review by international referees.

This Journal is copyright. Apart from any fair dealing for the purpose of private study, research, criticism or review as permitted under the Copyright Act, no part of this Journal may be reproduced by any process without the written permission of the publisher.

Responsibility for the contents of these articles rests upon the authors and not the publisher. Data presented and conclusions developed by the authors are for information only and are not intended for use without independent substantiating investigations on the part of the potential user.

World Transactions on Engineering and Technology Education

EDITOR-IN-CHIEF

Prof. Zenon J. Pudlowski
World Institute for Engineering and Technology Education (WIETE)
34 Hampshire Road, Glen Waverley, Melbourne, VIC 3150, Australia
Tel/Fax: +61 3 85550953, E-mail: zenon.pudlowski@wiete.com.au
Internet: <http://www.wiete.com.au>

ASSOCIATE EDITORS

Dr Elena A. Danilova
Dr Ian R. Dobson
Ms Dianne Q. Nguyen (Manager)
Ms Krystyna Wareing
Monash University & WIETE, Melbourne, Australia
Monash University, Clayton, Melbourne, Australia
Monash University & WIETE, Melbourne, Australia
Independent Communications Consultant, Crawley, West Sussex, England, UK

ADVISORY BOARD MEMBERS

Prof. Hosni I. Abu-Mulaweh
Prof. Tuncay Birand
Prof. Colin U. Chisholm
Prof. Ahmad Ibrahim
Prof. Adinarayana Kalanidhi
Prof. Efrossini C. Kalkani
Prof. Krzysztof Kluszczyński
Prof. Romanas V. Krivickas
A/Prof. Wojciech Kuczborski
A/Prof. Paul Maj
Prof. George Metaxas
Dr Bruce Moulton
Prof. Nikos J. Mourtos
Prof. Andrew Nafalski
Prof. Alexey F. Nesterov
Dr Venkatachalam Rajendran
Prof. Ákos Rédey
Prof. Ian M. Robinson
Prof. Kin Wai Michael Siu
Prof. Harold P. Sjursen
Prof. Robert Špaček
Prof. David W.S. Tai
Prof. Jacek Uziak
Prof. Algirdas V. Valiulis
Prof. Marika Vicziany
Prof. Promod Vohra
Prof. Sławomir Wiak
Indiana University-Purdue University Fort Wayne, USA
Middle East Technical University, Ankara, Turkey
Glasgow Caledonian University, Glasgow, Scotland, UK
Yorkville University, Toronto, Ontario, Canada
Commonwealth Science and Technology Academy for Research, Chennai, India
National Technical University of Athens, Athens, Greece
Silesian University of Technology, Gliwice, Poland
Kaunas University of Technology, Kaunas, Lithuania
Edith Cowan University, Mount Lawley, Perth, Australia
Edith Cowan University, Mount Lawley, Perth, Australia
Technological Education Institute of Piraeus, Piraeus-Athens, Greece
University of Technology, Sydney (UTS), Sydney, Australia
San José State University, San José, USA
University of South Australia, Mawson Lakes, Adelaide, Australia
Russian Association of Engineering Universities, Moscow, Russia
K.S. Rangasamy College of Technology, Tiruchengode, India
University of Pannonia, Veszprém, Hungary
Edge Hill University, Ormskirk, UK
Hong Kong Polytechnic University, Hong Kong, PRC
Polytechnic Institute of NYU, New York, USA
Slovak University of Technology in Bratislava, Bratislava, Slovakia
Association of Taiwan Engineering Education and Management, Taichung, Taiwan
University of Botswana, Gaborone, Botswana
Vilnius *Gediminas* Technical University, Vilnius, Lithuania
Monash University, Melbourne, Australia
Northern Illinois University, DeKalb, USA
Technical University of Łódź, Łódź, Poland

Contents

Z.J. Pudlowski	Editorial	407
C-Y. Chao & S-L. Hwu	A proper question representation mode with study content combination for Web-based formative assessment	408
Y-H. Wang & H-C. Liao	GEPT anxiety test for vocational and technical university students in Taiwan	413
J. Chen, S-J. Wu & K-L. Wen	The imperfection of <i>rough sets</i> in the education field	419
C-M. Chou	Design and implementation of teaching excellence knowledge-based systems for technical and vocational school teachers: a cognition apprenticeship perspective	426
R.C. Yeh, Y-C. Chen & S-H. Kuo	Industry-oriented competency requirements of business administration-majored technological university students in Taiwan	431
K-C. Yu, K-Y. Lin & K-F. Hung	Teaching science through technology: a confluence of knowledge, design and construction	436
W-L. Liu	The study of three universal constants in science education	442
Y-L. Chen & S-C. Wang	A novel teaching approach for undergraduates in a Micro-controller Application course	449
J-H. Su, C-S. Lee, H-H. Huang, S-H. Chuang & C-Y. Lin	An intelligent line-following robot project for introductory robot courses	455
P-N. Chou & C-C. Chang	Research characteristics and patterns in engineering education: content analysis 2000-2009	462
S-H. Lee & H.T.B. Ngoc	Investigating the on-line shopping intentions of Vietnamese students: an extension of the theory of planned behaviour	471
W-H. Ko	Evaluating effective culinary learning of food and beverage department students at technology universities	477
Y-C. Chen, R.C. Yeh & Y-C. Lin	Critical topics in e-commerce knowledge for college students who majored in IT	482
Y-C. Lin, Y-C. Chen & R.C. Yeh	Understanding college students' continuing intentions to use multimedia e-learning systems	488
M-Y. Hsieh	Do college professors need to be <i>Superman</i> ? An in-depth discussion of the current college teaching environment in Taiwan	494
C-M. Chou, C-H. Shen & H-C. Hsiao	Preliminary exploration of teaching excellence in technical institutes and colleges in Taiwan - presenting entrepreneurship education as an example	504
S-C. Chen, C-C. Huang & H-C. Chiang	Factors affecting the participation of the aquaculture industry in university-industry co-operation	510
K.W. Cheng	Current use of e-learning in the accounting industry	517
M-Y. Hsieh, C-H. Huang, W-M. Wu & C-S. Lai	Choosing the best contemporary alliance strategy for the lowest R&D expenditure	523
H-H. Tsai & H-P. Feng	Assessment of students' problem-solving abilities at a technological university in Taiwan	532

C-S.J. Hwang	Proposal for a service-oriented customer relationship management curricula and teaching modules in a technological university	537
C-T. Chen	Exploring an industry-based basic technological competence indicator system of electrical technology for students at a technological institute	542
Index of Authors		552