A journal of the World Institute for Engineering and Technology Education (WIETE)



GLOBAL JOURNAL OF ENGINEERING EDUCATION

Editor-in-Chief: Zenon J. Pudlowski World Institute for Engineering and Technology Education (WIETE) Ivanhoe East, Melbourne, VIC 3079, Australia

MELBOURNE 2019

WIETE Partners



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



Faculty of Engineering State University of Malang Malang, Indonesia



Faculty of Architecture Cracow University of Technology Kraków, Poland



Polytechnic Institute of New York University New York, USA



Faculty of Architecture Gdańsk University of Technology Gdańsk, Poland



University of Botswana Gaborone, Botswana



Faculty of Architecture Slovak University of Technology in Bratislava Bratislava, Slovakia



University of West Attica Piraeus-Athens, Greece

Published by:

World Institute for Engineering and Technology Education (WIETE) 141 The Boulevard, Ivanhoe East, Melbourne, VIC 3079, Australia

E-mail: info@wiete.com.au Internet: http://www.wiete.com.au

© 2019 WIETE

ISSN 1328-3154

Articles published in the *Global Journal of Engineering Education* (GJEE) have undergone a formal 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 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.

Global Journal of Engineering Education

EDITOR-IN-CHIEF

| MANAGER & ASSOCIATE EDITORWIETE, Melbourne, AustraliaDr Dianne Q. NguyenWIETE, Melbourne, AustraliaASSOCIATE EDITORSDr Ian R. Dobson Mrs Dorota I. Pudlowski Prof. Robert Špaček Ms Krystyna WareingMonash University, Melbourne, Australia Slovak University of Technology in Bratislava, Bratislava, Slovakia Independent Communications Consultant, Crawley, West Sussex, England, UKADVISORY BOARD MEMBERSProf. Hosni I. Abu-Mulaweh Prof. Colin U. ChisholmIndiana University-Purdue University Fort Wayne, Fort Wayne, USA Cracow University of Technology, Kraków, Poland Prof. Ahmad Ibrahim Prof. Adiarayana Kalanidhi Commonwealth Science and Technology Academy for Research, Chennai, India Prof. George Metaxas Piraeus University of South Australia, Adelaide, Australia Prof. Lucyna NykaDiversity of South Australia, Adelaide, Australia Prof. Jacek Uziak University of South Australia, Adelaide, Australia Prof. Jacek UziakDiviersity of South Australia, Adelaide, Australia Aleida, Prof. Algirdas V. Valiulis Viniversity of Technology, Gaánsk, Poland Prof. Algirdas V. Valiulis Viniversity of South Australia, Adelaide, Australia Prof. Jacek Uziak Prof. Augirdas V. Valiulis Viniversity of South Australia, Adelaide, Australia Prof. Algirdas V. Valiulis Viniversity of Technology, Gaánsk, Poland Prof. Lucyna Nyka Central Queensland University, Cairns, Australia Prof. Algirdas V. Valiulis Viniversity of Botswana, Gaborone, Botswana Prof. Lucyna Nyka Conversity of South Australia Chonology in Bratislava, Slovakia Souvak University of Malang, Malang, Indonesia Prof. Prof. Pibea Vitková Slovak University of Malang, Malang, Indonesia Prof. Pibea Vitková Slovak University of Technology, Kraków, Poland | Prof. Zenon J. Pudlowski | World Institute for Engineering and Technology Education (WIETE) 141 The Boulevard, Ivanhoe East, Melbourne, VIC 3079, Australia Tel/Fax: +61 3 94994339, E-mail: zenon.pudlowski@wiete.com.au Internet: http://www.wiete.com.au | |
|---|---|--|--|
| Dr Dianne Q. NguyenWIETE, Melbourne, AustraliaASSOCIATE EDITORSDr Ian R. Dobson Mrs Dorota I. Pudlowski Prof. Robert Špaček Ms Krystyna WareingMonash University, Melbourne, Australia VIETE, Melbourne, Australia Slovak University of Technology in Bratislava, Bratislava, Slovakia Independent Communications Consultant, Crawley, West Sussex, England, UKADVISORY BOARD MEMBERSIndiana University-Purdue University Fort Wayne, Fort Wayne, USA Cracow University of Technology, Kraków, Poland Prof. Wacław Celadyn Prof. Adinarayana Kalanidhi | MANAGER & ASSOCIATE EDITOR | | |
| ASSOCIATE EDITORSDr Ian R. DobsonMonash University, Melbourne, AustraliaMrs Dorota I. PudlowskiWIETE, Melbourne, AustraliaProf. Robert ŠpačekSlovak University of Technology in Bratislava, Bratislava, SlovakiaIndependent Communications Consultant, Crawley, West Sussex, England, UKADVISORY BOARD MEMBERSProf. Hosni I. Abu-MulawehIndiana University-Purdue University Fort Wayne, Fort Wayne, USAProf. Hosni I. Abu-MulawehIndiana University-Purdue University Fort Wayne, Fort Wayne, USAProf. Audaw CeladynCracow University of Technology, Kraków, PolandProf. Colin U. ChisholmGlasgow Caledonian University, Glasgow, Scotland, UKProf. Admarayana KalanidhiCommonwealth Science and Technology Academy for Research, Chennai, IndiaProf. George MetaxasPiraeus University of Applied Sciences (TEI), Piraeus-Athens, GreeceProf. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Lugica ViktováSlovak University of Technology in Bratislava, SlovakiaProf. Fubica VitkováSlovak University of Technology In Bratislava, SlovakiaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Jacek UziakVilnius Gediminas Technical University, Vilnius, LithuaniaA/Prof. Lubica VitkováSlovak University of Technology Kraków, Poland | Dr Dianne Q. Nguyen | WIETE, Melbourne, Australia | |
| Dr Ian R. Dobson Mrs Dorota I. Pudlowski Prof. Robert Špaček Ms Krystyna WareingMonash University, Melbourne, Australia | ASSOCIATE EDITORS | | |
| Prof. Hosni I. Abu-MulawehIndiana University-Purdue University Fort Wayne, Fort Wayne, USAProf. Hosni I. Abu-MulawehIndiana University of Technology, Kraków, PolandProf. Wacław CeladynCracow University of Technology, Kraków, PolandProf. Colin U. ChisholmGlasgow Caledonian University, Glasgow, Scotland, UKProf. Ahmad IbrahimYorkville University, Toronto, Ontario, CanadaProf. Adinarayana KalanidhiCommonwealth Science and Technology Academy for Research, Chennai, IndiaProf. Viljan MahničUniversity of Ljubljana, Ljubljana, SloveniaProf. George MetaxasPiraeus University of Applied Sciences (TEI), Piraeus-Athens, GreeceProf. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaDr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Technology, Gdańsk, PolandProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius <i>Gediminas</i> Technical University, Vilnius, LithuaniaA/Prof. Eubica VitkováSlovak University of Technology in Bratislava, SlovakiaDr Aji P. WibawaState University of Technology, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Dr Ian R. Dobson Mrs Dorota I. Pudlowski Prof. Robert Špaček Ms Krystyna Wareing | Monash University, Melbourne, Australia WIETE, Melbourne, Australia Slovak University of Technology in Bratislava, Bratislava, Slovakia Independent Communications Consultant, Crawley, West Sussex, England, UK | |
| Prof. Hosni I. Abu-MulawenIndiana University-Purdue University Fort Wayne, Fort Wayne, USAProf. Wacław CeladynCracow University of Technology, Kraków, PolandProf. Colin U. ChisholmGlasgow Caledonian University, Glasgow, Scotland, UKProf. Ahmad IbrahimYorkville University, Toronto, Ontario, CanadaProf. Adinarayana KalanidhiCommonwealth Science and Technology Academy for Research, Chennai, IndiaProf. Viljan MahničUniversity of Ljubljana, Ljubljana, SloveniaProf. George MetaxasPiraeus University of Applied Sciences (TEI), Piraeus-Athens, GreeceProf. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaDr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius Gediminas Technical University, Vilnius, LithuaniaA/Prof. Lubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Technology, Kraków, Poland | Def Heed Ale M heel | In the state of th | |
| Prof. Wactaw CeladyitCracow University of Technology, Krakow, FolandProf. Colin U. ChisholmGlasgow Caledonian University, Glasgow, Scotland, UKProf. Ahmad IbrahimYorkville University, Toronto, Ontario, CanadaProf. Adinarayana KalanidhiCommonwealth Science and Technology Academy for Research, Chennai, IndiaProf. Viljan MahničUniversity of Ljubljana, Ljubljana, SloveniaProf. George MetaxasPiraeus University of Applied Sciences (TEI), Piraeus-Athens, GreeceProf. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaDr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Cubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Technology, Kraków, Poland | Prof. Hosni I. Abu-Mulawen Prof. Washaw Celadyn | Indiana University-Purdue University Fort wayne, Fort wayne, USA | |
| Prof. Common C. ChusholmConstruction C. ChusholmOntersity, Ontagow, Beonand, OntProf. Adinarayana KalanidhiYorkville University, Toronto, Ontario, CanadaProf. Adinarayana KalanidhiCommonwealth Science and Technology Academy for Research, Chennai, IndiaProf. Viljan MahničUniversity of Ljubljana, Ljubljana, SloveniaProf. George MetaxasPiraeus University of Applied Sciences (TEI), Piraeus-Athens, GreeceProf. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaDr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius Gediminas Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof Colin II Chisholm | Glasgow Caledonian University Glasgow, Scotland UK | |
| Prof. Adinarayana KalanidhiProf. Adinarayana KalanidhiProf. Viljan MahničCommonwealth Science and Technology Academy for Research, Chennai, IndiaProf. Viljan MahničUniversity of Ljubljana, Ljubljana, SloveniaProf. George MetaxasPiraeus University of Applied Sciences (TEI), Piraeus-Athens, GreeceProf. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaDr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius <i>Gediminas</i> Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof Ahmad Ibrahim | Yorkville University Toronto Ontario Canada | |
| Prof. Viljan MahničUniversity of Ljubljana, Ljubljana, SloveniaProf. George MetaxasPiraeus University of Applied Sciences (TEI), Piraeus-Athens, GreeceProf. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaDr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. L'ubica VitkováSlovak University of Technology in Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof. Adinaravana Kalanidhi | Commonwealth Science and Technology Academy for Research, Chennai, India | |
| Prof. George MetaxasPiraeus University of Applied Sciences (TEI), Piraeus-Athens, GreeceProf. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaDr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius <i>Gediminas</i> Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof. Viljan Mahnič | University of Ljubljana, Ljubljana, Slovenia | |
| Prof. Andrew NafalskiUniversity of South Australia, Adelaide, AustraliaDr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius <i>Gediminas</i> Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof. George Metaxas | Piraeus University of Applied Sciences (TEI), Piraeus-Athens, Greece | |
| Dr Zorica NedicUniversity of South Australia, Adelaide, AustraliaProf. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius Gediminas Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof. Andrew Nafalski | University of South Australia, Adelaide, Australia | |
| Prof. Derek O. NorthwoodUniversity of Windsor, Windsor, CanadaProf. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius Gediminas Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Dr Zorica Nedic | University of South Australia, Adelaide, Australia | |
| Prof. Lucyna NykaGdańsk University of Technology, Gdańsk, PolandProf. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius Gediminas Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof. Derek O. Northwood | University of Windsor, Windsor, Canada | |
| Prof. Steven ThatcherCentral Queensland University, Cairns, AustraliaProf. Jacek UziakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius Gediminas Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof. Lucyna Nyka | Gdansk University of Technology, Gdansk, Poland | |
| Prof. Jaček UžlakUniversity of Botswana, Gaborone, BotswanaProf. Algirdas V. ValiulisVilnius Gediminas Technical University, Vilnius, LithuaniaA/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof. Steven Thatcher | Central Queensland University, Cairns, Australia | |
| A/Prof. Ľubica VitkováSlovak University of Technology in Bratislava, Bratislava, SlovakiaDr Aji P. WibawaState University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | Prof. Algirdas V. Valiulis | Vilnius <i>Cadiminas</i> Technical University Vilnius Lithuania | |
| Dr Aji P. WibawaStotuk University of Malang, Malang, IndonesiaProf. Maria J. ŻychowskaCracow University of Technology, Kraków, Poland | A/Prof L'ubica Vitková | Slovak University of Technology in Bratislava, Bratislava, Slovakia | |
| Prof. Maria J. Żychowska Cracow University of Technology, Kraków, Poland | Dr Aii P. Wibawa | State University of Malang, Malang, Indonesia | |
| | Prof. Maria J. Żychowska | Cracow University of Technology, Kraków, Poland | |

A journal of the World Institute for Engineering and Technology Education (WIETE)

Global Journal of Engineering Education

Contents

| Z.J. Pudlowski | 5 | Editorial |
|--|----|--|
| J. Legény and R. Špaček | 6 | Humour as a device in architectural education |
| S. Kaul, C.W. Ferguson, Y. Yan and P.M. Yanik | 14 | Triangulated mentorship of engineering students - leveraging peer mentoring and vertical integration |
| S.O. Ekolu and H. Quainoo | 24 | Reliability of assessments in engineering education using Cronbach's alpha, KR and split-half methods |
| S. Avsec and V. Ferk Savec | 30 | Creativity and critical thinking in engineering design: the role of interdisciplinary augmentation |
| L.M. Dos Santos | 37 | English language learning for engineering students: application of a visual-only video teaching strategy |
| H. Al-Junaid, M. Almeer, J. Khlaifat and A. Bushager | 45 | Developing a computer engineering undergraduate curriculum: the challenges and solutions |
| F.M. Kamaruzaman, R. Hamid, A.A. Mutalib and M.S. Rasul | 54 | Conceptual framework for the development of 4IR skills for engineering graduates |
| S. Ainane, A. Bouabid and W. El Sokkary | 62 | Factors that influence the high percentage of women enrolled in engineering in the UAE and preparing for careers in the oil and gas industry |
| J. Uziak | 69 | Student evaluation of course and teaching: a case study |
| E.T.B. Agustin and D.J.C. Tindowen | 75 | Improving engineering students' achievement in solid mensuration by using an obedized work text |
| A. Gero, D. Tsybulsky and I. Levin | 80 | Research and design triads in the digital epoch: implications for science and technology education |
| L. Vargas-Mendoza, K. Gallardo-Córdova and J.L. Gómez-Muñoz | 84 | A learning environment to stimulate the development of competencies for mechanical design |
| Index of Authors | 91 | |

A journal of the World Institute for Engineering and Technology Education (WIETE)