



World Transactions
on
Engineering and Technology
Education

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

Guest Editor
Maria Jolanta Żychowska
Cracow University of Technology
Kraków, Poland

World Transactions on Engineering and Technology Education



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



Faculty of Architecture
Cracow University of Technology
Kraków, Poland



Faculty of Architecture
Gdańsk University of Technology
Gdańsk, Poland



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



Politechnika Wroclawska
Wydział Architektury

Faculty of Architecture
Wrocław University of Science
and Technology
Wrocław, Poland

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>

© 2020 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)
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>

MANAGER & ASSOCIATE EDITOR

Dr Dianne Q. Nguyen
World Institute for Engineering and Technology Education (WIETE),
Melbourne, Australia

ASSOCIATE EDITORS

Mrs Dorota I. Pudlowski
World Institute for Engineering and Technology Education (WIETE),
Melbourne, Australia
Prof. Robert Špaček
Slovak University of Technology in Bratislava, Bratislava, Slovakia
Ms Krystyna Wareing
Independent Communications Consultant, Tetbury, Gloucestershire, England, UK
Mr Nial Wareing
University Lecturer (Ret.), Tetbury, Gloucestershire, England, UK

ADVISORY BOARD MEMBERS

A/Prof. Stanislav Avsec
University of Ljubljana, Ljubljana, Slovenia
A/Prof. Kristijan Breznik
International School for Social and Business Studies; College of Industrial
Engineering, Celje, Slovenia
Prof. Colin U. Chisholm
Glasgow Caledonian University, Glasgow, Scotland, UK
Prof. Barbara E. Gronostajska
Wrocław University of Science and Technology, Wrocław, Poland
Prof. Ahmad Ibrahim
Yorkville University, Toronto, Ontario, Canada
A/Prof. Lubica Ilkovičová
Slovak University of Technology in Bratislava, Bratislava, Slovakia
Prof. Sabina Kuc
Cracow University of Technology, Kraków, Poland
Prof. Viljan Mahnič
University of Ljubljana, Ljubljana, Slovenia
Prof. George Metaxas
University of West Attica, Piraeus-Athens, Greece
Prof. Andrew Nafalski
University of South Australia, Mawson Lakes, Adelaide, Australia
Prof. Lucyna Nyka
Gdańsk University of Technology, Gdańsk, Poland
Prof. Derek O. Northwood
University of Windsor, Windsor, Canada
A/Prof. Arthur J. Swart
Central University of Technology, Bloemfontein, Free State, South Africa
Prof. Steven Thatcher
Central Queensland University, Cairns, Australia
Prof. Jacek Uziak
University of Botswana, Gaborone, Botswana
Prof. Algirdas V. Valiulis
Vilnius *Gediminas* Technical University, Vilnius, Lithuania
Dr Aji P. Wibawa
State University of Malang, Malang, Indonesia

Contents

Z.J. Pudlowski	Editorial	366
M.J. Żychowska	Guest Editorial	367
S. Avsec & J. Jerman	Self-efficacy, creativity and proactive behaviour for innovative science and technology education	369
V. Šuligoj & J. Jerman	Pre-service science and technology teachers' self-efficacy	375
M. Brzezicki	Strengths and weaknesses of architectural education on-line classes conducted during COVID-19	381
P. Chatwattana, K. Kuntama & R. Phadungthin	A 3D-interactive virtual classroom with a virtual learning environment	387
E. Ilkovičová, J. Ilkovič & O. Ivánková	Architectural education for the conversion of old industrial buildings	393
S. Kowalski, P. Samól & R. Hirsch	Virtual reality tools in teaching the conservation and history of Polish architecture	399
G. Schnotale	The role of remote teaching platforms in architectural education	405
M-S. Kim	The effects of a capstone design course in industrial and management engineering: students' evaluation	410
S.R. Chowdhury, T. Ayadat & A. Asiz	Rubric-based scoring for engineering senior design course assessment and grading	417
D. Pusca & D.O. Northwood	The impact of positive change in higher education	427
E. Węclawowicz-Gyurkovich	Methodology of teaching Contemporary Architecture	433
D.M. Makhubele & S. Simelane-Mnisi	Learning activities in the Technology subject to engage learners in the senior phase of schooling	438
A. Zachariasz	Professional licensing of landscape architects in Poland	444
M. Pieczara	An architecture course to teach respect for the landscape	450
K. Porada & A. Zachariasz	Innovative methods for supporting the environment in the education of landscape architects	456
L. Oberfrancová & R. Špaček	Educating architects - an optimistic vision for building sustainability evaluation	462
M.J. Żychowska	Visual communication in imaging student projects	468
J. Gil-Mastalerczyk	Impact of engineering education on sustainable local architectural practice	473

M. Kwasek & A. Piwek	Supporting study tours in the teaching of architectural heritage	479
C.K.N. Che Ku Mohd, F. Shahbodin, M.S. Md Saad, A. Mohamad Nor, S.N.M. Mohamad & Z. Saaya	Educational technologies in a personalised learning environment (PLE): an overview	485
Index of Authors		491