Advances in Intelligent Systems and Computing 1266

Álvaro Herrero · Carlos Cambra · Daniel Urda · Javier Sedano · Héctor Quintián · Emilio Corchado *Editors*

The 11th International Conference on EUropean Transnational Educational (ICEUTE 2020)





Advances in Intelligent Systems and Computing

Volume 1266

Series Editor

Janusz Kacprzyk, Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland

Advisory Editors

Nikhil R. Pal, Indian Statistical Institute, Kolkata, India

Rafael Bello Perez, Faculty of Mathematics, Physics and Computing, Universidad Central de Las Villas, Santa Clara, Cuba

Emilio S. Corchado, University of Salamanca, Salamanca, Spain

Hani Hagras, School of Computer Science and Electronic Engineering, University of Essex, Colchester, UK

László T. Kóczy, Department of Automation, Széchenyi István University, Gyor, Hungary

Vladik Kreinovich, Department of Computer Science, University of Texas at El Paso, El Paso, TX, USA

Chin-Teng Lin, Department of Electrical Engineering, National Chiao Tung University, Hsinchu, Taiwan

Jie Lu, Faculty of Engineering and Information Technology, University of Technology Sydney, Sydney, NSW, Australia

Patricia Melin, Graduate Program of Computer Science, Tijuana Institute of Technology, Tijuana, Mexico

Nadia Nedjah, Department of Electronics Engineering, University of Rio de Janeiro, Rio de Janeiro, Brazil

Ngoc Thanh Nguyen^(D), Faculty of Computer Science and Management, Wrocław University of Technology, Wrocław, Poland

Jun Wang, Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong, Shatin, Hong Kong The series "Advances in Intelligent Systems and Computing" contains publications on theory, applications, and design methods of Intelligent Systems and Intelligent Computing. Virtually all disciplines such as engineering, natural sciences, computer and information science, ICT, economics, business, e-commerce, environment, healthcare, life science are covered. The list of topics spans all the areas of modern intelligent systems and computing such as: computational intelligence, soft computing including neural networks, fuzzy systems, evolutionary computing and the fusion of these paradigms, social intelligence, ambient intelligence, computational neuroscience, artificial life, virtual worlds and society, cognitive science and systems, Perception and Vision, DNA and immune based systems, self-organizing and adaptive systems, e-Learning and teaching, human-centered and human-centric computing, recommender systems, intelligent control, robotics and mechatronics including human-machine teaming, knowledge-based paradigms, learning paradigms, machine ethics, intelligent data analysis, knowledge management, intelligent agents, intelligent decision making and support, intelligent network security, trust management, interactive entertainment, Web intelligence and multimedia.

The publications within "Advances in Intelligent Systems and Computing" are primarily proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

** Indexing: The books of this series are submitted to ISI Proceedings, EI-Compendex, DBLP, SCOPUS, Google Scholar and Springerlink **

More information about this series at http://www.springer.com/series/11156

Álvaro Herrero · Carlos Cambra · Daniel Urda · Javier Sedano · Héctor Quintián · Emilio Corchado Editors

The 11th International Conference on EUropean Transnational Educational (ICEUTE 2020)



Editors Álvaro Herrero Grupo de Inteligencia Computacional Aplicada (GICAP), Departamento de Ingeniería Informática, Escuela Politécnica Superior Universidad de Burgos Burgos, Spain

Daniel Urda Grupo de Inteligencia Computacional Aplicada (GICAP), Departamento de Ingeniería Informática, Escuela Politécnica Superior Universidad de Burgos Burgos, Spain

Héctor Quintián Department of Industrial Engineering University of A Coruña La Coruña, Spain Carlos Cambra Grupo de Inteligencia Computacional Aplicada (GICAP), Departamento de Ingeniería Informática, Escuela Politécnica Superior Universidad de Burgos Burgos, Spain

Javier Sedano Technological Institute of Castilla y León Burgos, Spain

Emilio Corchado University of Salamanca Salamanca, Spain

 ISSN 2194-5357
 ISSN 2194-5365
 (electronic)

 Advances in Intelligent Systems and Computing
 ISBN 978-3-030-57798-8
 ISBN 978-3-030-57799-5
 (eBook)

 https://doi.org/10.1007/978-3-030-57799-5
 ISBN 978-3-030-57799-5
 (eBook)

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2021

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

This volume of Advances in Intelligent and Soft Computing contains accepted papers presented at ICEUTE 2020 conference held in the beautiful and historic city of Burgos (Spain), in September 2020.

The 11th International Conference on EUropean Transnational Education (ICEUTE 2020) has been a meeting point for people working on transnational education within Europe. It has provided a stimulating and fruitful forum for presenting and discussing the latest works and advances on transnational education within European countries.

After a through peer-review process, the ICEUTE 2020 International Program Committee selected 44 papers which are published in these conference proceedings achieving an acceptance rate of 41%. Due to the COVID-19 outbreak, the ICEUTE 2020 edition was blended, combining on-site and on-line participation. In this relevant edition, a special emphasis was put on the organization of five special sessions related to relevant topics as: Role of English in Transnational Education and Teacher Training, Personalization and ICT: a Path to Educational Inclusion, Innovation and Research Findings in Engineering Higher Education, Practical Implementations of Novel Initiatives, Innovation in Computer Science Higher Education.

The selection of papers was extremely rigorous in order to maintain the high quality of ICEUTE conference editions and we would like to thank the members of the Program Committees for their hard work in the reviewing process. This is a crucial process to the creation of a high standard conference and the ICEUTE conference would not exist without their help.

ICEUTE 2020 has teamed up with "Research Papers in Education" (Taylor & Francis) and "European Journal of Education" (Wiley) for proposals of special issues including selected papers from ICEUTE 2020.

Particular thanks go as well to the conference main sponsors Startup Ole and the IEEE Systems, Man, and Cybernetics Society—Spanish, Portuguese, French, and Italian Chapters, who jointly contributed in an active and constructive manner to the success of this initiative.

Preface

We would like to thank all the special session organizers, contributing authors, as well as the members of the Program Committees and the Local Organizing Committee for their hard and highly valuable work. Their work has helped to contribute to the success of the ICEUTE 2020 event.

September 2020

Álvaro Herrero Carlos Cambra Daniel Urda Javier Sedano Héctor Quintián Emilio Corchado

vi

Organization

General Chair

Emilio Corchado

General Co-chair

Álvaro Herrero

International Advisory Committee

Veronika Peralta	Université Francois Rabelais de Tours/Blois,
	France
Carlos Pereira	Polytechnic Institute of Coimbra, Portugal
Zhen Ru Dai	Hamburg University of Applied Sciences,
	Germany
Gabriel Michel	University of Lorraine, France
Sorin Stratulat	University of Lorraine, France
Daniela Zaharie	West University of Timisoara, Romania
Paula Steinby	Turku University of Applied Sciences, Finland
Alessandra Raffaetta	University Ca' Foscari of Venice, Italy

Program Committee Chairs

University of Salamanca, Spain
University of Burgos, Spain
Technological Institute of Castilla y León, Spain
University of A Coruña, Spain

Program Committee

Agueda Gras-Velazquez Alessandra Raffaetta Amaia Mesanza Ana Lara Ana Rosa Pereira Borges Andreea Vescan Angel Arroyo Bárbara de Aymerich Bruno Baruque Carlos Cambra Carlos Pereira Carmen Benavides Colm O'Reilly Damián Fernández Daniel Urda Daniela Zaharie David Aguilera David Alvarez Leon Deolinda Simões Dominique Laurent Dragan Simic Eduardo Solteiro Pires Eloy Irigoyen Esteban Jove Estibaliz Apiñaniz Federico Divina Fernanda Brito Correia Francisco Gómez-Vela Francisco Martínez-Álvarez Francisco Zayas Gato Gabriel Michel Ileana M. Greca Inmaculada Arnedillo-Sánchez Irene Arriassecq Isabela Dramnesc Isaias Garcia J. David Nuñez-Gonzalez Jairo Ortiz-Revilla Jean-Yves Antoine Jennifer Bruton Jesús Chacón Jiri Dvorsky

European Schoolnet, Belgium University Ca' Foscari of Venice, Italy University of the Basque Country, Spain University of Burgos, Spain Coimbra Institute of Engineering, Portugal Babes-Bolyai University, Romania University of Burgos, Spain University of Burgos, Spain University of Burgos, Spain University of Burgos, Spain Polytechnic Institute of Coimbra, Portugal University of León, Spain CTY Ireland, Ireland University of Seville, Spain University of Burgos, Spain West University of Timisoara, Romania University of Granada, Spain University of León, Spain Coimbra Institute of Engineering, Portugal Université Cergy-Pontoise, France University of Novi Sad, Serbia UTAD University, Portugal University of the Basque Country, Spain UDC, Spain University of the Basque Country, Spain Pablo de Olavide University, Spain Polytechnic Institute of Coimbra, Portugal Pablo de Olavide University, Spain Pablo de Olavide University, Spain University of A Coruña, Spain University of Lorraine, France University of Burgos, Spain Trinity College Dublin, Ireland UNICEN, Argentina

West University of Timisoara, Romania University of León, Spain University of the Basque Country, Spain University of Burgos, Spain University of Tours, France Dublin City University, Ireland Complutense University of Madrid, Spain VSB - Technical University of Ostrava, Czechia

viii

Joaquín Barreiro García Jorge Barbosa José Francisco Torres Maldonado Jose Luis Calvo-Rolle José-Luis Casteleiro-Roca José Manuel Galán Jose Manuel Gonzalez-Cava Jose Manuel Lopez-Guede José Nuñez-Gonzalez José-Lázaro Amaro-Mellado Juan Pavón Julio Elias Normey-Rico Laura Fernández-Robles Lidia Sánchez-González Luis Alfonso Fernández Serantes Manuel Castejón-Limas Manuel Dominguez Manuel Grana María Fernández-Raga María Inmaculada González Maria Jose Marcelino Marta Romero Ariza Matilde Santos Miguel Carriegos Miguel García Torres Monika Ciesielkiewicz Natividad Duro Nuno Ferreira Orlando Belo Paivi Oliva Paula Steinby Paulo Moura Oliveira Pedro Antonio Gutierrez Rafael Corchuelo Ramón-Ángel Fernández-Díaz Raquel Dormido Canto Richard Duro Salvatore Orlando Santiago Porras Sorin Stratulat Unai Fernandez Vaclay Snasel

Pablo de Olavide University, Spain University of A Coruña, Spain University of A Coruña, Spain University of Burgos, Spain University of La Laguna, Spain University of the Basque Country, Spain University of the Basque Country, University of Seville, Spain Complutense University of Madrid, Spain Federal University of Santa Catarina, Brazil University of León, Spain Universidad de León, Spain FH-Joanneum University of Applied Sciences, Spain University of León, Spain University of León, Spain University of the Basque Country, Spain University of León. Spain University of León, Spain University of Coimbra, Portugal University of Jaén, Spain Complutense University of Madrid, Spain University of León, Spain Pablo de Olavide University, Spain Complutense University of Madrid, Spain UNED, Spain Coimbra Institute of Engineering, Portugal University of Minho, Portugal Turku University of Applied Sciences, Finland Turku University of Applied Sciences, Finland UTAD University, Portugal University of Cordoba, Spain University of Seville, Spain University of León, Spain UNED, Spain

University of León, Spain

Coimbra Institute of Engineering, Portugal

UNED, Spain University of A Coruña, Spain Ca' Foscari University, Italy University of Burgos, Spain University of Lorraine, France University of the Basque Country, Spain

VSB: Technical University of Ostrava, Czechia

Verónika Peralta Vicente Matellan Victoria López Viorel Negru Zhen Ru Dai University of Tours, France University of León, Spain Complutense University of Madrid, Spain West University of Timisoara, Romania Hamburg University of Applied Sciences, Germany

х

Role of English in Transnational Education and Teacher Training

Special Session Organizers

María Amor Barros del Río	University of Burgos, Spain
Concetta Maria Sigona	University of Burgos, Spain
Ana Cunha	University of Lusófona, Portugal
Alina Doroch	Collegium Balticum, Poland
Onorina Botezat	Dimitrie Cantemir Christian University, Romania

Program Committee

Alina Doroch	SSW Collegium Balticum, Poland
Ana Cunha	Lusofona University, Portugal
Concetta Sigona	University of Burgos, Spain
Onorina Botezat	Dimitrie Cantemir Christian University, Romania
Paola Clara Leotta	University of Catania, Italy
Ramona Mihaila	Dimitrie Cantemir Christian University, Romania
Zut Koczalska	ZUT, SJO, Poland
Alina Doroch	SSW Collegium Balticum, Poland

Personalization and ICT: A Path to Educational Inclusion

Special Session Organizers

Beatriz Núñez Angulo	University of Burgos, Spain
Sonia Sapia	Universitá della Calabria, Italy

Program Committee

Miriam Lorenzo Bañuelos	University of Burgos, Spain
Natalia Muñoz-Rujas	University of Burgos, Spain
Pedro Luis Sánchez Ortega	University of Burgos, Spain
Wilco M.H. Verbeeten	University of Burgos, Spain

Innovation and Research Findings in Engineering Higher Education

Special Session Organizers

Eduardo Montero García	University of Burgos, Spain
Fatima E. M. Mhamdi Alaoui	University Chouaib Doukkali El Jadida, Morocco
María Consuelo	University of Burgos, Spain
Sáiz Manzanares	
Natalia Muñoz-Rujas	University of Burgos, Spain

Program Committee

Eduardo Montero García	University of Burgos, Spain
Fatima E. M. Mhamdi Alaoui	University Chouaib Doukkali El Jadida, Morocco
María Consuelo	University of Burgos, Spain
Sáiz Manzanares	
Miriam Lorenzo Bañuelos	University of Burgos, Spain
Natalia Muñoz-Rujas	University of Burgos, Spain

Practical Implementations of Novel Initiatives

Special Session Organizers

e Manuel Lopez-Guede	University of the Basque Country, Spain
nuel Graña	University of the Basque Country, Spain
ián Estévez	University of the Basque Country, Spain
ipe Núñez	Pontificia Universidad Católica de Chile, Chile
ián Estévez ipe Núñez	University of the Basque Country, Spain Pontificia Universidad Católica de Chile, C

Program Committee

University of the Basque Country, Spain
University of the Basque Country, Spain
University of the Basque Country, Spain
Technological University of Chile INACAP,
Chile
Pablo de Olavide University, Spain

xii

Julian Estevez	University	of the	Basque	Country,	Spain
Manuel Graña	University	of the	Basque	Country,	Spain

Innovation in Computer Science Higher Education

Special Session Organizers

Cristina Rubio Escudero	University of Seville, Spain
Guillermo Santamaría Bonfil	CONACYT-INEEL, Mexico
Federico Divina	Pablo de Olavide University, Spain
Isabel Sofía Brito	Polytechnic Institute of Beja, Portugal
Miguel Torres-García	Pablo de Olavide University, Spain
Maria Teresa Godinho	Polytechnic Institute of Beja, Portugal
Francisco Gómez-Vela	Pablo de Olavide University, Spain
Francisco Martínez-Álvarez	Pablo de Olavide University, Spain

Program Committee

Adela Has	University of Osijek, Croatia
Antonio Morales-Esteban	University of Seville, Spain
Jorge Reyes	NT2 Labs, Chile
Khawaja Asim	PIEAS, Pakistan
Laura Melgar-García	Pablo de Olavide University, Spain
María Victoria Requena	University of Seville, Spain
García de la Cruz	
Marinela Knežević	University of Osijek, Croatia

Organising Committee Chairs

Álvaro Herrero	University of Burgos, Spain
Javier Sedano	ITCL, Spain
Carlos Cambra	University of Burgos, Spain
Daniel Urda	University of Burgos, Spain

Organising Committee

Emilio Corchado	University of Salamanca, Spain
Héctor Quintián	University of A Coruña, Spain
Carlos Alonso de Armiño	University of Burgos, Spain
Ángel Arroyo	University of Burgos, Spain
Bruno Baruque	University of Burgos, Spain
Nuño Basurto	University of Burgos, Spain
Pedro Burgos	University of Burgos, Spain
David Caubilla	University of Burgos, Spain
Leticia Curiel	University of Burgos, Spain

Raquel Redondo Jesús Enrique Sierra Belén Vaquerizo Juan Vicente Martín University of Burgos, Spain University of Burgos, Spain University of Burgos, Spain University of Burgos, Spain

xiv

Contents

Transnational Education at Pre-university Level

Are Secondary Mathematics Student Teachers Ready for the Profession? A Multi-actor Perspective on Mathematics Student Teachers' Mastery of Related Competences Laura Muñiz-Rodríguez, Pedro Alonso, Luis J. Rodríguez-Muñiz, and Martin Valcke	3
From Trivium to Smart Education Javier Teira-Lafuente, Ana Belén Gil-González, and Ana de Luis Reboredo	11
Analysis and Classification of Inappropriate Strategies Used by Students to Find the Winning Strategy in Catch the Frog and Daisy Games Esther Lorenzo-Fernández and Jordi Deulofeu	21
Implementation of an Integrated STEM Activity in Pre-primary Schools Eva M. García Terceño, Ileana M. Greca, Andreas Redfors, and Marie Fridberg	30
Intentions Towards Following Science and Engineering Studies Among Primary Education Pupils Participating in Integrated STEAM Activities	40
Engagement and Learning from a Team-Based Mini-Project in Mechatronic Engineering	50
Educational-Oriented Mobile Robot: Hidden Lessons Francisco Manuel García-Álvarez and Matilde Santos	61

Transnational Education at University Level	
The Acquisition of Competences in Transnational Education Through the ePortfolio	75
A Conceptual Framework for a Communication and Collaboration Platform Within a European Transnational Logistics Knowledge Cluster of Universities and Companies	84
Variables Influencing University Dropout: A Machine Learning-Based Study Irene Díaz, Ana B. Bernardo, María Esteban, and Luis J. Rodríguez-Muñiz	94
Prospective Teachers Creating and Solving a Probability Problem: An Exploratory Study	104
Introducing Active Methodologies in Renewable EnergyEngineering Bachelor in Mathematical and NumericalAnalysis SubjectOihana Aristondo, J. David Nuñez-Gonzalez, and Manuel Graña	114
Estimating Expected Student Academic Performance	121
International PhD Quality Assessment: Growing Awareness of Transnational Projection Bruno Baruque-Zanón and Ana María Lara-Palma	132
Trends and Patterns of International Student Mobility: The Case of Bachelor's Degrees in Computer Science at the University of Burgos Ángel Arroyo, Secil Bayraktar, Carlos Cambra, Daniel Urda, and Álvaro Herrero	142
Special Session: Role of English in Transnational Education and Teacher Training	
The European Foreign Language Teacher Training Programme:A Comprehensive ProposalMaría Amor Barros-del Río	157
The European Portfolio for Student Teachers of Languages: A Reflection and Communication Tool in Teacher	164
Aránzazu-Lucía Cosido García	104

xvi

Contents	xvii
Using English in Teaching Romanian Language for Foreign Students Ramona Mihăilă	173
The Relevance of an Intercultural Approach in Teaching Englishfor Academic PurposesPaola Clara Leotta	181
Adopting the Montessori Methodology in Teaching Languagesto Adult Students- Transnational ApproachAlina Doroch	187
Cross-Cultural Experiences in Transnational Education: Preservice Teachers and Global Perspectives Concetta Maria Sigona and Alba Fernández-Alonso	196
Special Session: Personalization and ICT: a Path to Educational Inclusion	
NetExtractor. A Semi-automatic Educational Tool for Network Extraction Conceived to Differentiate by Student Interest Luis Miguel Cabrejas-Arce, Jorge Navarro, Virginia Ahedo, and José Manuel Galán	205
Comparative of Clustering Techniques for Academic Advice and Performance Measurement	215
English for Specific Purposes and Dyslexia at Higher-Education Level: Overcoming the Challenges of Vocabulary Acquisition Alba Fernández-Alonso and Concetta Maria Sigona	227
Educational Inclusion: Teachers' Technical Needs and Supports Beatriz F. Núñez, Antonella Valenti, and Sonia Sapia	236
Special Session: Innovation and Research Findings in Engineering Higher Education	
Motivation, Technical Achievement and Communication Skills in Engineering Degree Projects Under the European Higher Education Area Javier Rodríguez Martín, Ignacio López Paniagua, Susana Sánchez Orgaz, Celina González Fernández, Carlos Arnaiz del Pozo, Ángel Jiménez Álvaro, and Rafael Nieto Carlier	247

Developing Engineering Skills in Secondary Students ThroughSTEM Project Based LearningMiguel Ángel Queiruga-Dios, Emilia López-Iñesta, María Diez-Ojeda,María Consuelo Sáiz-Manzanares, and José Benito Vázquez Dorrío	257
Towards an Innovative Learning of Chemical and Enzymatic Catalysis for Moroccan Secondary Students Mohammed Amine Merzougui, Rachid Janati-Idrisi, Mohamed Dakkach, Mourad Madrane, Mohammed Laafou, and Fernando Aguilar	268
The International Mobility Strategy of the ENSA El Jadida in Morocco: The Case Study of Student's Exchange with Spain Mohamed Lifi, Sanae El Hassani, and Fernando Aguilar	278
The Impact of International Mobility in Doctoral Trainingin Novel Research Groups: A Case StudyGabriel Rubio-Pérez, Mohamed Lifi, Raúl Briones-Llorente,and Fernando Aguilar	288
Enhancing Interactive Teaching of Engineering Topics Using Digital Materials of the MERLOT Database Natalia Muñoz-Rujas, Jennifer Baptiste, Ana Pavani, and Eduardo Montero	295
Technologies Applied to the Improvement of Academic Performance in the Teaching-Learning Process in Secondary Students	307
Data Collection Description for Evaluation and Analysis of Engineering Students Academic PerformanceJosé Antonio López Vázquez, José-Luis Casteleiro-Roca, Esteban Jove, Francisco Zayas-Gato, Héctor Quintián, and José Luis Calvo-Rolle	317
Special Session: Practical Implementations of Novel Initiatives	
Expansion of an Evidence-Based Workshop for Teaching of Artificial Intelligence in Schools	331
Design of a PBL Experience in the Field of Sustainability for Industrial Informatics Isidro Calvo, Jose Miguel Gil-García, Estibaliz Apiñaniz, Cesar Escudero, Angel J. García-Adeva, Amaia Mesanza, and María Gastón	338

xviii

Contents

Simple Conception of Photoresistor Cell Current-Voltage Characteristic Measurement by Arduino-Based Platform for Educational Purposes Abdelaziz El Moussaouy, Mohammed El Hadi, Abdelaziz Ouariach, Rachid Essaadaoui, Driss Bria, and Khalid Laabidi	348
Dual University Training at the Faculty of Engineering Vitoria-Gasteiz (UPV-EHU) Jose Antonio Ramos-Hernanz, Inmaculada Tazo-Herran, Ekaitz Zulueta, Amaia Mesanza-Moraza, Ruperta Delgado-Tercero, Javier Sancho-Saiz, Estibaliz Apiñaniz-Fernandez de Larrinoa, and Jose Manuel Lopez-Guede	357
Electromobility Laboratory: A Contribution for Student Participation in Higher Education Felipe A. Nuñez-Donoso and Jose Manuel Lopez-Guede	367
Special Session: Innovation in Computer Science Higher Education	
Classroom Improvement Cycle in Architecture by Means of Problem-Based Learning	377
Problem Generalization for Designing Recursive Algorithms Diana Borrego, Irene Barba, Miguel Toro, and Carmelo Del Valle	388
Analysis of Student Achievement Scores via ClusterAnalysisViviana E. Jiménez Chaves, Miguel García-Torres, David Becerra Alonso,Francisco Gómez-Vela, Federico Divina, and José L. Vázquez-Noguera	399
Knowledge Modelling for Ill-Defined Domains Using Learning Analytics: Lineworkers Case	409
School Success and School Dropout in Portuguese Polytechnic Higher Education (Case Study) Elsa Rodrigues	419
Use of IT in Project-Based Learning Applied to the Subject Surveying in Civil Engineering Oihana Mitxelena-Hoyos, José Lázaro Amaro-Mellado, and Francisco Martínez-Álvarez	428
Author Index	439



The European Foreign Language Teacher **Training Programme: A Comprehensive** Proposal

María Amor Barros-del Río^(⊠)

University of Burgos, Burgos, Spain abarros@ubu.es

Abstract. Mobility has been a key and central concept for the Bologna Process. Labour mobility of the teaching and learning community within the European borders is in continuous growth. But so far, despite this dynamic reality, there is no unified format for teacher training at a European level. In the light of this, a virtual solution for a comprehensive and coordinated training for foreign language teachers in Europe is needed. Within the frame of the VIR_TEACH Erasmus+ project, this article outlines the creation of a digital tool to improve the postgraduate certificates on Masters on Education (Foreign Languages), and to provide teachers, researchers, student teachers and policy-makers with opensource tools and resources.

Keywords: Teacher Training · Language Teacher · European education

1 Foreign Language Teacher Training in Europe: An Overview

Labour mobility within the teaching and learning collectives is in continuous growth within the European borders. This fact is clearly detected in the Eurydice report on teacher mobility which states that:

In half of the education systems surveyed, less than a third of all teachers appear to be transnationally mobile. In the EU, Executive Summary 13 12.4% of respondents reported that they had gone abroad solely when they were already practising teachers, whereas 5.9% had done so only during their Initial Teacher Training, and 3.6% only in both cases. In all countries surveyed except Iceland, modern foreign language teachers are the most transnationally mobile, compared to teachers of four other main subjects [1].

Many factors contribute to this situation, among which we can point to a constant increase in opportunities for university study abroad [2], which favours the

The contents of this article fall within the scope of the Erasmus+ funded VIR_TEACH project (A VIRtual Solution for a comprehensive and coordinated training for foreign language TEACHers in Europe, Project Reference: 2018-1-ES01-KA203-050045). The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

[©] The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2021

Á. Herrero et al. (Eds.): ICEUTE 2020, AISC 1266, pp. 157-163, 2021. https://doi.org/10.1007/978-3-030-57799-5_16

158 M. A. Barros-del Río

internationalisation of teacher training, and a static labour market resulting from the last years of economic crisis [3], which impels graduated students to seek jobs beyond their frontiers.

Despite these trends, there is no unified format for teacher training at a European level. Added to that, university trainers do not usually have a space where they can share their worries and advances in their education practice. This lack of common environments also affects teacher students who miss unified digital tools that cover their supervision and tutoring needs, especially during their internship phase. In terms of educational policy, national agencies tend to design and develop their lines of work on teacher training in each country separately.

The evident unbalance between nationally-oriented training and international practice demands urgent action towards the internationalization of the teaching profession as a whole. Within the European Higher Education Area, this may be facilitated thanks to the possibility of homologation of university degrees. However, so far there is no unified format for teacher training at the international level. At the level of educational policies, there is also a need to converge towards a more unified and coherent set of principles among the different European countries, particularly in terms of curricular content and experiences of internships. In general terms, Initial Teacher Education (hereinafter ITE), suffers from an excessively local projection that limits the future teaching exercise of teacher students beyond their borders. Hence, a greater degree of internationalization and convergence of the training of future language teachers is an urgent need within European borders.

2 Data Gathering: Consultation and Report

As Freeman et al. affirmed in the prologue of their famous volume *Teacher Learning in Language Teaching* [4], "in order to better understand language teaching, we need to know more about language teachers". Hence, before addressing the construction of a coherent proposal for foreign language teacher training, we deemed necessary to collect the opinions and experiences of the stakeholders involved in the matter. This, would help build consensus on the lacks and needs of current foreign language training programmes, and improve them coherently at a European scale.

For these purposes, in October–November 2019, a survey was passed among stakeholders to test the perception of language teacher training in Europe.

The main objectives of this survey were to detect current weak aspects regarding language teacher training and to implement positive measures for the advancement of foreign language teacher education in Europe. In particular, this survey sought to:

- Collect comparative data.
- Build consensus during the project.
- Fix potential issues.
- Improve methodological approaches, materials and resources.
- Prioritise intellectual outputs, contents and events' main topics.

The survey was launched in November 2019 and was open for 3 weeks. It reached a total of 508 participants from different gender, ages, countries of residence and profiles, which ensured the heterogeneity of the sample.

The survey was intended to offer a national and international picture of the current situation of foreign language teacher training in Europe. For this purpose, the survey was conducted in several European countries. The countries of residence of the participants were closely related to this fact, with 41,6% of respondents living in Portugal, 27,0% from Spain, 12,0% from Romania, 10,5% from Poland and 5,6% from Belgium. Other countries of residence such as Finland, Iceland, Germany and Turkey, also participated in the survey but with a much smaller percentage (less than 4% in total).

The procedure and results of this survey have been published in detail elsewhere [5] with the following conclusions:

- 1. There is an urgent need to move towards homogenization of teacher training.
- 2. Digital platforms are particularly useful tools for internationalisation of foreign language teacher training.
- 3. The contents of the training programmes need modernisation and upgrading, providing tools, skills and resources to help professionals adapt to the continuous transformations taking place in a changing and dynamic society.
- 4. Investment in ITE, particularly in the financing of student and teacher mobility, is essential.
- 5. Feminisation of the teaching practice is related with a low status of the profession and unappealing salaries. Governing bodies and universities should invest in attracting high quality people into the profession, irrespective of their sex/gender. In the medium term, these measures should impact on gender balance in teaching and learning.

3 Language Teacher Training Through a Virtual Learning Environment

In order to move towards language teacher training homogenization, virtual learning environments seem to be particularly useful tools for sharing and learning successful teaching formulas specific to this field of higher education. This way, cultural diversity and geographical distance could be overcome by a multi-national alliance of higher institutions. Moreover, this solution would facilitate cultural adaptation and favour international communication, two essential elements for teaching at an international level. However, a lack of coherence between teaching digital platforms that promote mobility and digital tools that guide the needs of students in their training and internship phases is problematic. As pointed out by Townsend and Bates [6], it is a set of tensions and pressures, inherent in an unstoppable process of globalization that makes a dent in the quality of teaching. This issue becomes more acute, if possible, in the training of language teachers, whose orientation towards communicative teaching requires the implementation of a series of strategies and predisposition to interaction and mutual understanding.

160 M. A. Barros-del Río

As Stanley [7] has affirmed, language learning with technology provides a wide range of interesting and useful activities, shows how any teacher can use technology, and offers a range of activities, which are suitable for all levels of proficiency to both novice and experienced teachers. Hence, in order to create a European Foreign Language Teacher Training Programme, it seems mandatory the development of a multinational dynamic and lasting over time environment that offers useful tools for the training of future teachers of languages. In the light of these reflections, a communicative approach seems a mandatory element to infuse in the training of 21st century language teachers. For this to happen, prospective teachers must acquire a reflective and critical training [8], oriented towards social commitment [9]. This implies the construction of a critical teaching identity among the candidates during their training process [10]. Added to that, the critical pedagogy received must be closely linked to a culturally receptive teaching practice [11, 12], especially in the multinational contexts in which future professionals of the teaching of languages will have to move. Finally, in a changing and global reality, future language teachers must know how to manage and apply to their teaching the digital technologies that best adapt to their teachinglearning objectives. In the same way, teachers that had been exposed to a learning process through MOOCs "expressed positive attitudes towards their learning experience and a desire to participate in more courses in the future" [13] showing not only gains in content knowledge but also in pedagogical knowledge, which is fundamental not only to the MOOC course design, but also to the overall future teacher's learning process.

4 Design and Methodological Guidelines for a European Language Teacher Training Programme

The creation of an open digital space to promote the exchange of methodologies and good practices that inspire a common, comprehensive and effective training of future professionals of language teaching at European level. This idea must be reflected in the design and development of a platform for online courses, the development of coherent levels of competence at the international level and the advancement of methodologies for better regulation in education policy. In addition, it must promote a greater degree of transparency of the training processes and the creation of a series of digital tools that favour the convergence of educational systems and the exchange of good practices.

Likewise, it must offer a consistent functionality in progressive, significant and cumulative learning sequences developed through a wide variety of learning resources. These must incorporate in turn the diversity that new technologies offer today. Therefore, these resources will have multiple formats, among which videos, readings, infographics, discussion forums, and so on, can be counted. Besides, the design of the exercises will seek to prioritize the interaction through formulas such as multiple choice, open questions with peer review, drag and drop, etc.

Added to that, the implementation of digital tools that facilitate coherence and follow-up between the phases of training and practice in the education of future language teachers should be considered. This measure should include a common protocol and interactive communication spaces. In addition, as indicated by the Finnish Institute

for Educational Research, the training of future language teachers should contemplate competences related to pedagogical, communicative and reflection skills. Furthermore, attention to diversity and collaboration with colleagues and peers should be contemplated too. Therefore, the practical phase, or Practicum, must be oriented towards a reflection on the action that the future teachers carry out in the classroom [14]. For this purpose, it is appropriate to incorporate a digital tool that, based on a predetermined protocol, allows to monitor the internship period and to facilitate communication between the different agents involved: the teacher students, their respective mentors from the educational centre, and their academic tutors. As a result, the role of the mentors is expected to acquire more relevance and professionalism in the learning process, a concern addressed in numerous studies [15, 16]. Besides, this tool will allow the establishment of more intense interaction and support among the participants, an issue that brings positive outcomes according to Tomaš, Farrelly and Haslam [17]. Particularly, this virtuous communicative triangle will greatly facilitate the interaction between the aforementioned stakeholders, displaying a reflective, dynamic and enriching learning experience for all parties.

Also, the establishment of international networks that facilitate mobility and exchange among future teachers in training would be desirable. Although there are previous experiences of networks that have been pursuing the internationalization of educational practice, such as the Thematic Network on Teaching Education (TNTEE) and the Policy of Teaching Education in Europe (TEPE), one of the main challenges has been the lack of communication, cooperation and collaboration between the actors of the different countries. The VIRTEACH project tries to fill these gaps through the establishment of organized professional groups and networks of teacher educators.

At the same time, this question poses an enormous challenge that goes beyond the purely academic sphere, bringing into play factors such as intercultural communication or the development of the ability to adapt. As demonstrated by He, Lundgren and Pynes [18], the integration of teaching-learning experiences of languages abroad, included within a study program, offers future teachers a unique opportunity to develop empathy and innovative strategies for instruction. In order to collect the best results from this type of experience, it is advisable to follow up through open reflection journals, in which teaching beliefs and previous intercultural experiences are included, as well as the development of individual goals [19]. For these purposes, the European Portfolio for Student Teachers of Languages (EPOSTL) is an adequate tool for reflection and self-assessment of the knowledge and didactic skills necessary to teach languages [20]. It is an instrument that takes as reference the Common European Framework of Reference for Languages (CEFR) and that allows future teachers to connect their experiences with their teaching practices, so that these same reflections serve as evaluation and self-assessment tools. With permission already granted by the European Centre for Modern Languages of the Council of Europe, VIRTEACH will adapt EPOSTL to the requirements of the virtual environment to maximize its functionality.

The design of protocols and lines of action common to the European Higher Education Area in relation to the training of future language teachers. In this respect, it is necessary to point out the necessary collaboration of the political institutions with competences in educational matters. From the universities themselves, which are the

162 M. A. Barros-del Río

immediate training entities, to the competent councils and governmental delegations, it is necessary to work on the convergence and coherence of curricula for the training of future language teachers with an international perspective, oriented to intercultural communication and that promote a collaborative, empathetic and reflective learning.

To finish, the national and international recognition of this training is essential and can be an interesting pilot project that ultimately would result in good teaching professionals who are dynamic and capable of adaptation and improvement.

5 Final Remarks and Conclusions

The previous sections have dissected the current state of Foreign Language Teacher Training in Europe and shed light upon a comprehensive proposal for convergence and quality enhancement in this field of education.

The suggested measures are expected to improve the quality of language teacher training programs and the coordination among the different stakeholders, through the design of comprehensive but coherent and converging curricula for ITE in the Member States of the European Union. The combination of open courses and teaching practices of a transnational nature must combine with a personalized orientation of the learning process. Coherence between theoretical and practical training, and the exchange of good practices, are the hallmarks of this proposal.

All in all, the final goal is to foster a more exigent training and selection of future educators of languages at an international level, to raise the quality of language teaching programs within the European Union, and to strengthen and unify European educational policies.

References

- 1. European Commission/EACEA/Eurydice: The Teaching Profession in Europe: Practices, Perceptions, and Policies. Eurydice Report. Publications Office of the European Union, Luxembourg (2015)
- Martínez Rodríguez, J.B.: Movilidad/movilización de profesorado y estudiantes para la formación. Revista interuniversitaria de formación del profesorado 51, 233–250 (2004)
- ET2020 Working Group on Schools Policy. 2014/15: Shaping Career-long Perspectives on Teaching: a Guide on Policies to Improve Initial Teacher Education. European Commission - Directorate-General for Education and Culture, Brussels (2015)
- Freeman, D., Freeman, D.J., Richards, J.C., Swan, M. (eds.): Teacher Learning in Language Teaching. Cambridge University Press, Cambridge (1996)
- Barros-del Río, M.A., Mediavilla-Martínez, B.: The European perception of Foreign language teacher training. Findings on a survey in 13 countries. Ann. "Dimitrie Cantemir" Christ. Univ. Linguist. Lit. Methodol. Teach. 2, 67–81 (2019)
- 6. Townsend, T., Bates, R.: Handbook of Teacher Education: Globalisation, Standards and Professionalism in Times of Change. Springer, Dordrecht (2007)
- 7. Stanley, G.: Language Learning with Technology: Ideas for Integrating Technology in the Classroom. Cambridge University Press, Cambridge (2013)

- Barros-del Río, M.A.: Cómo fomentar el espíritu crítico en los futuros docentes de inglés desde la formación: fundamentos y propuestas. Íkala: Revista de Lenguaje y Cultura 24(3), 607–618 (2019)
- 9. Yogev, E., Michaeli, N.: Teachers as society-involved "organic intellectuals": training teachers in a political context. J. Teach. Educ. **62**(3), 312–324 (2011)
- Dvir, N., Avissar, I.: Constructing a critical professional identity among teacher candidates during service-learning. Prof. Dev. Educ. 40(3), 398–415 (2014)
- 11. Abednia, A.: From teacher training to teacher education in second language education. AUC TESOL J. 1(1), 4–12 (2011)
- Jiménez, R.T., Rose, B.C.: Knowing how to know: building meaningful relationships through instruction that meets the needs of students learning English. J. Teach. Educ. 61(5), 403–412 (2010)
- Donitsa-Schmidt, S., Topaz, B.: Massive open online courses as a knowledge base for teachers. J. Educ. Teach. 44(5), 608–620 (2018)
- Manso Ayuso, J., Martín Ortega, E.: Valoración del Máster de Formación de Profesorado de Educación Secundaria: estudio de casos en dos universidades. Ministerio de Educación de España, Madrid (2013)
- Andreucci, P.A.: La supervisión de prácticas docentes: una deuda pendiente de la formación inicial de profesores. Estudios pedagógicos (Valdivia) 39(1), 7–26 (2013)
- Sepúlveda Ruiz, M.: Las prácticas de enseñanza en el proceso de construcción del conocimiento profesional. Educar 36, 71–93 (2005)
- 17. Tomaš, Z., Farrelly, R., Haslam, M.: Designing and implementing the TESOL teaching practicum abroad: focus on interaction. TESOL Q. **42**(4), 660–664 (2008)
- He, Y., Lundgren, K., Pynes, P.: Impact of short-term study abroad program: inservice teachers' development of intercultural competence and pedagogical beliefs. Teach. Teach. Educ. 66, 147–157 (2017)
- He, Y., Levin, B.B., Li, Y.: Comparing the content and sources of the pedagogical beliefs of Chinese and American pre-service teachers. J. Educ. Teach. 37(2), 155–171 (2011)
- 20. Newby, D., et al.: European Portfolio for Student Teachers of Languages EPOSTL. Council of Europe Publishing, Strasbourg (2007)