CSEDU 2010
2nd International Conference on Computer Supported Education

Proceedings
Volume 2
Valencia, Spain · April 07 - 10, 2010
BRIEF CONTENTS

INVITED SPEAKERS ................................................................. IV
SPECIAL SESSION CHAIRS ....................................................... IV
ORGANIZING AND STEERING COMMITTEES ................................ V
PROGRAM COMMITTEE ............................................................. VI
AUXILIARY REVIEWERS .......................................................... VIII
SPECIAL SESSION PROGRAM COMMITTEE ................................ IX
FOREWORD .............................................................................. XI
CONTENTS ............................................................................... XIII
INVITED SPEAKERS

Michael Gould
ESRI
U.S.A.

Hermann Maurer
Graz University of Technology
Austria

Robert M. Panoff
The Shodor Education Foundation
U.S.A.

SPECIAL SESSION CHAIRS

SPECIAL SESSION ON GAMING PLATFORMS FOR EDUCATION AND REEDUCATION PURPOSES
Francisco Ibañez, Brainstorm Multimedia / Innovatec / Toy Research Institute, Spain

SPECIAL SESSION ON ENTERPRISE SYSTEMS IN HIGHER EDUCATION
Liane Haak, Carl von Ossietzky University of Oldenburg, Germany
Jorge Marx Gómez, Carl von Ossietzky University of Oldenburg, Germany
Dirk Peters, Carl von Ossietzky University of Oldenburg, Germany
ORGANIZING AND STEERING COMMITTEES

CONFERENCE CO-CHAIRS
José Cordeiro, Polytechnic Institute of Setúbal / INSTICC, Portugal
Boris Shishkov, IICREST / Delft University of Technology, The Netherlands

PROGRAM CO-CHAIRS
Markus Helfert, Dublin City University, Ireland
Alexander Verbraeck, Delft University of Technology, The Netherlands

PROCEEDINGS PRODUCTION
Helder Coelhas, INSTICC, Portugal
Andreia Costa, INSTICC, Portugal
Bruno Encarnação, INSTICC, Portugal
Bárbara Lima, INSTICC, Portugal
Raquel Martins, INSTICC, Portugal
Carla Mota, INSTICC, Portugal
Vítor Pedrosa, INSTICC, Portugal
Filipa Rosa, INSTICC, Portugal
José Varela, INSTICC, Portugal

CD-ROM PRODUCTION
Elton Mendes, INSTICC, Portugal
Pedro Varela, INSTICC, Portugal

GRAPHICS PRODUCTION AND WEBDESIGNER
Daniel Pereira, INSTICC, Portugal

SECRETARIAT
Bruno Encarnação, INSTICC, Portugal

WEBMASTER
Sérgio Brissos, INSTICC, Portugal
Program Committee

Grigore Albeanu, Spiru Haret University, Romania
Peter Albion, University of Southern Queensland, Australia
Colin Allison, University of St. Andrews, U.K.
Roger Austin, University of Ulster, U.K.
Azita Bahrami, Armstrong Atlantic State University, U.S.A.
Andreas Bollin, Alpen-Adria Universität Klagenfurt, Austria
Stephen Bostock, Keele University, U.K.
Federico Botella, UMH, Spain
Ch. Bouras, University of Patras and RACTI, Greece
Paul Brna, University of Edinburgh, U.K.
Dumitru Burdescu, University of Craiova, Romania
Kan Kan Chan, University of Macau, Macau
Maiga Chang, Athabasca University, Canada
Weiqin Chen, University of Bergen, Norway
Gennaro Costagliola, Università di Salerno, Italy
Caroline M. Crawford, University of Houston-Clear Lake, U.S.A.
Sergiu Dascalu, University of Nevada, Reno, U.S.A.
Danco Davcev, University Ss. Cyril & Methodius, Faculty of Electrical Engineering, Macedonia, The Former Yugoslav Republic of
John Dempsey, University of South Alabama, U.S.A.
Michael Derntl, University of Vienna, Austria
Giuliana Dettori, Istituto per le Tecnologie Didattiche (ITD)-CNR, Italy
Yannis Dimitriadis, School of Telecommunications Engineering, University of Valladolid, Spain
Ian Douglas, Florida State University, U.S.A.
Chyi-Ren Dow, Feng Chia University, Taiwan
Heinz Dreher, Curtin University of Technology, Australia
Martin Ebner, Technische Universität Graz, Austria
Larbi Esmahi, Athabasca University, Canada
Victor Manuel Garcia-Barrios, Carinthia University of Applied Sciences, Austria
Song Gilsun, Zhejiang University, China
Sabine Graf, Athabasca University, Canada
Nuno Guimarães, Lasige/Faculty of Sciences, University of Lisbon, Portugal
Laurence Habib, Oslo University College, Norway
John Hamer, University of Auckland, New Zealand
Yasunari Harada, Waseda University, Japan
Tali Heiman, The Open University, Israel
Eva Heinrich, Massey University, New Zealand
Markus Helfert, Dublin City University, Ireland
Denis Helic, TU Graz, Austria
Andreas Holzinger, Medical University Graz, Austria
Janet Hughes, University of Dundee, U.K.
Kin-chuen Hui, University of Hong Kong, Hong Kong
Kamini Jaipal, Brock University Faculty of Education, Canada
Mohamed Jemni, University of Tunis, Tunisia
Patrick Johnscher, Technische Universität Darmstadt, Germany
Michail Kalogiannakis, University of Crete, Greece
Atis Kapenieks, Riga Technical University, Latvia
Bill Kapralos, University of Ontario Institute of Technology, Canada
PROGRAM COMMITTEE (CONT.)

Göran Karlsson, KTH Stockholm, Sweden
Gwendolyn Kolfschoten, Delft University of Technology, The Netherlands
Maria Kordaki, Computer Institute of Technology, Greece
Georgios Kouroupetroglou, University of Athens, Greece
Timo Lainema, Turku School of Economics, Finland
Reneta Lansiquot, New York City College of Technology, U.S.A.
Frederick Li, University of Durham, U.K.
Andrew Lian, Western Illinois University, U.S.A.
Hwee Ling Lim, The Petroleum Institute, U.A.E.
Stephan Lukosch, Delft University of Technology, The Netherlands
Bruce Maxim, University of Michigan-Dearborn, U.S.A.
José Carlos Metrólio, Instituto Politécnico de Castelo Branco, Portugal
Silvia Mirri, University of Bologna, Italy
Felix Mödritscher, Vienna University of Economics and Business, Austria
Michael Grahame Moore, The Pennsylvania State University, U.S.A.
Cristobal Romero Morales, University of Cordoba, Spain
Roberto Moriyón, Universidad Autonoma de Madrid, Spain
Chrystalla Mouza, University of Delaware, U.S.A.
Jogesh K. Muppala, Hong Kong University of Science and Technology, Hong Kong
Ryohei Nakatsu, Interactive & Digital Media Institute, Singapore
Minoru Nakayama, Tokyo Institute of Technology, Japan
Kyparisia A. Papanikolaou, School of Pedagogical & Technological Education, Greece
Iraklis Paraskakis, South East European Research Centre, Greece
Becky Sue Parton, Southeastern Louisiana University, U.S.A.
Leonard A. Plugge, Stichting SURF, The Netherlands
Philippos Pouyioutas, University of Nicosia, Cyprus
T. Ramayah, Universiti Sains Malaysia, Malaysia
Felipa Reis, Portuguese Open University, Portugal
Griff Richards, Athabasca University, Canada
Maria Roussou, Makebelieve design & consulting, Greece
Pasi Sahlberg, CIMO, Finland
Abdolhossein Sarrafzadeh, Unitec, New Zealand
Giuseppe Scanniello, Università Degli Studi della Basilicata, Italy
Jane Seale, University of Southampton, U.K.
Boris Shishkov, IICREST / Delft University of Technology, The Netherlands
Ann M. Shortridge, University of Oklahoma-Tulsa, U.S.A.
Marten van Sinderen, University of Twente, The Netherlands
Michael Sonntag, Johannes Kepler University, Austria
Martin Sperka, Bratislava School of Law, Slovak Republic
Karl Steffens, University of Cologne, Germany
Eleni Stroulia, University of Alberta, Canada
Lily Sun, University of Reading, U.K.
Antonio Teixeira, Universidade Aberta, Portugal
John Thompson, Buffalo State College, State University of New York, U.S.A.
A. Min Tjoa, Vienna University of Technology, Austria
Carsten Ullrich, Shanghai Jiao Tong University, China
Andreas Veglis, Aristotle University of Thessaloniki, Greece
Jari Veijalainen, University of Jyvaskyla, Finland
Program Committee (cont.)

Kimberly Voll, University of British Columbia, Canada
Charalambos Vrasidas, CARDET, Cyprus
Eva Lindh Waterworth, Umeå University, Sweden
Les Watson, leswatsondotnet, U.K.
Steve Wheeler, University of Plymouth, U.K.

Jana M. Willis, University of Houston - Clear Lake, U.S.A.
Tina Wilson, The Open University, U.K.
Clayton R. Wright, International Education Consultant, Canada
Takami Yasuda, Graduate School of Information Science, Nagoya University, Japan
Fani Zlatarova, Elizabethtown College, U.S.A.

Auxiliary Reviewers

David Chodos, University of Alberta, Canada
Howard Duncan, Dublin City University, Ireland
Owen Foley, Galway Mayo IT, Ireland
Mouzhi Ge, Dublin City University, Ireland
Thanos Hatziapostolou, CITY College, International Faculty of the University of Sheffield, Greece

Petros Lameras, Ellinogermaniki Agogi, Greece
Muhanna Muhanna, University of Nevada, Reno, U.S.A.
Thoa Pham, Dublin City University, Ireland
Ian Stimpson, Keele University, U.K.
Ikaros Tsantekidis, SEERC, Greece
Qingsheng Zhang, Athabasca University, China
SPECIAL SESSION PROGRAM COMMITTEE

SPECIAL SESSION ON GAMING PLATFORMS FOR EDUCATION AND REEDUCATION PURPOSES

María Costa, Toy Research Institute, Spain
David Cuesta, Polytechnic University of Valencia, Spain
Maria Elena Fabregat, InnovaTec, Spain
Jose Luis Guillén González, Colegio "La Encarnación", Spain
James Playfoot, White Loop Ltd, U.K.
Sonia Torres, Toy Research Institute (AIJU), Spain
Ryan Wall, Wheeling Jesuit University - WJU, U.S.A.

SPECIAL SESSION ON ENTERPRISE SYSTEMS IN HIGHER EDUCATION

Maria Manuela Cruz Cunha, Polytechnic Institute of Cavado and Ave, Portugal
Danco Davcev, Faculty of Electrical Engineering and Computer Science, Macedonia, The Former Yugoslav Republic of
Jorge Marx Gómez, Carl von Ossietzky University of Oldenburg, Germany
Liane Haak, Carl von Ossietzky University of Oldenburg, Germany
Gustaf Juell-Skielse, Royal Institute of Technology, Sweden
Rafael Bello Pérez, UCLV Santa Clara, Cuba
Dirk Peters, Carl von Ossietzky University of Oldenburg, Germany
Karin Rebmann, Carl von Ossietzky University of Oldenburg, Germany
Frank Teuteberg, University of Osnabrück, Germany, Germany
João Varajão, University of Trás-os-Montes e Alto Douro, Portugal
Stefan Weidner, Otto-von-Guericke University Magdeburg, Germany
Karsten Wolf, University of Bremen, Germany
Volker Zimmermann, IMC GmbH, Germany
FOREWORD

This volume contains the proceedings of the 2nd International Conference on Computer Supported Education (CSEDU 2010), organized by INSTICC – the Institute for Systems and Technologies of Information, Control and Communication, technically co-sponsored by the Spanish Chapter of the IEEE Education Society and the Interdisciplinary Institute for Collaboration and Research on Enterprise Systems and Technology (IICREST), and in cooperation with the Workflow Management Coalition (WFMC), and ACM SIGITE.

CSEDU is becoming an annual meeting place for presenting and discussing educational paradigms, best practices and case studies on innovative computer-supported learning strategies, institutional policies on technology-enhanced learning including learning from distance, supported by technology. The Web is currently a preferred medium for distance learning and the learning practice in this context is usually referred to as e-learning or technology-enhanced learning. CSEDU 2010 is expected to give an overview of the state of the art in technology-enhanced learning and to also outline upcoming trends and promote discussion about the education potential of new learning technologies in the academic and corporate world.

This conference brings together researchers, engineers and practitioners interested in methodologies and applications related to the education field. It has six main topic areas, covering different aspects of Computer Supported Education, including “Information Technologies Supporting Learning”, “Learning/Teaching Methodologies and Assessment”, “Social Context and Learning Environments”, “Legal and Cultural Management Issues”, “Domain Applications and Case Studies” and “Quality, Evaluation and Accreditation Policies”. CSEDU is held in conjunction with WEBIST, the International Conference on Web Information Systems and Technologies, providing a synergetic environment for delegates from both conferences, as many current and future issues and applications of Computer Supported Education are clearly related to the Web. This joint conference format may continue for future events.

CSEDU 2010 received 304 paper submissions from 64 countries in all continents. A double-blind review process was enforced, with the help of the 143 experts who are members of the conference program committee, all of them internationally recognized in one of the main conference topic areas. After reviewing, only 30 papers were selected to be published and presented as full papers, i.e. completed work (8 pages in proceedings / 30’ oral presentations) and 79 papers, describing work-in-progress, were selected as short papers for 20’ oral presentation. Furthermore there were also 46 papers presented as posters. The full-paper acceptance ratio was thus 10%, and the total oral paper acceptance ratio was less than 36%. These ratios denote a high level of quality, which we intend to maintain or reinforce in the next edition of this conference.

The high quality of the CSEDU 2010 programme is enhanced by three keynote lectures, delivered by distinguished guests who are renowned experts in their fields, including (alphabetically): Michael Gould (ESRI, U.S.A.), Hermann Maurer (Graz University of Technology,
Austria) and Robert M. Panoff (The Shodor Education Foundation, U.S.A.).

For the second edition of the conference we extended and ensured appropriate indexing of the proceedings of CSEDU including DBLP, INSPEC, EI (expected) and Thomson Reuters Conference Proceedings Citation Index (expected). Furthermore, all papers will soon be available at the SciTePress digital library.

Building an interesting and successful program for the conference required the dedicated effort of many people. Firstly, we must thank the authors, whose research and development efforts are recorded here. Secondly, we thank the members of the program committee and additional reviewers for their diligence and expert reviewing. We also wish to include here a word of appreciation for the excellent organization provided by the conference secretariat, from INSTICC, who have smoothly and efficiently prepared the most appropriate environment for a productive meeting and scientific networking. Last but not least, we thank the invited speakers for their invaluable contribution and for taking the time to synthesize and deliver their talks.

Looking forward to an inspiring world-class conference and a pleasant stay in Valencia for all delegates, we hope to meet you again next year for the 3rd CSEDU, details of which will be shortly made available at http://www.csedu.org.

José Cordeiro
Polytechnic Institute of Setúbal / INSTICC, Portugal

Boris Shishkov
IICREST / Delft University of Technology, The Netherlands

Alexander Verbraeck
Delft University of Technology, The Netherlands

Markus Helfert
Dublin City University, Ireland
CONTENTS

INVITED SPEAKERS

KEYNOTE SPEAKERS

DESKTOP TO LAPTOP TO CLOUD - Challenges for Teaching and for Administration
Michael Gould

“How much technology?” is the Question
Hermann Maurer

COMPUTATIONAL THINKING ACROSS THE CURRICULUM - The Power and the Peril
Robert M. Panoff

LEARNING/TEACHING METHODOLOGIES AND ASSESSMENT

FULL PAPERS

FINAL YEAR PROJECT MANAGEMENT PROCESS
Carlos López, David H. Martin, Andrés Bustillo and Raúl Marticorena

AN INTERACTIVE TOOL FOR DATA STRUCTURE VISUALIZATION AND ALGORITHM ANIMATION - Experiences and Results
Rafael del Vado Vírseda

AN APPROACH TO MEASURE STUDENT ACTIVITY IN LEARNING MANAGEMENT SYSTEMS
Marta Zorrilla, Diego García and Elena Alvarez

EPISTEMOLOGICAL CONCEPTS FOR TEACHER DEVELOPMENT IN VIRTUAL ENVIRONMENTS AND IN THE TEACHING-LEARNING PROCESS FOR VISUALLY IMPAIRED STUDENTS
Elmara Pereira de Souza, Claudia Pinto Sena and Claudia Vivien Carvalho de Oliveira Soares

AN INFRASTRUCTURE FOR MECHANISED GRADING
Queinnec Christian

PROMOTING STUDENTS SUCCESS WITH A BUSINESS INTELLIGENCE SYSTEM
Maria Beatriz Piedade and Maribel Yasmina Santos

USING BLOOM’S COGNITIVE DOMAIN IN WEB EVALUATION ENVIRONMENTS
Gustavo H. S. Alexandre, Simone C. dos Santos and Patrícia C. A. R. Tedesco

SHOULD AUDIO FEEDBACK BE USED BECAUSE IT IS EASILY AVAILABLE OR FOR REASONS OF PEDAGOGY?
Shirley Hunter-Barnett and Sue Murrin-Bailey

THE JIGSAW COLLABORATIVE METHOD WITHIN THE ONLINE COMPUTER SCIENCE CLASSROOM
Maria Kordaki and Haris Siempos
SHORT PAPERS

A COMPETITIVE-GAME PROJECT-BASED LEARNING SCHEME FOR MOBILE COMMUNICATIONS SUBJECTS
A. Portilla-Figueras, S. Jiménez-Fernández and S. Salcedo-Sanz

PROBLEM-BASED LEARNING - A Graph Theory Experience
María Angélica Pinninghoff J., Ricardo Contreras A. and Pedro Salcedo L.

ON THE IMPROVEMENT OF MOTIVATION IN USING A BLENDED LEARNING APPROACH - A Success Case
Diana Perez-Marin and Ismael Pascual-Nieto

HOW BLENDED LEARNING CLOSES THE LANGUAGE GAP BETWEEN NATIVE STUDENTS AND SPANISH LANGUAGE LEARNERS
Pablo Ortega Gil and Francisco Arcos García

DEVELOPING SOFT SKILLS IN A B-LEARNING ENVIRONMENT
Paula Peres and Ana Azevedo

USING SPREADSHEETS TO TEACH COMPUTER ARCHITECTURE
Claude Timsit and Soraya Zertal

INNOVATION BY COLLABORATION AMONG FIRMS. A NEW METHODOLOGY - Building Theory from Case Study Research and Simulation Models
Paola Pisano

A GENERIC MODELING OF INDICATOR WITH UTL - The Collaborative Action Function Example
Sébastien Iksal, Christophe Choquet and Diem Pham Thi Ngoc

DIFFICULTIES WITH COLLECTION CLASSES IN JAVA - The Case of the ArrayList Collection
Stelios Xinogalos

AN EDUTAINMENT APPROACH TO ACADEMIC TEACHING BASED ON STORYTELLING
Wolfgang Heiden and Eric Fassbender

WATA - A System for Written Authenticated though Anonymous Exams
Giampaolo Bella, Gianpiero Costantino and Salvatore Riccobene

PERSONALISED E-LEARNING PROCESS - The Case of Geometry in IWT
Giovannina Albano and Giuseppe Maresca

AN EXPERIMENTAL PROTOTYPE FOR AUTOMATICALLY TESTING STUDENT PROGRAMS USING TOKEN PATTERNS
Chung Man Tang, Yuen Tak Yu and Chung Keung Poon

THE INDIVIDUAL PERFORMANCE MEASUREMENT FRAMEWORK IN VIRTUAL TEAM LEARNING
Virgilijus Sakalauskas and Dalia Kriksciuniene

USING MYERS-BRIGGS TYPE INDICATOR (MBTI) FOR ASSESSMENT SUCCESS OF STUDENT GROUPS IN PROJECT BASED LEARNING
Vicente Rodríguez Montequín, Joaquín Villanueva Balsera, José Manuel Mesa Fernández and Javier De Cos Juez

XIV
# Posters

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN EXPERIENCE TO INCLUDE ADVANCED OPTIMIZATION TECHNIQUES IN MICROWAVE UNDERGRADUATE LABORATORIES</td>
<td>163</td>
</tr>
<tr>
<td>P. López-Espi, S. Salcedo-Sanz, R. Sánchez-Montero and A. Portilla-Figueras</td>
<td></td>
</tr>
<tr>
<td>MODELING THE FRAGILE ECONOMIC SITUATIONS</td>
<td>167</td>
</tr>
<tr>
<td>Stasys Girdzijauskas, Andzelė Mialik and Ramunas Mackevicius</td>
<td></td>
</tr>
<tr>
<td>USING A COMPUTER-AIDED PBL APPROACH IN THE DESIGN OF A COURSE IN ENTREPRENEURSHIP AND MANAGEMENT</td>
<td>171</td>
</tr>
<tr>
<td>João Miranda</td>
<td></td>
</tr>
<tr>
<td>AN ENHANCED PRACTICAL PROGRAM ON DATA MINING EDUCATION</td>
<td>177</td>
</tr>
<tr>
<td>Hiroyuki Morita, Masashi Kondo, Tomonori Ishigaki, Nagate Araki and Yuji Nakayama</td>
<td></td>
</tr>
<tr>
<td>OBSERVATIONS ON PLAGIARISM IN PROGRAMMING COURSES</td>
<td>181</td>
</tr>
<tr>
<td>Branko Kaučič, Dejan Sraka, Maja Ramšak and Marjan Krašna</td>
<td></td>
</tr>
<tr>
<td>TEACHING IT IN THE PRIMARY SCHOOL - Some Aspects of Propaedeutics of Informatics Knowledge</td>
<td>185</td>
</tr>
<tr>
<td>Rumyana Yordanova Papancheva, Krasimira Atanasova Dimitrova and Krasimir Nedelchev Manev</td>
<td></td>
</tr>
<tr>
<td>USING MOODLE FOR AN AUTOMATIC INDIVIDUAL EVALUATION OF STUDENT’S LEARNING</td>
<td>189</td>
</tr>
<tr>
<td>P. Gil, F. Candelas, J. Pomares, S. T. Puente, J. A. Corrales, C. Jara, G. J. García and F. Torres</td>
<td></td>
</tr>
<tr>
<td>A TEACHING SCHEMA FOR MULTI-CORE PROGRAMMING</td>
<td>195</td>
</tr>
<tr>
<td>Yun Gao and Xuejie Zhang</td>
<td></td>
</tr>
</tbody>
</table>

# Social Context and Learning Environments

## Full Papers

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPARKING EMPLOYEES’ INTEREST IN SIX SIGMA - Transferring a Paper-based Simulation to a Workflow Management Application</td>
<td>203</td>
</tr>
<tr>
<td>Rene Börner and Andreas Uremovic</td>
<td></td>
</tr>
</tbody>
</table>

## Short Papers

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS STUDENT COLLABORATIVE WORK SUPPORTED BY MOODLE WIKI</td>
<td>213</td>
</tr>
<tr>
<td>Viktorija Sulčič</td>
<td></td>
</tr>
<tr>
<td>THE NEED FOR SPECIAL GAMES FOR GAMERS WITH SPECIAL NEEDS</td>
<td>220</td>
</tr>
<tr>
<td>Andrea Hofmann, Imke Hoppe and Klaus P. Jantke</td>
<td></td>
</tr>
<tr>
<td>A CASE STUDY THAT SHOWS THE IMPORTANCE OF COLOR IN WEB COLLABORATIVE EDUCATIONAL ENVIRONMENT</td>
<td>226</td>
</tr>
<tr>
<td>Ana L. Dias, Marcos A. R. Silva, Junia C. Anacleto, Luciana M. Silveira and Rosângela A. D. Penteado</td>
<td></td>
</tr>
<tr>
<td>USING CONTEXTUALIZED NARRATIVE GAME TO IMPROVE STUDENTS AND TEACHERS COMMUNICATION</td>
<td>232</td>
</tr>
<tr>
<td>Marcos Alexandre Rose Silva, Ana Luiza Dias and Junia Coutinho Anacleto</td>
<td></td>
</tr>
<tr>
<td>AN APPROACH TO TEACH MECHANICAL ENGINEERING IN ORDER TO AVOID CURRICULUM FRAGMENTATION AMONG TECHNICAL AND MANAGEMENT CLASSES</td>
<td>238</td>
</tr>
<tr>
<td>Adriano Fagali de Souza, Edgar Augusto Lanzer, Carlos Mauricio Sacchelli and Leonidas Cayo M. Gilapa</td>
<td></td>
</tr>
</tbody>
</table>
THE MODEL RAILROAD AS AN EXAMPLE AVOIDING TACTT KNOWLEDGE IN MICROELECTRONICS STUDIES
Wiebke Schwelgengräber, Ralf Salomon and Ralf Joost

MULTICULTURAL EXCHANGE & NEW MEDIA - Global Education Solution for Children
Marcos Sadao Maekawa, Takehiro Suzuki and Keiko Okawa

POSTERS
HIERARCHICAL CONSTRUCTION OF TEACHING FACULTY IN COMPUTER ORGANIZATION AND DESIGN
Tianzhou Chen, Gang Wang, Wei Hu and Qinsong Shi

PRACTICAL EDUCATION OF CONTROL ENGINEERING - Using Open OS, Free Software and Actual Plant
Sunao Tanimoto, Kiyoshi Yoshida and Jyunichiro Tahara

TRANSACTIVE MEMORY SYSTEM PROPOSAL TO FOSTER COLLABORATIVE LEARNING AND KNOWLEDGE SHARING INTO ORGANIZATIONS
Arturo Mora-Soto, Maria-Isabel Sanchez-Segura, Fuensanta Medina-Dominguez and Antonio Amescua

LEARNING METHODOLOGIES AND THEIR SOFTWARE TOOLS - An Approach to Definition of Possible Use Scenarios
Mario Massimo Petrone, Eugenio Pasquariello, Roberto Valente and Massimo Brunale

LEGAL AND CULTURAL MANAGEMENT ISSUES

SHORT PAPERS
COMPUTERS FOSTER EDUCATION AND EDUCATION FOSTERS COMPUTER SCIENCE - The Politecnico’s Approach
Dino Mandrioli, Aldo Torrebruno and Luisa Marini

CROSS-CULTURAL LEARNING CHALLENGES AND TEACHING STRATEGIES FOR FIRST-YEAR ASIAN STUDENTS IN AUSTRALIAN UNIVERSITIES
Jitian Xiao, Jie Lu, K. L. Chin, Jun Xu and Juan Yao

DOMAIN APPLICATIONS AND CASE STUDIES

FULL PAPERS
TEACHING PROGRAMMING WITH FORMAL MODELS IN GREENFOOT
Moritz Balz and Michael Goedicke

FIELD REPORT ON FIVE YEARS OF eLEARNING - Observations and Inspirations
Heiko Sturzrehm, Claire Fautsch and Peter Kropf

CONSTRAINTS ON REUSABILITY OF LEARNING OBJECTS - Didactic Aspects of Modular e-Learning in Engineering Education
Michael May, Peter Munkebo Hussmann, Anne Skov Jensen, Helle Rootzén, Steen Markvorsen, Karsten Schmidt, Kasper Skårhøj and Søren Enemark
SHORT PAPERS

MapO2R: MAPPING OBJECT ORIENTED APPLICATIONS TO RELATIONAL DATABASES - A Case of Study
J. J. Astrain, A. Córdoba and J. Villadangos

INNOVATIVE TECHNOLOGIES AND EDUCATION - Two Successful Case-studies
Nicoletta Di Blas, Paolo Paolini and Aldo Torrebruno

TEACHERS’ COMPUTER SUPPORTED CONSTRUCTIONS WITHIN A EUROPEAN VIRTUAL COMMUNITY COLLABORATIVE SPACE FOR SCIENCES EDUCATION - An Experience Achieved in a Multinational European Project
Maria Kordaki, Gabriel Gorghiu and Mihai Bizoi

E-LEARNING TOOLS FOR EDUCATION AND TRAINING IN DIAGNOSTICS AND MACHINE CONDITION MONITORING
Ondrej Kreibich and Radislav Smid

AN EFFICIENT TOOL FOR ONLINE ASSESSMENT AT THE POLISH-JAPANESE INSTITUTE OF INFORMATION TECHNOLOGY
Paweł Lenkiewicz, Małgorzata Rzeźnik and Lech Banachowski

IMPLEMENTING DYNAMIC-EPISTEMIC QUESTIONING - Engineering and Teaching Information Seeking via Dynamic Inquiry
Ștefan Minică

POSTERS

VISUALIZATION IN EDUCATION - Support for the Cognitive Processes in Understanding and Learning
Bengt Lennartsson

EVALUATING THE EFFECTIVENESS OF A PILOT SEMINAR ON COOPERATIVE LEARNING IN AN ENGINEERING COURSE
Krassadaki Evangelia, Matsatsinis F. Nikolaos and Zampetakis A. Leonidas

THE APP ORACLE - An Interactive Student Competition on Pattern Recognition
Alfons Juan, Jesús Andrés, Adrià Giménez, Jorge Civera, Roberto Paredes and Enrique Vidal

QUALITY, EVALUATION AND ACCREDITATION POLICIES

FULL PAPERS

THE SHORT-TERM BENEFITS OF EDUCATIONAL ROBOTICS WHEN PAIRED WITH GEOSPATIAL TECHNOLOGIES IN INFORMAL LEARNING ENVIRONMENTS
Bradley S. Barker, Gwen Nugent, Viacheslav I. Adamchuk and Neal Grandgenett

SHORT PAPERS

THE DEVELOPMENT OF TUNTOOL - A Software Tool for the Tuning Methodology
Philippos Pouyioutas, Harald Gjermundrod and Ioanna Dionysiou

DISCUSSION OF THE BENEFIT POTENTIALS OF PROCESS MINING FOR E-LEARNING PROCESSES
Marianne Holzhüter, Dirk Frosch-Wilke and Salvador Sánchez-Alonso
THE INTERNET AS A TOOL FOR IMPROVING THE STUDENT EVALUATION OF TEACHING
L. Mediero, F. J. Martín-Carrasco and A. Sánchez

THE IMPACT OF TECHNOLOGY-ENABLED ACTIVE LEARNING ON STUDENT PERFORMANCE, GENDER AND ACHIEVEMENT LEVEL
Ruey Shieh

DESIGN AND DEVELOPMENT OF AN UNDERGRADUATE COURSE ON INTERNET APPLICATIONS BASED ON AN INTEGRAL PEDAGOGICAL APPROACH
Camilo Jiménez and Jorge Villalobos

THE EVALUATION OF AN E-LEARNING WEB-BASED PLATFORM
Michail N. Giannakos

POSTERS

CONCEPT CLASSIFICATION FOR STUDY PROGRAMS QUALITY EVALUATION
Dainis Dosbergs and Juris Borzovs

DOES ANYBODY NEED HELP? PUPILS AND TEACHERS IN HARMONY - Creating an Adaptive Visualisation-module for Teachers to Support their Scheduling and Teaching Processes
Christoph Vogler, André Schulz and Andrea Hofmann

CANONICAL CORRELATION ANALYSIS OF COURSE AND TEACHER EVALUATIONS
Tamara Sliusarenko and Bjarne Kjær Ersbøll

TOWARDS E-LEARNING QUALITY - A Proposal of e-Learning Quality Model
Rosa Cabedo

SPECIAL SESSION ON GAMING PLATFORMS FOR EDUCATION AND REEDUCATION PURPOSES

FULL PAPERS

ADAPTIVE GAME MECHANICS FOR LEARNING PURPOSES - Making Serious Games Playable and Fun
Jonathan Tremblay, Bruno Bouchard and Adbenour Bouzouane

SIMPROJET: AN INNOVATIVE SIMULATION PLATFORM FOR EXPERIENTIAL LEARNING IN PROJECT MANAGEMENT
Dominique Jaccard and Stefano Riboni

UTILIZING INTERACTIVE TABLETOPS FOR EDUCATIONAL GAMES
Won Moon, Joong-Ho Lee and Ji-Hyung Park

DESIGN AND DEVELOPMENT OF ONLINE EDUCATIONAL GAMES BASED ON QUESTIONS
M. Espinilla, I. Palomares and H. Bustince

REPLAY PROJECT - Gaming Technology Platform for Social Reintegration of Marginalised Youth
Francisco Ibáñez, James Playfoot, Maria Elena Fabregat, Maria Costa, Sonia Torres and Carmen Cretu
SPECIAL SESSION ON ENTERPRISE SYSTEMS IN HIGHER EDUCATION

FULL PAPERS

IMPROVING SPELLING SKILLS FOR BLIND LANGUAGE LEARNERS - Orthographic Feedback in an Auditory Vocabulary Trainer
Verena Stein, Robert Neßelrath and Jan Alexandersson

GET TOGETHER - A Case of ERP Implementation and its Transfer to Class
Johan Magnusson, Håkan Enquist, Anders Gidlund and Bo Oskarsson

OVERCOMING ENTERPRISE SYSTEMS EDUCATION DEFICIENCY - A Simulated Laboratory Pedagogic Approach
A. D. Jaffar, P. R. J. Campbell and F. Ahmed

LEARNER-ORIENTED APPROACH FOR ENTERPRISE SYSTEMS IN HIGHER EDUCATION USING TEL-BASED CONCEPTS - Research Positioning Paper
Dirk Peters, Liane Haak and Jorge Marx Gómez

AUTHOR INDEX
LEARNING/TEACHING
METHODOLOGIES AND ASSESSMENT
POSTERS
USING MOODLE FOR AN AUTOMATIC INDIVIDUAL EVALUATION OF STUDENT’S LEARNING

Physics, Systems Engineering and Signal Theory Department, University of Alicante, 03080 Alicante, Spain
{pablo.gil, francisco.candelas}@ua.es

Keywords: LMS/CMS, Moodle, b-Learning, Qualification, SCORM.

Abstract: This paper presents several strategies and actions which improve the education process by using a platform of learning such as Moodle. In particular, a set of resources and an evaluation system have been created using this blended leaning platform with three basic objectives: to stimulate the autonomous learning by providing interactivity between students to make flexible the way how the students study, and to facilitate the implantation and beginning of subjects in the new European Space of Higher Education system by using tools which offer collaborative surroundings. This work has been developed for the subject of Computer Networks taught in the Computer Science Engineering degree at the University of Alicante, in Spain.

1 INTRODUCTION

In the next years, Spain and the rest of member states of the European Union (UE) must adapt their educational structure and curricula to achieve a same objective without losing the specific features of every educational system. This process of convergence is called European Space of Higher Education (ESHE). The pedagogical methodology for the process of convergence to the ESHE considers the student’s learning the principal aim. This assumption means that the students have to develop a more active function in the education process, and consequently the student must be the main person in the learning process. This pedagogical methodology has to be near to the constructivist educational model where the learning process is based on resolution of questions, problems, projects and real situations. The constructivist educational model is different from the traditional education model because it considers new aspects such as horizontal relations between professor and student (between equals), the interaction among the students’ groups and the exchange of opinions during the solution of tasks. The courses and subjects based on ESHE have been structured with the European Credit Transfer System (ECTS) to recognize the studies degrees in the same way in all UE. ECTS considers the hours the student studies on his own in addition to class time in college.

The work presented in this paper is based on the pedagogical methodology used to adapt the subject of Computer Networks taught in the Computer Science Engineering degree at University of Alicante, in Spain, to the process of convergence to ESHE using ECTS. In previous works, virtual laboratories, such as KivaNS (Candelas, 2008) have been implemented and used in that subject. As support in this adaptation towards ECTS, a b-learning (‘blended learning’) methodology has been employed with the help of a Learning Content Management System (LCMS) such as Moodle. A LCMS represents the fusion of a Content Management System (CMS), which is used to generate, broadcast and administrate informational resources, with a Learning Management System (LMS), which is mainly focused on the administration of courses and learning contents (Romero, 2008-Koohang, 2009-Martin-Blas, 2009).

The b-learning methodology can be defined as a model for learning that combines face to face education with the web technology applied to e-learning (‘electronic learning’) (Falconer, 2007) for distance education. In contrast, the concept of e-learning is used to define a learning model where the students rarely or never meet face to face, that is, the students are only supported by online courses based on web technology. Furthermore, the LMS are considered management platforms which permit to integrate or create a virtual learning environment (VLE). Some popular VLEs to be emphasized are
BlackBoard, WebCT or CyberExtension. Moreover, the LMS organize the classroom activities, sources, questionnaires, etc. At this moment, there are not only commercial LMS such as Cogno or Pegasus but also free and open source systems such as Dokeos, Caroline, ILIAS or Moodle (Romero, 2008-Chapman, 2009).

In the work described in this paper, Moodle has been used as LCMS for the learning of Computer Networks taught in the Computer Science Engineering degree at the University of Alicante in the academic year 2008. This subject is structured in 75 hours of which only 45 have been taught and evaluated using the help of Moodle. Furthermore, 115 students have participated, attended the course and have been evaluated by means of Moodle. Although, only 64 students have freely and voluntarily participated in the opinion survey presented in this paper. This paper has been structured as follows. Section 2 describes the learning methodology using digital documents, resources like questionnaires, and web based guides which have been published in Moodle as SCORM (Sharable Content Object Reference Model) packages (Scorm, 2009). In Section 3, the results of the surveys of students’ opinion are shown. These interviews have been developed to evaluate the satisfaction degree of the students with regard to the evaluation modality, the educational resources, provided material and documents as well as the attitude of the professor with the new form of interaction with the students.

2 EDUCATIONAL METHODOLOGIES FOR AN AUTONOMOUS LEARNING

2.1 Using Moodle as LCMS

Among the different available CMS/LMS options, Moodle was chosen to develop the educational strategy presented here because it offers many features in comparison with other systems. The most important characteristics for this work are described below.

First, Moodle (Moodle, 2009) is a very popular free and open-source software (under the GNU Public License), and this fact enables Moodle to be regularly updated with new features and bug corrections. Moreover, any person with programming skills can develop modules with new features for Moodle. For example, a research group has developed a new module for including remote laboratories as activities in Moodle courses (Uran, 2007).

Secondly, Moodle provides teachers with many activities and resources for the courses (Martin-Blas, 2009), and it is even possible to include modules from third parties with new activities and resources which are not included in the official version. More specifically, the following activities and resources have had an especial use in this work: quizzes, forums, and SCORM as activities, as well as web pages, files, and directories as resources.

At this point, the SCORM activity must be pointed out. This module enables Moodle to include learning objects that meet the SCORM standard, which makes possible to transform documentation developed with other software tools, like different office software, into Moodle hypertext web pages which also can include questionnaires in addition to the static information. This process is better described in Section 2.2

Third, the University of Alicante facilitates the use of Moodle by supplying community servers, although it has its own official LMS called “Virtual Campus”, which offers powerful tools for administrative tasks, documentation managing, evaluation questionnaires and electronic communications among the university community.

Finally, it should be mentioned that the questionnaires of Moodle offer many kinds of questions and possibilities which facilitates the creation of self-assessment, polls and qualification questionnaires for the topics covered in our courses, as explained in Section 2.3. Moreover, more kinds of questions can be added to Moodle by installing optional or third party modules.

2.2 SCORM Web based Guides and Other Resources

Two principal types of digital documents have been used as educative resources to teach topics about the subject Computer Networks: a guide in PDF (Portable Document Format, from Adobe) and SCORM packages. A SCORM is a collection of standards and specifications for web-based e-learning. SCORM defines how to package into a transferable ZIP file a set of web documents linked according to a format of a course where it is possible to learn by following an educative training material.

Specific software called ‘Wimba Create’, from Wimba (Wimba, 2009), has been used to create SCORM package. This commercial software, which is only distributed with campus-wide licenses, is a
plug-in for Microsoft Word which permits user to convert Word documents into web documents with interactive HTML contents. Furthermore, this plug-in can export the HTML content such as a SCORM package saved like ZIP file to be used in LMS platforms. Once the SCORM package has been created, it is easily exportable to Moodle.

The exported SCORM package has a runtime API and a data model used for communication between content objects and Moodle. In addition, the SCORM package provides a sequence to navigate during the learning activities. This kind of package can include documents such as HTML, graphs, Javascript code, Adobe Flash presentations and other sources which can be played in a modern web browser. Therefore, SCORM is very useful to import and reuse educational material and learning contents with LMS platforms.

In Figure 1, the main view of a Moodle course is shown on the left side. On the right side of Figure 1, the reader can see the HTML content of a SCORM package generated from an original guide in a PDF file.

2.3 Self-assessment and Qualification Questionnaires

As previously said in Section 2.2, it has been commented that the target subject for this work is structured in 75 hours of which only 45 have been taught and evaluated with the help of Moodle. The qualification of these student work-study hours has been accomplished by designing questionnaires for the Quiz activity of Moodle. In Figure 1, several links called “Control Practica N” lead to the questionnaires which are used to evaluate the student work for four practical experiments in the Computers Network laboratory. Each experiment approaches and comments several concepts related with the same thematic and topics. There are also different models of questionnaires for each experiment. In this way, a qualification questionnaire is used for each 9 student work-study hours, including 1 hour that the student dedicates to solve it. Considering the four experiments, there are 36 hours of work-study in total. During this time, the teacher only participates solving doubts and problems in two ways: an electronic support through forums and in person in the laboratory. In addition, 5 hours of lecture are used to teach the handling of specific software tools and commands which are used in the Computer Networks subject.

According to the topic, an average of 10 questions and/or exercises have been designed and implemented in each one of 10 available categories, distributed in 4 experiments. In each category, there are questions related to a same concept which has been previously seen in the experiments. Thus, there are about 100 questions in total available for designing questionnaires. Furthermore, each questionnaire of 10 questions is designed among 25 possible questions. The remaining questions can be used to design self-assessment questionnaires so that students can know their level of learning before the final qualification.

Moodle, by means of the Quiz module, offers a random selection of one or several questions from each category for each final qualification questionnaire. This procedure guarantees questions of all categories in a qualification questionnaire. Therefore, the final questionnaires not only are different for each student but they also keep a same level of difficulty. Although, Moodle defines ten different types of standard questions, only three types have been considered in this work (Figure 2): short answer, multiple choice and embedded answers (also called cloze test). A short answer represents a question which has several possible correct answers in form of different numbers, words or phrases. The multiple choice is a question where the teacher can define multiple answers and the student has to choose one or more answer by means of check boxes. An embedded question consists of a
3 STUDENTS’ OPINION

A survey has been arranged to determine the degree of satisfaction of the students in relation to the teaching methodology and the learning process. This survey was made the last day of class using Moodle. Thereby, the students could express their global opinion on the education process once finalized. Among 115 students (41 new students and 74 students which have attended this subject before with another methodology but with the same teachers and same contents), only 64 (55.7%) decided to make the voluntary survey. The survey consisted of four different types of questions as follows. a) Questions about the teacher as facilitator of the learning process. b) The educational resources and documents provided to understand the concepts and topics, to acquire skills and pass the final qualification questionnaires. c) The student opinion about the degree of knowledge and skills acquired, in comparison with those that they knew before attending the subject; d) The evaluation methodology based on qualification questionnaires implemented with Moodle. However, due to restrictions on length, only the results related to the educational resources and the evaluation modality are commented in this paper (Table 1 shows these questions).

### Table 1: Questions which have been answered about Education Resources and Documentation (R) and Learning Evaluation Process (L).

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The resources provided by the teacher in Moodle to pass the subject are:</td>
<td>R</td>
</tr>
<tr>
<td>2</td>
<td>The most suitable format to develop the study is:</td>
<td>R</td>
</tr>
<tr>
<td>3</td>
<td>The satisfaction degree in handling resources using Moodle from home is:</td>
<td>R</td>
</tr>
<tr>
<td>4</td>
<td>The satisfaction degree in handling resources using Moodle from the University’s laboratory is:</td>
<td>R</td>
</tr>
<tr>
<td>5</td>
<td>What LMS with document repository do you prefer for an interactive education?</td>
<td>R</td>
</tr>
<tr>
<td>6</td>
<td>What is the student’s opinion about forums, different documents, questionnaires and other resources provided by the teacher in Moodle for the Computer Network subject?</td>
<td>R</td>
</tr>
<tr>
<td>7</td>
<td>The evaluation methodology using questionnaires via Moodle has been:</td>
<td>L</td>
</tr>
<tr>
<td>8</td>
<td>The understanding and clarity of exposition of evaluation questions have been:</td>
<td>L</td>
</tr>
<tr>
<td>9</td>
<td>The understanding and clarity of exposition of schemes and figures shown in the evaluation questions have been:</td>
<td>L</td>
</tr>
<tr>
<td>10</td>
<td>The opinion about evaluation with test questions is:</td>
<td>L</td>
</tr>
<tr>
<td>11</td>
<td>The opinion about evaluation with short answers is:</td>
<td>L</td>
</tr>
<tr>
<td>12</td>
<td>The opinion about evaluation with multiple choice with embedded answers is:</td>
<td>L</td>
</tr>
</tbody>
</table>

3.1 Educational Resources and Moodle

A part of the survey looked for the rating of the degree of utility of the educational resources provided in order to understand and learn concepts and topics, to acquire skills and pass the evaluation of the Computer Network subject. Analyzing the students’ answers (Figure 3, see question 1), it can be affirmed that the 73% of students consider that the teacher supplied very good notes and documents for self-learning. Nevertheless, a considerable group of students also considered that the same resources are insufficient or just right to pass the final questionnaires. This fact demonstrates that the supplied notes and documents are valid for the majority of students but they must also be improved with more clarifying and comprehensible examples for the students with assimilation problems of concepts. Furthermore, in question 2 (Figure 3) students show a great diversity of opinion with respect to the useful format for notes and documents. For this reason, it would be recommendable to facilitate notes and documents in different formats.
so that each student can choose the format more suitable for him. On the one hand, the 65% of students consider LMS-Moodle the more suitable education platform (Figure 3, see question 5) but on the other hand, the 25% of students think that LMS-Moodle can be improved and contribute little more than the virtual campus (Figure 3, see questions 3-4). The virtual campus is an institutional repository of documents that includes such as simple forums, announcements and permits to solve doubts about the subject remotely.

3.2 Learning Evaluation Process

In this part of the survey, the questions tried to evaluate: the degree of acceptance of LMS-Moodle for creating the qualification questionnaires and the chosen method of qualification based on questionnaires designed with the quiz module of Moodle (Figure 4, see question 7). In general, the great majority of students, 85%, consider good the...
design of qualification questionnaires created. Among the 85% of students, there are 44% of students that consider it as a very good solution and 19% as an excellent solution. But once the student’s opinions to make questionnaires with Moodle are favourable, it is needed to know the student’s opinion about the way in which the teacher designed the questions. Thereby, they are adapted and useful to evaluate the student’s knowledge of Computer Network subject. Near 80% of students judge positively this aspect while a group of students, below 10%, the contrary (Figure 4, see question 8-9). Therefore, we have to do a small effort to improve the clarity of questions, with more figures and schemes and better language. Finally, the last questions try to determine what type of qualification questions have been more acceptable. In general, the three types of questions selected by the teacher have been considered as (Fig 4, see question 12) good. Only the 3% of students think that the test and the embedded questions with multiple choice are little adapted.

4 CONCLUSIONS
A b-learning methodology has been introduced as a novel teaching method for the Computer Network subject during the last course. To perform this methodological change, in comparison with classical teaching and learning, a learning support based on educational resources as digital documents, web packages, interaction tools, etc. has been used to provide flexibility and autonomy to the learning process. This support is based on the LCMS platform Moodle, which is accessible from the institutional LMS of the University of Alicante. Moreover, a survey has been carried out to determine the degree of satisfaction and the opinion of students about the innovations introduced in the subject, changes that have mainly influenced in the evaluation and qualification mechanisms (quiz module of Moodle) of concepts, topics and skills for Computer Network subject. In future works, new resources based on simulations and training questionnaires will be designed and implemented so that the students can test and practice concepts and thus, they can measure the acquired skills, before facing the qualification questionnaires necessary to pass the subject.

ACKNOWLEDGEMENTS
Authors would like to thank the Education Sciences Institute and Technology & Educational Innovation Vicepresident Office of the University of Alicante for their financial support.

REFERENCES
AUTHOR INDEX

Adamchuk, V. ........................................ 393
Ahmed, F. ............................................ 513
Albano, G. .............................................. 138
Alexandersson, J. ................................. 501
Alexandre, G. ......................................... 53
Alvarez, E. ............................................... 21
Amescua, A. ............................................. 271
Anacleto, J. .............................................. 226, 232
Andrés, J. ................................................. 385
Araki, N. .................................................. 177
Astrain, J. .................................................. 335
Azevedo, A. .............................................. 96
Balsera, J. .................................................. 156
Balz, M. ...................................................... 309
Banachowski, L. ....................................... 362
Barker, B. .................................................. 393
Bella, G. ...................................................... 132
Bizoi, M. ..................................................... 349
Blas, N. ....................................................... 341
Börner, R. ................................................. 203
Borozvos, J. ............................................... 441
Bouchard, B. .............................................. 465
Bouzouane, A. .......................................... 465
Brunale, M. ............................................... 277
Bustillo, A. ............................................... 5
Bustince, H. .............................................. 484
Cabeo, R. ..................................................... 455
Campbell, P. ............................................. 513
Candelas, F. ............................................... 189
Chen, T. ...................................................... 261
Chin, K. ....................................................... 297
Choquet, C. ............................................... 114
Christian, Q. ............................................ 37
Civera, J. ..................................................... 385
Contreras A., R. ....................................... 79
Córdoba, A. ............................................... 335
Corrales, J. ............................................... 189
Costa, M. ..................................................... 489
Costantino, G. .......................................... 132
Cretu, C. ..................................................... 489
Dias, A. ..................................................... 226, 232
Dionysiou, I. ............................................ 401
Dosbergs, D. ............................................. 441
Enemark, S. .............................................. 325
Enquist, H. ................................................. 507

Erbsøll, B. ................................................. 451
Espinilla, M. ............................................. 484
Fabregat, M. ............................................ 489
Fassbender, E. ......................................... 126
Fautsch, C. ............................................... 317
Fernández, J. ............................................ 156
Frosch-Wilke, D. ..................................... 407
Gao, Y. ....................................................... 195
García, D. ................................................... 21
García, F. ................................................... 90
García, G. ................................................... 189
Giannakos, M. .......................................... 433
Gidlund, A. ............................................... 507
Gil, P. ......................................................... 90, 189
Gilapa, L. ..................................................... 238
Giménez, A. ............................................... 385
Girdzijauskas, S. ....................................... 167
Gjermundro, H. ......................................... 401
Goedicke, M. ............................................. 309
Gómez, J. ..................................................... 521
Gorgiu, G. ................................................... 349
Grandgenett, N. ....................................... 393
Haak, L. ....................................................... 521
Heiden, W. ................................................. 126
Hofmann, A. ............................................. 220, 446
Holzhüter, M. ........................................... 407
Hoppe, I. ..................................................... 220
Hu, W. ......................................................... 261
Hunter-Barnett, S. ..................................... 60
Hussmann, P. ............................................ 325
Ibañez, F. .................................................... 489
Ikosal, S. ..................................................... 114
Ishigaki, T. ................................................... 177
Jaccard, D. .................................................. 471
Jaffar, A. ..................................................... 513
Jantke, K. ..................................................... 220
Jara, C. ......................................................... 189
Jiménez, C. ............................................... 426
Jiménez-Fernández, S. .............................. 75
Joost, R. ..................................................... 246
Juan, A. ....................................................... 385
Kaučič, B. .................................................... 181
Kondo, M. .................................................... 177
<table>
<thead>
<tr>
<th>Author Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kordaki, M.</td>
<td>65, 349</td>
</tr>
<tr>
<td>Krašna, M.</td>
<td>181</td>
</tr>
<tr>
<td>Kreibich, O.</td>
<td>357</td>
</tr>
<tr>
<td>Kriksciuniene, D.</td>
<td>150</td>
</tr>
<tr>
<td>Kropf, P.</td>
<td>317</td>
</tr>
<tr>
<td>Lanzer, E.</td>
<td>238</td>
</tr>
<tr>
<td>Lee, J.</td>
<td>478</td>
</tr>
<tr>
<td>Lenkiewicz, P.</td>
<td>362</td>
</tr>
<tr>
<td>Lennartsson, B.</td>
<td>375</td>
</tr>
<tr>
<td>Leonidas, Z.</td>
<td>380</td>
</tr>
<tr>
<td>López, C.</td>
<td>5</td>
</tr>
<tr>
<td>López-Espi, P.</td>
<td>163</td>
</tr>
<tr>
<td>Lu, J.</td>
<td>297</td>
</tr>
<tr>
<td>Mackevicius, R.</td>
<td>167</td>
</tr>
<tr>
<td>Maekawa, M.</td>
<td>252</td>
</tr>
<tr>
<td>Magnusson, J.</td>
<td>507</td>
</tr>
<tr>
<td>Mandrioli, D.</td>
<td>289</td>
</tr>
<tr>
<td>Manev, K.</td>
<td>185</td>
</tr>
<tr>
<td>Marescia, G.</td>
<td>138</td>
</tr>
<tr>
<td>Marin, L.</td>
<td>289</td>
</tr>
<tr>
<td>Markvorsen, S.</td>
<td>325</td>
</tr>
<tr>
<td>Marticorena, R.</td>
<td>5</td>
</tr>
<tr>
<td>Martin, D.</td>
<td>5</td>
</tr>
<tr>
<td>Martín-Carrasco, F.</td>
<td>412</td>
</tr>
<tr>
<td>May, M.</td>
<td>325</td>
</tr>
<tr>
<td>Mediero, L.</td>
<td>412</td>
</tr>
<tr>
<td>Medina-Dominguez, F.</td>
<td>271</td>
</tr>
<tr>
<td>Mialik, A.</td>
<td>167</td>
</tr>
<tr>
<td>Minică, Z.</td>
<td>367</td>
</tr>
<tr>
<td>Miranda, J.</td>
<td>171</td>
</tr>
<tr>
<td>Montequín, V.</td>
<td>156</td>
</tr>
<tr>
<td>Moon, W.</td>
<td>478</td>
</tr>
<tr>
<td>Mora-Soto, A.</td>
<td>271</td>
</tr>
<tr>
<td>Morita, H.</td>
<td>177</td>
</tr>
<tr>
<td>Murrin-Bailey, S.</td>
<td>60</td>
</tr>
<tr>
<td>Nakayama, Y.</td>
<td>177</td>
</tr>
<tr>
<td>Neßelrath, R.</td>
<td>501</td>
</tr>
<tr>
<td>Ngoc, D.</td>
<td>114</td>
</tr>
<tr>
<td>Nikolaos, M.</td>
<td>380</td>
</tr>
<tr>
<td>Nugent, G.</td>
<td>393</td>
</tr>
<tr>
<td>Okawa, K.</td>
<td>252</td>
</tr>
<tr>
<td>Oskarsson, B.</td>
<td>507</td>
</tr>
<tr>
<td>Palomares, I.</td>
<td>484</td>
</tr>
<tr>
<td>Paolini, P.</td>
<td>341</td>
</tr>
<tr>
<td>Papancheva, R.</td>
<td>185</td>
</tr>
<tr>
<td>Paredes, R.</td>
<td>385</td>
</tr>
<tr>
<td>Park, J.</td>
<td>478</td>
</tr>
<tr>
<td>Pascual-Nieto, I.</td>
<td>84</td>
</tr>
<tr>
<td>Pasquariello, E.</td>
<td>277</td>
</tr>
<tr>
<td>Penteado, R.</td>
<td>226</td>
</tr>
<tr>
<td>Peres, P.</td>
<td>96</td>
</tr>
<tr>
<td>Perez-Marín, D.</td>
<td>84</td>
</tr>
<tr>
<td>Peters, D.</td>
<td>521</td>
</tr>
<tr>
<td>Petrone, M.</td>
<td>277</td>
</tr>
<tr>
<td>Piedade, M.</td>
<td>46</td>
</tr>
<tr>
<td>Pinninghoff, J. M.</td>
<td>79</td>
</tr>
<tr>
<td>Pisano, P.</td>
<td>106</td>
</tr>
<tr>
<td>Playfoot, J.</td>
<td>489</td>
</tr>
<tr>
<td>Pomares, J.</td>
<td>189</td>
</tr>
<tr>
<td>Poon, C.</td>
<td>144</td>
</tr>
<tr>
<td>Portilla-Figuera, A.</td>
<td>75, 163</td>
</tr>
<tr>
<td>Pouyioutas, P.</td>
<td>401</td>
</tr>
<tr>
<td>Puente, S.</td>
<td>189</td>
</tr>
<tr>
<td>Ramšak, M.</td>
<td>181</td>
</tr>
<tr>
<td>Riboni, S.</td>
<td>471</td>
</tr>
<tr>
<td>Riccobene, S.</td>
<td>132</td>
</tr>
<tr>
<td>Rootzén, H.</td>
<td>325</td>
</tr>
<tr>
<td>Rzeźnik, M.</td>
<td>362</td>
</tr>
<tr>
<td>Sacchelli, C.</td>
<td>238</td>
</tr>
<tr>
<td>Sakalauskas, V.</td>
<td>150</td>
</tr>
<tr>
<td>Salcedo L., P.</td>
<td>79</td>
</tr>
<tr>
<td>Salcedo-Sanju, S.</td>
<td>75, 163</td>
</tr>
<tr>
<td>Salomon, R.</td>
<td>246</td>
</tr>
<tr>
<td>Sánchez, A.</td>
<td>412</td>
</tr>
<tr>
<td>Sánchez-Alonso, S.</td>
<td>407</td>
</tr>
<tr>
<td>Sánchez-Montero, R.</td>
<td>163</td>
</tr>
<tr>
<td>Sanchez-Segura, M.</td>
<td>271</td>
</tr>
<tr>
<td>Santos, M.</td>
<td>46</td>
</tr>
<tr>
<td>Santos, S.</td>
<td>53</td>
</tr>
<tr>
<td>Schmidt, K.</td>
<td>325</td>
</tr>
<tr>
<td>Schulz, A.</td>
<td>446</td>
</tr>
<tr>
<td>Schwelgenprüer, W.</td>
<td>246</td>
</tr>
<tr>
<td>Sena, C.</td>
<td>29</td>
</tr>
<tr>
<td>Shi, Q.</td>
<td>261</td>
</tr>
<tr>
<td>Shieh, R.</td>
<td>420</td>
</tr>
<tr>
<td>Siempos, H.</td>
<td>65</td>
</tr>
<tr>
<td>Silva, M.</td>
<td>226, 232</td>
</tr>
<tr>
<td>Silveira, L.</td>
<td>226</td>
</tr>
<tr>
<td>Skårhøy, K.</td>
<td>325</td>
</tr>
<tr>
<td>Sliusarenko, T.</td>
<td>451</td>
</tr>
</tbody>
</table>
AUTHOR INDEX (CONT.)

Soares, C. .................................29
Souza, A. .................................238
Souza, E. .................................29
Sraka, D. .................................181
Stein, V. .................................501
Sturzrehm, H. ..........................317
Sučič, V. .................................213
Suzuki, T. .................................252
Tahara, J. .................................265
Tang, C. .................................144
Tanimoto, S. ............................265
Tedesco, P. .............................53
Timsit, C. .................................101
Torrebruno, A. ..........................289, 341
Torres, F. .................................189
Torres, S. .................................489
Tremblay, J. .............................465
Uremovic, A. ............................203
Valente, R. ...............................277
Vidal, E. .................................385
Villadangos, J. ..........................335
Villalobos, J. ............................426
Viršeda, R. ...............................13
Vogler, C. .................................446
Wang, G. .................................261
Xiao, J. .................................297
Xinogalos, S. ............................120
Xu, J. .................................297
Yao, J. .................................297
Yoshida, K. .............................265
Yu, Y. .................................144
Zertal, S. .................................101
Zhang, X. .................................195
Zorrilla, M. ..............................21