TECHNICAL SESSIONS TABLE OF CONTENTS

Wednesday, October 22nd

1A: Your Data Deserve Better than Pies and Bars: An R Graphics Workshop for the Timid
2:00 PM - 5:00 PM
Room: El Jardin

Your Data Deserve Better than Pies and Bars: An R Graphics Workshop for the Timid
Richard Layton (Rose-Hulman Institute of Technology, USA)

1B: Evaluability Assessment for Engineering Educators
2:00 PM - 5:00 PM
Room: Alcalá

Evaluability Assessment for Engineering Educators
Michael S. Trevisan (Washington State University, USA)
Tamara Walser (University of North Carolina-Wilmington, USA)

1C: Training Student in Responsibility for Their Own Learning: True Student Centered Learning
2:00 PM - 5:00 PM
Room: Patio 1

Training Student in Responsibility for Their Own Learning: True Student Centered Learning
Peter Shull (Penn State University, USA)

1D: Using Community Engagement to Teach Engineering and Computing
2:00 - 5:00 PM
Room: Comendador

Using Community Engagement to Teach Engineering and Computing
William Oakes (Purdue University, USA)
Carla Zoltowski (Purdue University, USA)

2A: Developing and Evaluating Active Learning Classroom Experiences with Tablet PCs and Slate Devices
6:00 PM - 9:00 PM
Room: El Jardin

Developing and Evaluating Active Learning Classroom Experiences with Tablet PCs and Slate Devices
Joseph G Tront (Virginia Tech, USA)
Flora McMartin (Broad-based Knowledge, USA)

2B: Qualifying Qualitative Research Quality (The Q3 Project): An interactive discourse around research quality in interpretive approaches to engineering education research
6:00 PM - 9:00 PM
Room: Alcalá

Qualifying Qualitative Research Quality (The Q3 Project): An interactive discourse around research quality in interpretive approaches to engineering education research
Joachim Walthier (University of Georgia, USA)
Nicola Sochacka (University of Georgia, USA)
2C: Using and Disseminating a Taxonomy for Engineering Education Research
6:00 PM - 9:00 PM
Room: Patio 1

Using and Disseminating a Taxonomy for Engineering Education Research.......................................................... 17
Cynthia Finelli (University of Michigan, USA)
Golnoosh Rasoulifar (University of Michigan, USA)

2D: Simulink for Project-Based Learning using LEGO MINDSTORMS NXT and MATLAB & Simulink with Raspberry Pi - A hands-on workshop on hardware support
6:00 PM - 9:00 PM
Room: Comendador

Simulink for Project-Based Learning using LEGO MINDSTORMS NXT................................................................. xiii
Mathworks

MATLAB & Simulink with Raspberry Pi - A hands-on workshop on hardware support............................................. xiii
Mathworks
Thursday, October 23

**CBL1: Developing professionals**
11:00 AM - 12:30 PM
Room: Patio 3

*Merlin-Know, An Interactive Virtual Teacher for Improving Learning in Moodle* ................................................... 19
Raquel Hijon-Neira (Universidad Rey Juan Carlos, Spain)
J. Ángel Velázquez-Iturbide (Universidad Rey Juan Carlos, Spain)
Celeste Pizarro-Romero (Universidad Rey Juan Carlos, Spain)
Luís Carriço (University of Lisbon, Portugal)

*Managing and Assessing Group Work from a Distance* .................................................................................................. 27
Alvaro Figueira (University of Porto, Portugal)
Rui Pereira (University of Porto, Portugal)

*A Methodological Approach to Use Technological Support on Teaching and Learning Data Structures* ............... 35
Ronaldo Correia (Universidade Estadual Paulista, Brazil)
Rogério Garcia (Universidade Estadual Paulista, Brazil)
Celso Olivete Junior (Universidade Estadual Paulista, Brazil)
A nalice C. Brandi (Universidade Estadual Paulista, Brazil)
Guilherme Cardim (Universidade Estadual Paulista, Brazil)

*Building SCORM embedded WebLabs with LMS interaction* ..................................................................................... 43
Ildefonso Ruano Ruano (University of Jaen, Spain)
Javier Gámez García (University of Jaen, Spain)
Juan Gómez Ortega (University of Jaen, Spain)

*A SCORM Based Package Model for WebLabs* ........................................................................................................... 47
Ildefonso Ruano Ruano (University of Jaen, Spain)
Javier Gámez García (University of Jaen, Spain)
Sebastián Dormido (UNED, Spain)
Juan Gómez Ortega (University of Jaen, Spain)

*Authentic Learning in Network and Security with Portable Labs* ........................................................................... 51
Dan Lo (Southern Polytechnic State University, USA)
Kai Qian (Southern Polytechnic State University, USA)
Wei Chen (Tennessee State University, USA)
Hossain Shahriar (Kennesaw State University, USA)
Victor Clincy (Kennesaw State University, USA)

**CUR: Setting the stage for CE2016: A Revised Body of Knowledge**
Chair: Eti de Vries
11:00 AM - 12:30 PM
Room: El Escorial

*Setting the stage for CE2016 A Revised Body of Knowledge* ................................................................................. 56
Eric Durant (Milwaukee School of Engineering, USA)
John Impagliazzo (Hofstra University, USA)
Susan Conry (Clarkson University, USA)
Robert Reese (Mississippi State University, USA)
Mitchell A Thornton (Southern Methodist University, USA)
Herman Lam (University of Florida, USA)
Victor Nelson (Auburn University, USA)
EER: How do we talk about impact?: Engineering education change language beyond "dissemination"
11:00 AM - 12:30
Room: El Jardin

How do we talk about impact? Engineering education change language beyond "dissemination".............................. 60
Mel Chua (Purdue University, USA)
Robin Adams (Purdue University, USA)
Sally Fincher (University of Kent, United Kingdom)
Lynn Andrea Stein (Franklin W. Olin College of Engineering, USA)

EER1: Research on Blended Learning Environments
Chair: Azim Abdool
11:00 AM - 12:30
Room: Aranjuez

E-participation in higher education The importance of non-technical factors as identified in the EU-project
MyUniversity........................................................................................................................................................................... 63
Pooyeh Mobini (Stockholm University, Sweden)
Henrik Hansson (Stockholm University, Sweden)

Using textual analysis with Concept Inventories to identify root causes of misconceptions........................................... 71
Andrea Goncher (Queensland University of Technology, Australia)
Wageeh Boles (Queensland University of Technology, Australia)
Dhammika Jayalath (Queensland University of Technology, Australia)

"Tap it again, Sam": harmonizing the frontiers between digital and real worlds in education........................................ 75
Bernardo Tabuenca (Open University of The Netherlands, The Netherlands)
Marco Kalz (Open University of The Netherlands, The Netherlands)
Marcus Specht (Open University of the Netherlands, The Netherlands)

Classroom Discourse Development for "Flipping Classrooms": Theoretical Concepts, Practices, and Joint Efforts
From Engineering Students and Instructors............................................................................................................................ 84
Jia-Ling Lin (University of Minnesota Twin-Cities, USA)
Paul Imbertson (University of Minnesota Twin-Cities, USA)
Tamara J. Moore (Purdue University, USA)

What Students Use: Results of a Survey on Media Use among Engineering Students...................................................... 92
Dominik May (TU Dortmund University, Germany)
Karsten Lensing (TU Dortmund University, Germany)
A. Erman Tekkaya (TU Dortmund University, Germany)
Michael Grosch (Karlsruhe Institute of Technology, Germany)
Ute Berbuer (Ruhr University Bochum, Germany)
Marcus Petermann (Ruhr Universität Bochum, Germany)

Blended Instruction in a Programming Course: Lessons Learned.................................................................................. 98
K.-Y. Daisy Fan (Cornell University, USA)
**FYE1: First Year Engineering 1**
Chair: Christine F Reilly
11:00 AM - 12:30 PM
Room: Doblon

*Influence of Teaching Assistants' Motivation on Student Learning* ............................................................... 103
Kelsey J Rodgers (Purdue University, USA)
Farshid Marbouti (Purdue University, USA)
Ali Shafaat (Purdue University, USA)
Hyunyi Jung (Purdue University, USA)
Heidi Diefes-Dux (Purdue University, USA)

*Spatial Skills as Predictors of Success in First-year Engineering* ................................................................. 111
Sheryl Sorby (Dublin Institute of Technology, USA)
Edmund Nevin (Dublin Institute of Technology, Ireland)
Avril Behan (Dublin Institute of Technology, Ireland)
Eileen Mageean (Dublin Institute of Technology, Ireland)
Sarah Sheridan (Dublin Institute of Technology, Ireland)

*Assessment of Student Preparedness for Freshman Engineering Courses Through Assessment of Math Background* .................................................................................. 118
Branimir Pejcinovic (Portland State University, USA)
Donald Duncan (Portland State University, USA)
Phillip K Wong (Portland State University, USA)
Mark G Faust (Portland State University, USA)
Gerald Recktenwald (Portland State University, USA)

*Self-efficacy and task orientation in first-year engineering design courses* .................................................... 123
Debbie Chachra (Franklin W. Olin College of Engineering, USA)
Alex Dillon (Franklin W. Olin College of Engineering, USA)
Elizabeth Spingola (Ohio Northern University, USA)
Briana Saul (Louisiana State University, USA)

*Relevance-Based Learning in Students' Early Engineering Education Experience* ........................................... 127
Diana Bairaktarova (University of Oklahoma, USA)
Mary K. Pilotte (Purdue University, USA)
Isaac J. Tetzloff (Purdue University, USA)

**GDI1: Overcoming Stereotypes to Help Students Succeed in Engineering and Computer Science Education**
Chair: James Huff
11:00 AM - 12:30 PM
Room: Patio 1

*Stories 'Told' About Engineering in the Media: Implications for attracting diverse groups to the profession* .... 130
Nicola Sochacka (University of Georgia, USA)
Joachim Walther (University of Georgia, USA)
Jennifer Wilson (University of Georgia, USA)
Michael Brewer (University of Georgia, USA)

*Fear of the Mouse - And other ICT4D Change projects in developing countries* .......................................... 139
Henrik Hansson (Stockholm University, Sweden)
Proven Practices that can Reduce Stereotype Threat in Engineering Education: A Literature Review
Elizabeth A. Eschenbach (Humboldt State University, USA)
Mary Vironoche (Humboldt State University, USA)
Eileen Cashman (Humboldt State University, USA)
Susan M. Lord (University of San Diego, USA)
Michelle Madsen Camacho (University of San Diego, USA)

Relationships among Student Work/Family Attitudes, Computing Further Education and Career Intentions
Leslie Cintron (University of Virginia, USA)
Joanne Cohoon (University of Virginia, USA)

Same course, different goals: Examining the Personal Goals of Men and Women in a Project-Based Engineering Environment
Janie Harari (Olin College of Engineering, USA)
Julianne Jorgensen (Olin College of Engineering, USA)
Jonathan Stolk (Olin College of Engineering, USA)

PHII: Philosophy of Engineering Education
Chair: Paul B. Crilly
11:00 AM - 12:30 PM
Room: La Granja

A Knowledge Basis for Engineering Design
Stephen Frezza (Gannon University, USA)

An analysis of consistency in, and between, ontology, epistemology and philosophical perspective as contained studies of the first year experience
Gavin Duffy (Dublin Institute of Technology, Ireland)
Brian Bowe (Dublin Institute of Technology, Ireland)

Scenario Planning to Envision Potential Futures for Engineering Education
Jeffrey E Froyd (Texas A&M University, USA)
Susan M. Lord (University of San Diego, USA)
Matthew W Ohland (Purdue University, USA)
Kishore Prahallad (International Institute of Information Technology, India)
Euan Lindsay (Charles Sturt University, Australia)
Burton Dicht (IEEE, USA)

Exploring Conceptual Understanding and Personal Epistemologies through Metaphor
Kacey Beddoes (Oregon State University, USA)
Devlin Montfort (Oregon State University, USA)
Shane Brown (Oregon State University, USA)
PRO1: Developing Technical Communication as a Professional Skill
Chair: Ronald Harichandran
11:00 AM - 12:30
Room: Comendador

A Comprehensive Engineering College-Wide Program for Developing Technical Communication Skills in Students.......................................................... 182
Ronald Harichandran (University of New Haven, USA)
Jean Nocito-Gobel (University of New Haven, USA)
Eric Brisart (University of New Haven, USA)
Nadiye Erdil (University of New Haven, USA)
Michael Collura (University of New Haven, USA)
Samuel Daniels (University of New Haven, USA)
David Harding (University of New Haven, USA)
David Adams (Consultant, USA)

Technical Writing Knowledge Transfer from First Year Composition to Major Courses............................................. 190
Robert Weissbach (Penn State Erie, The Behrend College, USA)
Ruth C Pflueger (Penn State Erie, The Behrend College, USA)

Enabling higher order thinking and technical communication - An Indian context for OBE .................................. 195
Naresh Kumar Mallenahalli (National Remote Sensing Centre, India)
Uma Garimella (Nalla Malla Reddy Engineering College, India)
Divya Nalla (Nalla Malla Reddy Engineering College, India)

Throwing Out the First Pitch................................................................................................... 202
Adrienne Decker (Rochester Institute of Technology, USA)
Christopher Egert (Rochester Institute of Technology, USA)
Stephen Jacobs (Rochester Institute of Technology, USA)

Project-Based Learning of Scientific Writing and Communication Skills for Postgraduate Students .................. 210
Anthony Mandow (Universidad de Malaga, Spain)
Martinez Jorge (Universidad de Malaga, Spain)
Alfonso Garcia-Cerezo (Universidad de Malaga, Spain)

REM1: Remote Laboratories, implementation and evaluation
Chair: Diana Urbano
11:00 - 12:30
Room: Escudo

Educational Biogas Installation Monitoring using Virtual Instrumentation Concepts................................................. 214
Adrian Cioabla (University “Politehnica” Timișoara, Romania)
Mihaela Lascu (University “Politehnica” Timișoara, Romania)
Raul Ionel (University “Politehnica” Timișoara, Romania)

A Liquid-Level Control Training Lab Including a Model-Based Design for Electronics Technologists and Instrumentation Technicians.................................................. 223
Daniel Cheverez-Gonzalez (University of Puerto Rico-Bayamón, Puerto Rico)
Wesley Feliciano de Jesús (University of Puerto Rico-Bayamón, Puerto Rico)
Yamil Huertas Morales (University of Puerto Rico-Bayamón, Puerto Rico)
Luis Meléndez Lorenzana (University of Puerto Rico-Bayamón, Puerto Rico)
Generic integration of remote laboratories in public learning tools: organizational and technical challenges

- Pablo Orduña (DeustoTech - Deusto Institute of Technology, Spain)
- Agustín Caminero (Spanish University for Distance Education (UNED), Spain)
- Irene Lequerica (Spanish University for Distance Education (UNED), Spain)
- Danilo G. Zutin (Carinthia University of Applied Sciences, Austria)
- Philip Bailey (Massachusetts Institute of Technology, USA)
- Elio Sancristóbal (Spanish University for Distance Education (UNED), Spain)
- Luis Rodríguez-Gil (DeustoTech - Deusto Institute of Technology, Spain)
- Antonio Robles-Gómez (Spanish University for Distance Education (UNED), Spain)
- Miguel Latorre (Spanish University for Distance Education (UNED), Spain)
- Kimberley DeLong (Massachusetts Institute of Technology, USA)
- Llano Tobarría (Spanish University for Distance Education (UNED), Spain)
- Salvador Ros (Spanish University for Distance Education (UNED), Spain)
- Manuel Castro (Spanish University for Distance Education (UNED), Spain)
- Diego López-de-Ipiña (DeustoTech - Deusto Institute of Technology, Spain)
- Javier García-Zubia (DeustoTech - Deusto Institute of Technology, Spain)

Critical Factors in the Architectural Design of Modern Educational Remote Laboratories

- Mohamed Tawfik (Spanish University for Distance Education (UNED), Spain)
- David Lowe (University of Sydney, Australia)
- Christophe Salzmann (Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland)
- Denis Gillet (EPFL, Switzerland)
- Elio Sancristóbal (Spanish University for Distance Education (UNED), Spain)
- Manuel Castro (Spanish University for Distance Education (UNED), Spain)

Arduino and LabVIEW in Educational Remote Monitoring Applications

- Delia Calinoiu (University "Politehnica" Timișoara, Romania)
- Raul Ionel (University "Politehnica" Timișoara, Romania)
- Mihaela Lascu (University "Politehnica" Timișoara, Romania)
- Adrian Cioabla (University "Politehnica" Timișoara, Romania)

SCL1: Inspiring Learning in Different Domains through Student-centric Learning

Chair: Julie Linsey
11:00 AM - 12:30 PM
Room: Alcalá

Using the similarities between biological and computer virus behavior to connect and teach introductory concepts in cybersecurity in a biology classroom

- Camilla Nix (Drexel University, USA)
- Jessica Ward (Drexel University, USA)
- Adam Fontecchio (Drexel University, USA)
- Jared Ruddick (Girard Academic Music Program, USA)

Helping Students to Find Biological Inspiration: Impact of Valuableness and Presentation Format

- Jin Woo Kim (Georgia Institute of Technology, USA)
- Daniel McAdams (Texas A&M University, USA)
- Julie Linsey (Georgia Institute of Technology, USA)

A Mobile Learning System to Enhance Field Trips in Geology

- Edgar Marçal (Federal University of Ceará, Brazil)
- Rossana Maria de Castro Andrade (Federal University of Ceará, Brazil)
- Windsor Viana (Federal University of Ceará, France)
- Daniel Nascimento Jr. (Federal University of Ceará, Brazil)
Smart physics with smartphone sensors....................................................................................... 271
Enrique Ballester Sarrias (Universitat Politecnica de Valencia, Spain)
Juan Carlos Castro Palacio (Universität Basel, Switzerland)
Luisberis Velázquez Abad (Universidad Católica del Norte, Chile)
Marcos Giménez (Universitat Politècnica de Valencia, Spain)
Juan Antonio Monsoriu Serra (Universitat Politècnica de València, Spain)
Luis M. Sanchez Ruiz (Universitat Politècnica de València, Spain)

Martha Madison: Marvelous Machines - Exploring Simple Machines in an Open-Ended, Collaborative Sandbox. 275
David Simkins (Rochester Institute of Technology, USA)
Adrienne Decker (Rochester Institute of Technology, USA)
Christopher Egert (Rochester Institute of Technology, USA)
Anne Snyder (Second Avenue Learning, USA)
Victoria Van Voorhis (Second Avenue Learning, USA)

Enhancing Collaborative Project-based Learning Using Participatory Design Approach......................... 282
Jianyu Dong (California State University Los Angeles, USA)
Xuan Qin (California State University Los Angeles, USA)
Pearl Chen (California State University Los Angeles, USA)

TLE1: Increasing the Relevance in Teaching and Learning
Chair: John Mativo
11:00 AM - 12:30 PM
Room: La Galería

Design Based Wilderness Education: A Cross-Cultural Experience in Engineering Education.................. 286
Christopher R. Saulnier (Massachusetts Institute of Technology, USA)
Aikaterini Bagiati (Massachusetts Institute of Technology, USA)
John Brisson (Massachusetts Institute of Technology, USA)

Exploiting Research Results in ICT to Extend the Scope of Educational Activities.............................. 291
Maurizio Molinaro (ISMB, Italy)

Internationalizing Engineering Education With Phased Study Programs: India-European Experience......... 295
Krishnashree Achuthan (Amrita Vishwa Vidyapeetham, India)
Maneesh Ramesh (Amrita Vishwa Vidyapeetham, India)
Sasikumar Punnekkat (Mälardalen University, Sweden)
Raghu Raman (Amrita Vishwa Vidyapeetham, India)

Students' research on lean and green.................................................................................................. 302
Itziar Lujan (Universitat Politècnica de Catalunya-BarcelonaTech, Spain)
Jordi Fortuny-Santos (Universitat Politècnica de Catalunya-BarcelonaTech, Spain)

Environmental Technological Projects in the Computer Engineering Program........................................... 310
Ricardo Santos (Federal University of Mato Grosso do Sul, Brazil)

October 22-25, 2014 Madrid, Spain
CBL2: Systems and Standards for Computer Based Learning
Chair: Victor F. A. Barros
2:30 PM - 4:00 PM
Room: Patio 3

A Learning Environment for Augmented Reality Mobile Learning................................................. 314
Joaquín Cubillo Arribas (National University for Distance Education of Spain, Spain)
Sergio Martin (National University for Distance Education of Spain, Spain)
Manuel Castro (National University for Distance Education of Spain, Spain)
Gabriel Díaz (National University for Distance Education of Spain, Spain)
Antonio Colmenar (National University for Distance Education of Spain, Spain)
Ivica Botički (University of Zagreb, Croatia)

A Crowdsourcing Caption Editor for Educational Videos................................................................. 322
Rucha Deshpande (University of Houston, USA)
Tayfun Tuna (University of Houston, USA)
Jaspal Subhlok (University of Houston, USA)
Lecia Barker (University of Texas & School of Information, USA)

On Using the Cloud to Support Online Courses.............................................................................. 330
Germán Moltó (Universitat Politècnica de València, Spain)
Miguel Caballer (Universitat Politècnica de València, Spain)

Improving Learning Outcomes by Designing Engaging Educational Tools........................................... 339
John Allan Casey (Unitec Institute of Technology, New Zealand)
Nilufar Baghaei (Unitec Institute of Technology, New Zealand)
Kalpana Nand (Mission Heights Primary School, New Zealand)

Developing Interactive Classroom Exercises for use with Mobile Devices to Enhance Class Engagement and Problem-solving Skills......................................................... 343
Debzani Deb (Winston-Salem State University, USA)
Mohammad Muztaba Fuad (Winston-Salem State University, USA)
Waleed Farag (Indiana University of Pennsylvania, USA)

EEC1: Electrical and Computer Engineering Courses and Laboratories
Chair: Robert Weissbach
2:30 PM - 4:00 PM
Room: Doblon

Depecabot: A Hands on Workshop to Teach Robotics and to Improve Students Electronics Knowledge........ 347
Julio Pastor (University of Alcalá, Spain)
Pedro Revenga (University of Alcalá, Spain)
Marcelo Salazar Arcucci (University of Alcalá, Spain)
Ángel Sánchez García (University of Alcalá, Spain)
Carlos de la Rubia (University of Alcalá, Spain)
Juan García Domínguez (University of Alcalá, Spain)
Francisco Rodriguez (University of Alcalá, Spain)

A Novel Approach to Teaching Phased Array Antenna Systems......................................................... 353
Paul B Crilly (U.S. Coast Guard Academy, USA)
Richard J Hartnett (U.S. Coast Guard Academy, USA)
Betty-Rose Santrach (U.S. Coast Guard Academy, USA)
Carlos Palenzuela (U.S. Coast Guard Academy, USA)

A first year, VHDL based, digital electronics course................................................................. 357
José Daniel Muñoz Frias (Universidad Pontificia Comillas, Spain)
Sadot Alexandres (Universidad Pontificia Comillas, Spain)
Electrons to Light Bulbs: Understanding Electricity with a Multi-Level Simulation Environment .................. 363
Elham Beheshti (Northwestern University, USA)
Asmaa Aljuhani (Northwestern University, USA)
Michael Horn (Northwestern University, USA)

Investigating Student Learning of the Voltage and Potential Concepts in Introductory Electrical Engineering...... 371
Dion Timmermann (Hamburg University of Technology, Germany)
Christian Kautz (Hamburg University of Technology, Germany)

A Model of Photo-Voltaic Generator for Education ........................................................................ 375
Joan Pons-Llinares (Universitat Politècnica de València, Spain)
José Belda-Gisbert (Universitat Politècnica de València, Spain)
Carla Montagud (Universitat Politècnica de València, Spain)
Jose Antonino-Daviu (Universitat Politècnica de València, Spain)

Roadmap towards the Openness of Educational Resources:
Outcomes of the participation in the eMadrid network........................................................................ 383
Edmundo Tovar (Technical University of Madrid, Spain)
Nelson Piedra (Technical University of Loja, Ecuador)
Jorge Lopez-Vargas (Technical University of Loja, Ecuador)
Janneth Chicaiza (Technical University of Loja, Ecuador)

Enhancing Higher Education Experience: The eMadrid initiative at UNED University............................. 387
Miguel Rodriguez-Artacho (Universidad Nacional de Educación a Distancia, Spain)
Manuel Castro (Universidad Nacional de Educación a Distancia, Spain)
Luz Robles (Universidad Nacional de Educación a Distancia, Colombia)
Sergio Martin (Universidad Nacional de Educación a Distancia, Spain)
Salvador Ros (Universidad Nacional de Educación a Distancia, Spain)

Serious games: A journey from research to application ........................................................................ 391
Pablo Moreno Ger (Complutense University of Madrid, Spain)
Ivan Martinez-Ortiz (Complutense University of Madrid, Spain)
Manuel Freire (Complutense University of Madrid, Spain)
Borja Manero (Complutense University of Madrid, Spain)
Baltasar Fernandez-Manjon (Complutense University of Madrid, Spain)

A Multidimensional Analysis of Trends in Educational Technology................................................. 395
Carlos Delgado Kloos (Universidad Carlos III de Madrid, Spain)
María-Blanca Ibáñez (Universidad Carlos III de Madrid, Spain)
Carmen Fernandez-Panadero (Universidad Carlos III de Madrid, Spain)
Pedro J. Muñoz Merino (Universidad Carlos III de Madrid, Spain)
Iria Estevez-Ayres (Universidad Carlos III de Madrid, Spain)
Raquel Crespo (Universidad Carlos III de Madrid, Spain)
Carlos Alario Hoyos (Universidad Carlos III de Madrid, Spain)
Mar Pérez Sanagustín (Universidad Carlos III de Madrid, Spain)
Exploring on e-Learning Enhancement by Means of Advanced Interactive Tools: The GHIA (Group of Advanced Interactive Tools) proposals
Xavier Alamán (Universidad Autónoma de Madrid, Spain)
Rosa M. Carro (Universidad Autónoma de Madrid, Spain)
Ivan Claros (Universidad Autónoma de Madrid, Spain)
Ruth Cobos (Universidad Autónoma de Madrid, Spain)
Leovy Echeverría (Universidad Autónoma de Madrid, Colombia)
Javier Gomez (Universidad Autónoma de Madrid, Spain)
Pablo A. Haya (Universidad Autónoma de Madrid, Spain)
Francisco Jurado (Universidad Autónoma de Madrid, Spain)
Germán Montoro (Universidad Autónoma de Madrid, Spain)
Jaime Moreno-Llorena (Universidad Autónoma de Madrid, Spain)
Alvaro Ortigosa (Universidad Autónoma de Madrid, Spain)
Pilar Rodríguez (Universidad Autónoma de Madrid, Spain)

Automatic Detection of Bad Programming Habits in Scratch: A Preliminary Study
Jesús Moreno León (Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado, Spain)
Gregorio Robles (Universidad Rey Juan Carlos, Spain)

EER2: Dissemination of Research and Teaching Innovations
Chair: Richard Layton
2:30 PM - 4:00 PM
Room: Aranjuez

Catalyzing Research-to-Practice Conversations: A Global, Interdisciplinary and Emergent Symposium in the Context of Learning to Design
Robin Adams (Purdue University, USA)
Andrew O. Brightman (Purdue University, USA)
Patrice Buzzanell (Purdue University, USA)
Monica Cardella (Purdue University, USA)
Nathalie Duval-Couetil (Purdue University, USA)
Michael Fosmire (Purdue University, USA)
Holly Jaycox (Purdue University, USA)
Shannon McMullen (Purdue University, USA)
Senay Purzer (Purdue University, USA)
David Radcliffe (Purdue University, USA)
Junaid Siddiqui (Purdue University, USA)
Fu Zhao (Purdue University, USA)

Learning from the Best: How Award-Winning Courseware Has Impacted Engineering Education
Flora McMartin (Broad-based Knowledge, LLC, USA)
Sarah Giersch (Broad-based Knowledge, LLC, USA)
Joseph Tront (Virginia Polytechnic University, USA)
Joshua Morrill (Morrill Solutions, USA)

Development and Propagation: A Case Study of the AIChE Concept Warehouse
Debra Gilbuena (Oregon State University, USA)
Christina Smith (Oregon State University, USA)
Milo Koretsky (Oregon State University, USA)

Promoting More Effective Communication of Stories in the Data
Richard Layton (Rose-Hulman Institute of Technology, USA)
Richard House (Rose-Hulman Institute of Technology, USA)
Matthew W Ohland (Purdue University, USA)
George Ricco (Purdue University, USA)
Enhancing Collaboration and Dissemination Through a Faculty Scheduled Development Management Framework
Shohreh Hadian (Camosun College, Canada)

GBL2: Advances in Game Based Learning
Chair: Paul Anderson
2:30 PM - 4:00 PM
Room: La Granja

Taking It to the Next Interface Level: Advancing Game Design for Higher Education STEM Applications
Elizabeth Lennon (Manhattan College, USA)
Brian Moriarty (Stevens Institute of Technology, USA)
Marko Zivkovic (Stevens Institute of Technology, USA)

A Game-Based Approach to Information Literacy and Engineering in Context
Kristin Boudreau (Worcester Polytechnic Institute, USA)
Laura R. Hanlan (Worcester Polytechnic Institute, USA)

BrasilEduca - An Open-Source MOOC platform for Portuguese speakers with gamification concepts
Marcell Mesquita (Centro Universitário do Estado do Pará, Brazil)
Armando Toda (Universidade Estadual de Londrina, Brazil)
Jacques Brancher (Universidade Estadual de Londrina, Brazil)

Educational games for improving the teaching-learning process of a CLIL subject: Physics and Chemistry in Secondary Education
Raquel Rodriguez (Universidad Antonio de Nebrija, Spain)
Manuel Blazquez (Universidad Antonio de Nebrija, Spain)
Beatriz López-Medina (Universidad Antonio de Nebrija, Spain)
Manuel Castro (Spanish University for Distance Education - UNED, Spain)
Elio Sancristobal (Spanish University for Distance Education - UNED, Spain)
Sergio Martin (Spanish University for Distance Education - UNED, Spain)

The Impact of Open Educational Resources in Teacher Activities. A Perception Survey
Sonia Valladares-Rodriguez (University of Vigo, Spain)
Roberto Perez Rodriguez (University of Vigo, Spain)
Manuel Fernández Iglesias (University of Vigo, Spain)
Montserrat Vazquez Gestal (University of Vigo, Spain)
Luis Anido-Rifon (University of Vigo, Spain)
Antonia Blanco Pesquera (University of Vigo, Spain)

GD12: Recruiting and Retaining Female Students to Engineering and Computer Science
Chair: Lecia Barker
2:30 PM - 4:00 PM
Room: Patio 1

Analysis of women enrollment in engineering programs at the Public University of Navarre
Gurutze Pérez-Artieda (Public University of Navarre, Spain)
Eugenio Gubia (Public University of Navarre, Spain)
Edurne Barrenechea (Public University of Navarre, Spain)
Pablo Sanchis (Public University of Navarre, Spain)
Antonio J López-Martin (Public University of Navarre, Spain)
David Astrain (Public University of Navarre, Spain)
Daniel Morato (Public University of Navarre, Spain)
Jesus López-Taberna (Public University of Navarre, Spain)
Ignacio R. Matias (Public University of Navarre, Spain)
Expanding women in undergraduate engineering: 
A mixed-methods analysis of recruitment cultures, practices, and policies ................................. 474
David Knight (Virginia Tech, USA)
Brian Novoselich (Virginia Tech, USA)
Lois Trautvetter (Northwestern University, USA)

Integrated Educational Research and Technical Experiences to Draw Females into the Energy Systems Area:
The UPRM Experience............................................................................................................................... 482
Lorena Delgado-Vazquez (University of Puerto Rico-Mayaguez, Puerto Rico)
Vivian Rodriguez (University of Puerto Rico-Mayaguez, Puerto Rico)
Luisa Feliciano-Cruz (University of Puerto Rico-Mayaguez, USA)
Liann Ruiz-Crespo (University of Puerto Rico-Mayaguez, Puerto Rico)
Ashley del Valle Morales (University of Puerto Rico-Mayaguez, Puerto Rico)
Eduardo Ortiz-Rivera (University of Puerto Rico-Mayaguez, Puerto Rico)

Understanding Gender Differences in Online Learning........................................................................ 488
Julie Little-Wiles (Indiana University-Purdue University (IUPUI), USA)
Eugenia Fernandez (Indiana University-Purdue University (IUPUI), USA)
Patricia Fox (Indiana University-Purdue University (IUPUI), USA)

HFC1: Evaluating the Flipped Classroom Experience
Chair: Pramod Pathak
2:30 PM - 4:00 PM
Room: Escudo

Do Students Like the Flipped Classroom?
An Investigation of Student Reaction to a Flipped Undergraduate IT Course ........................................ 492
Rob Elliott (IUPUI, USA)

Experimentation and Analysis of undergraduate students performance and 
satisfaction in a blended model of an introductory computer science and programming course........... 499
Juliana Cristina Braga (ABC Federal University, Brazil)
Edson Pimentel (ABC Federal University, Brazil)
Itana Stiubiener (ABC Federal University, Brazil)
Silvia Dotta (ABC Federal University, Brazil)

An Analysis of Flip-Classroom Pedagogy in First Year Undergraduate Mathematics for Computing .......... 507
Michael Bradford (National College of Ireland, Ireland)
Cristina Muntean (National College of Ireland, Ireland)
Pramod Pathak (National College of Ireland, Ireland)

A Pilot Flipped Engineering Education Class Utilizing the Online Delivery of 
Lectures with Speech-Synchronized PC-Screen-Capture Technology .................................................. 512
Masanori Hanawa (University of Yamanashi, Japan)
Tatsuhiro Hinag (University of Yamanashi, Japan)
Masayuki Morisawa (University of Yamanashi, Japan)
Hidetoshi Ando (University of Yamanashi, Japan)
Eriko Tamaru (Fuji Xerox Co., Ltd., Japan)
Atsushi Hirano (Fuji Xerox Co., Ltd., Japan)
Takeshi Nagamine (Fuji Xerox Co., Ltd., Japan)

Tools for the Flipped Classroom Model: an Experiment in Teacher Education ..................................... 516
Aracele Fassbinder (Federal Institute of Education, Science and Technology of the South of Minas Gerais, Brazil)
Glauca Cruz (Federal University of Goiás (UFG), Brazil)
Danilo Moreira (Federal Institute of Education, Science and Technology of the South of Minas Gerais, Brazil)
Ellen Barbosa (University of São Paulo, Brazil)
The development of transferable skills through continuous improvement: a case study in the UAE .................. 524
Robert Craig (PETROLEUM INSTITUTE, UAE)

Co-curricular experiences link to nontechnical skill development for African-American engineers Communication, Teamwork, Professionalism, Lifelong Learning, and Reflective Behavior Skills........... 530
Glenda Young (Virginia Tech, USA)
David Knight (Virginia Tech, USA)
Denise R. Simmons (Virginia Tech, USA)

A Suggested Strategy for Teamwork Teaching in Undergraduate Engineering Programmes Particularly in China ................................................................................... 537
Dan Zhang (Beijing University of Posts and Telecommunications, P.R. China)
Na Yao (Queen Mary, University of London, United Kingdom)
Laurie Cuthbert (Queen Mary, University of London, United Kingdom)
Steve Ketteridge (Queen Mary, University of London, United Kingdom)

An Investigation of the Team Knowledge and Team Performance of the Chinese Engineering Students in a Senior Technical Module ................................................................................... 545
Dan Zhang (Beijing University of Posts and Telecommunications, P.R. China)
Paula Fonseca (Queen Mary, University of London, United Kingdom)
Laurie Cuthbert (Queen Mary, University of London, United Kingdom)
Steve Ketteridge (Queen Mary, University of London, United Kingdom)

Utilizing International Design Competitions for Enhancing 21st Century Engineering Skills:
The Experience of Shell Eco-Marathon ........................................................................................... 553
Mahmoud Abdulwahed (Qatar University, Qatar)
Mohieddine Benammar (Qatar University, Qatar)
Mazen Omar Hasna (Qatar University, Qatar)
Saud Ghani (Qatar University, Qatar)

SCL: Mini Workshop - Developing Engineers for a Changing World through Modeling and Simulation-based Pedagogy
2:30 PM - 4:00 PM
Room: El Jardin

Mini Workshop - Developing Engineers for a Changing World through Modeling and Simulation-based Pedagogy ................................................................. 560
Kelsey J Rodgers (Purdue University, USA)
Heidi Diefes-Dux (Purdue University, USA)
Krishna Madhavan (Purdue University, USA)
Yi Kong (Purdue University, USA)

SCL2: Leveraging Student-centric Learning in Practice
Chair: Aubrie L Pfirman
2:30 PM - 4:00 PM
Room: Alcalá

Bridging Gaps in Engineering Education Design thinking a critical factor for project based learning .............. 563
Ashis Jalote-Parmar (Indian Institute of Management, IIMA, India)
An Active Learning Methodology in Power Electronic Education

Francisco J. Maseda (University of the Basque Country, Spain)
Irene Martija (University of the Basque Country, Spain)
Itziar Martija (University of the Basque Country, Spain)

Inquiry-based approaches in K-12 classrooms to empower the next generation STEM workforce

Padmanabhan Seshaiyer (George Mason University, USA)
Jennifer Suh (George Mason University, USA)
Nathalia Peixoto (George Mason University, USA)
Mike Long (Howard Community College, USA)
Mimi Corcoran (George Mason University, USA)
Varinder Grewal (Robinson High School, USA)

A Classroom Observation Instrument to Assess Student Response to Active Learning

Cynthia Finelli (University of Michigan, USA)
Matt DeMonbrun (University of Michigan & School of Education, USA)
Prateek Shekhar (Virginia Polytechnic Institute, USA)
Maura Borrego (University of Texas, Austin, USA)
Michael Prince (Bucknell University, USA)
Charles Henderson (Western Michigan University, USA)
Cindy Waters (North Carolina A&T State University, USA)

Use of Argument Maps to Promote Critical Thinking in Engineering Education

Sean Rocke (The University of the West Indies, Trinidad and Tobago)
Cathy-Ann Radix (The University of the West Indies, Trinidad and Tobago)
Jeevan Persad (The University of The West Indies, Trinidad and Tobago)
Daniel Ringis (The University of the West Indies, Trinidad and Tobago)

A teacher's view about introductory programming teaching and learning: difficulties, strategies and motivations

Anabela Gomes (University of Coimbra, Portugal)
António José Mendes (University of Coimbra, Portugal)

Leveraging Scrum Principles in Collaborative, Inter-disciplinary Service-Learning Project Courses

Brian Nejmeh (Messiah College, USA)
Daniel Weaver (Messiah College, USA)

Case study using Test-driven Learning methodology for building contextualized feedback by logical errors in Introductory Programming Learning

Dirson Campos (Federal University of Goiás, Portugal)
António José Mendes (University of Coimbra, Portugal)
Maria José Marcelino (University of Coimbra, Portugal)

"AliCe-ViLlagE" Alice as a Collaborative Virtual Learning Environment

Ahmad Al-Jarrah (New Mexico State University, USA)
Enrico Pontelli (New Mexico State University, USA)

Learning Supported by Peer Production and Digital Ink

José V Benlloch-Dualde (Universitat Politècnica de València, Spain)
Sara Blanc (Universitat Politècnica de València, Spain)
CBL3: Supporting Computer Based Learning  
Chair: Jinghua Zhang  
4:30 PM - 6:00 PM  
Room: Patio 3  

A Contribution to the Adoption of Software Product Lines in the Development of Mobile Learning Applications  
Venilton Falvo Júnior (ICMC/USP, Brazil)  
Nemesio Duarte Filho (ICMC/USP, Brazil)  
Edson Oliveira Jr (UEM/PR, Brazil)  
Ellen Barbosa (ICMC/USP, Brazil)  

Teach Reconfigurable Computing using Mixed-grained Fabrics based Hardware Infrastructure  
Chenchen Deng (Tsinghua University, P.R. China)  
Leibo Liu (Tsinghua University, P.R. China)  
Zhaoshi Li (Tsinghua University, P.R. China)  
Shouyi Yin (Tsinghua University, P.R. China)  
Shaojun Wei (Tsinghua University, P.R. China)  

Using a Game-Like Module to Reinforce Student Understanding of Recursion  
Jinghua Zhang (Winston-Salem State University, USA)  
Mustafa Atay (Winston-Salem State University, USA)  
Emanuel Smith (Winston-Salem State University, USA)  
Rebecca Caldwell (Winston-Salem State University, USA)  
Elva Jones (Winston-Salem State University, USA)  

Engaging Computer Engineering Students with an Augmented Reality Software for Laboratory Exercises  
Jorge López Benito (CreativiTIC Innova SL, Spain)  
Enara Artetxe González (CreativiTIC Innova SL, Spain)  
Margarita Anastassova (CEA LIST, France)  
Florent Souvestre (CEA LIST, France)  

Signals and Systems Demonstrations for Undergraduates Using Android-based Localization  
Paul Curtis (Arizona State University, USA)  
Mahesh Banavar (Arizona State University, USA)  
Xue Zhang (Arizona State University, USA)  
Andreas Spanias (Arizona State University, USA)  
Vitor Weber (Arizona State University, USA)  

CUR1: Computer Science and Software Engineering Curricula Design 1  
Chair: Jaspal Subhlok  
4:30 PM - 6:00 PM  
Room: Doblon  

Student-Faculty Collaboration on Design of Innovative Agile Software Engineering Curriculum  
Vladimir Uskov (Bradley University, USA)  
Harika Govada (Bradley University, USA)  

Research Methodology Education in Computing: Arrangements and Results from Two Course  
Matti Tedre (Stockholm University, Sweden)  
Harko Verhagen (Stockholm University, Sweden)  

Gamification of Software Engineering Curriculum  
Vladimir Uskov (Bradley University, USA)  
Bhuvana Sekar (Bradley University, USA)
An Innovative Approach to Software Engineering Term Projects, Coordinating Student Efforts Between Multiple Teams Over Multiple Semesters .......................................................... 682
John Bell (University of Illinois Chicago, USA)
Anushri Prabhu (University of Illinois Chicago, USA)

A Model for Designing Learning Experiences for Computer Science Curriculum...................................................... 689
Ioana Ghergulescu (National College of Ireland, Ireland)
Paul Stynes (National College of Ireland, Ireland)
Pramod Pathak (National College of Ireland, Ireland)

DIS1: Massively Open On-line Courses: Then and Now
Chair: Manuel Castro
4:30 PM - 6:00 PM
Room: Escudo

MOOCs with Attitudes Insights from a Practitioner Based Investigation.......................................................... 693
Monika Chadaj (University of St Andrews, United Kingdom)
Colin Allison (University of St Andrews, United Kingdom)
Gordon Baxter (University of St Andrews, United Kingdom)

Analysis of demographics and results of student's opinion survey of a large scale MOOC deployment for the Spanish speaking community................................................................. 702
Ignacio Despujol (Universitat Politècnica de València, Spain)
Carlos Turro (Universitat Politècnica de València, Spain)
Jaime Busquets (Universitat Politècnica de València, Spain)
Aristóteles Cañero (Universitat Politècnica de València, Spain)

Telescope, a MOOCs initiative in Latin America: Infrastructure, Best Practices, Completion and Dropout Analysis................................................................................ 710
Miguel Morales Chan (Galileo University, Guatemala)
Rocael Hernandez-Rizzardini (Galileo University, Guatemala)
Christian Guetl (Graz University of Technology, Austria)

This is NOT a MOOC! Reflections on On-Line Asynchronous Education.............................................................. 717
Larry Richards (University of Virginia, USA)

Utilizing MOOCs for Blended Learning in Higher Education....................................................................... 723
Ali Shafaat (Purdue University, USA)
Farshid Marbouti (Purdue University, USA)
Kelsey J Rodgers (Purdue University, USA)

EER3: Diverse Perspectives and Experiences in Engineering and Computer Science
4:30 PM - 6:00 PM
Room: Aranjuez

The People Part of Engineering: Engineering For, With, and As People .............................................................. 727
Nicholas D Fila (Purdue University, USA)
Justin Hess (Purdue University, USA)
Avneet Hira (Purdue University, USA)
Cole Joslyn (Purdue University, USA)
DeLean Tolbert (Purdue University, USA)
Morgan Hynes (Purdue University, USA)
Bilingualism as a Meaning-Making Resource for Learning Engineering

Alberto Esquinca (University of Texas at El Paso, USA)
Erika Mein (University of Texas at El Paso, USA)
Elsa Villa (University of Texas at El Paso, USA)
Angelica Monarrez (University of Texas at El Paso, USA)

Determining Student Beliefs about Engineering

Mary Anderson-Rowland (Arizona State University, USA)
Armando Rodriguez (Arizona State University, USA)
Anita Grierson (Arizona State University, USA)

The Powerful Construction of Norms within Sophomore Engineering

Janet Tsai (University of Colorado Boulder, USA)
Daria Kotys-Schwartz (University of Colorado Boulder, USA)
Daniel Knight (University of Colorado Boulder, USA)

A Pilot Study of the Dimensions of Disciplinary Culture among Engineering Students

Homero Murzi (Virginia Polytechnic Institute and State University, USA)
Thomas L. Martin (Virginia Polytechnic Institute and State University, USA)
Lisa McNair (Virginia Polytechnic Institute and State University, USA)
Marie Paretti (Virginia Polytechnic Institute and State University, USA)

GBL1: Programming and Game Based Learning

Chair: Leônidas O. Brandão
4:30 PM - 6:00 PM
Room: La Granja

Serious Games for Motivating into Programming

Raquel Hijon-Neira (Universidad Rey Juan Carlos, Spain)
J. Ángel Velázquez-Iturbide (Universidad Rey Juan Carlos, Spain)
Celeste Pizarro-Romero (Universidad Rey Juan Carlos, Spain)
Luis Carriço (University of Lisbon, Portugal)

A game Engine to Learn Computer Science Languages

Angel Serrano-Laguna (Complutense University of Madrid, Spain)
Javier Torrente (Complutense University of Madrid, Spain)
Borja Manero (Complutense University of Madrid, Spain)
Baltasar Fernandez-Manjon (Complutense University of Madrid, Spain)

Evaluation of the lasting impacts on employability of co-operative serious game-playing by first year Computing students: An exploratory analysis

Jyoti Bhardwaj (Edinburgh Napier University, United Kingdom)

A Review of Games Designed to Improve Introductory Computer Programming Competencies

Adilson Vahldick (University of Coimbra, Portugal)
António José Mendes (University of Coimbra, Portugal)
Maria José Marcelino (University of Coimbra, Portugal)

Object-Oriented Sokoban Solver: A Serious Game Project for OOAD and AI Education

Zheng Li (Australian National University (ANU) & National ICT Australia (NICTA), Australia)
Liam O’Brien (Geoscience Australia, Australia)
Shayne Flint (Australian National University (ANU), Australia)
Ramesh Sankaranarayana (Australian National University (ANU), Australia)
GDI3: Developing a Diverse and Inclusive Faculty  
Chair: DeLois Kijana Crawford  
4:30 PM - 6:00 PM  
Room: Patio 1  

Institutional Transformation at a Large Private Technical University:  
Reporting on the Accomplishments of a Combined Data Driven Top-Down and Bottom-Up Approach............... 792  
Sharon Mason (Rochester Institute of Technology, USA)  
Carol Marchetti (Rochester Institute of Technology, USA)  
DeLois Kijana Crawford (Rochester Institute of Technology, USA)  
Margaret Bailey (Rochester Institute of Technology, USA)  
Susan Foster (Rochester Institute of Technology, USA)  
Elizabeth Dell (Rochester Institute of Technology, USA)  
Stefi Baum (Rochester Institute of Technology, USA)  
Laurie Clayton (Rochester Institute of Technology, USA)  
Maureen Valentine (Rochester Institute of Technology, USA)  

Considerations for the Effective Mentoring of STEM Women of Color Faculty at a Striving Private Technical University .................................................. 800  
DeLois Kijana Crawford (Rochester Institute of Technology, USA)  

Interactive Theatre to Engage Faculty in Difficult Dialogues: First Implementation ............................................. .... 805  
Michelle Madsen Camacho (University of San Diego, USA)  
Susan M. Lord (University of San Diego, USA)  
Lisa Baird (University of San Diego, USA)  
Perla Myers (University of San Diego, USA)  
Jane Friedman (University of San Diego, USA)  
Sandra Sgoutas-Emch (University of San Diego, USA)  

Emphasizing Professional Skills and Professional Values: Investigating the role of faculty's gender and departmental gender diversity ............................................................................. 810  
Matt DeMonbrun (University of Michigan, USA)  
Michael G. Brown (University of Michigan, USA)  

MINI WS: To what extent can instructors influence student motivation in the classroom?  
4:30 PM - 6:00 PM  
Room: El Escorial  

To what extent can instructors influence student motivation in the classroom? .................................................. ........ 818  
Jonathan Stolk (Franklin W. Olin College of Engineering, USA)  
Yevgeniya V Zastavker (Franklin W. Olin College of Engineering, USA)  
Alex Dillon (Franklin W. Olin College of Engineering, USA)  
Michael Gross (Bucknell University, USA)  

PRO3: Assessing Student Professional Skills  
Chair: Jesus Alfonso Perez Gama  
4:30 PM - 6:00 PM  
Room: Comendador  

Fair Assessment of Group Work by Mutual Evaluation Based on Trust Network ...................................................... .821  
Yumeno Shiba (Waseda University, Japan)  
Toshiharu Sugawara (Waseda University, Japan)  

Learning after learning: Perceptions of engineering alumni on skill development............................................... 828  
Timothy Kinoshita (Virginia Tech, USA)  
Glenda Young (Virginia Tech, USA)  
David Knight (Virginia Tech, USA)
Developing well-rounded graduates through integration of soft skills in the teaching of engineering courses .......... 835
Hairuzila Idrus (Universiti Teknologi PETRONAS, Malaysia)

Professional Competency Attainment in a Project Based Learning Curriculum........................................................... 844
Bart Johnson (Itasca Community College & Iron Range Engineering, Aalborg University, USA)
Ron Ulseth (Iron Range Engineering, USA)

Misalignment of everyday and technical language ................................................................................ ........................ 848
Mirjam Glessmer (Hamburg University of Technology, Germany)
Andrea Brose (Hamburg University of Technology, Germany)

SCL3: Student-centric Learning, Beyond the Classroom
Chair: Jenni Rikala
4:30 PM - 6:00 PM
Room: Alcalá

Learning to Learn: The Co-Evolution of an Institution and its Students ................................................................. 852
Sebastian Dziallas (Franklin W. Olin College of Engineering, United Kingdom)
Sally Fincher (University of Kent, United Kingdom)

Transforming Engineering and Science Education Through Active Learning......................................................... 859
Massood Towhidnejad (Embry-Riddle Aeronautical University, USA)
Thomas Hilburn (Embry-Riddle Aeronautical University, USA)
Salamah Salamah (University of Texas El Paso, USA)

Long Term Impacts of Off-Campus Project Work on Student Learning and Development......................................... 864
Richard Vaz (Worcester Polytechnic Institute, USA)
Paula Quinn (Quinn Evaluation Consulting, USA)

Authentic Learning in Cybersecurity: Learning Opportunities and Pedagogical Challenges ........................................ 873
Hwee-Joo Kam (Ferris State University, USA)
Greg Gogolin (Ferris State University, USA)
Gerald Emerick (Ferris State University, USA)

On the Evaluation of an Open Software Engineering Course................................................................................ 873
Eduardo Figueiredo (Federal University of Minas Gerais (UFMG), Brazil)
Juliana Pereira (Federal University of Minas Gerais (UFMG), Brazil)
Lucas Garcia (Federal University of Minas Gerais (UFMG), Brazil)
Luciana Lourdes (Federal University of Minas Gerais (UFMG), Brazil)

Individual creativity and team engineering design: a taxonomy for team composition............................................. 881
Kylie Berger (South Dakota School of Mines and Technology, USA)
Andrea Surovec (South Dakota School of Mines and Technology, USA)
Dean Jensen (South Dakota School of Mines and Technology, USA)
David Cropley (University of South Australia, Australia)

TLE: Improvisation as a Tool to Develop Creativity
4:30 PM - 6:00 PM
Room: El Jardin

Improvisation as a tool to develop creativity ........................................................................................................... 885
Eti de Vries (Hanze University of Applied Sciences, The Netherlands)
Synergies between Writing Stories and Writing Programs in Problem-Solving Courses......................................................... 888
Candido Cabo (New York City College of Technology/CUNY, USA)
Reneta D. Lansiquot (New York City College of Technology/CUNY, USA)

Digital Technology Teachers' Perceptions of Computer Science: It is not all about programming ............................. 897
Elena Prieto (The University of Newcastle, Australia)
Regina Berretta (The University of Newcastle, Australia)

A first course in engineering design combining just-in-time CAD instruction within a horizontally integrated design project.......................................................................................................................... 902
Wilhelm Friess (University of Maine, USA)

Learning by Competing and Competing by Learning: Experience from the e-Yantra Robotics Competition........... 909
Saraswathi Krithivasan (Indian Institute of Technology Bombay, India)
Saurav Shandilya (Indian Institute of Technology Bombay, India)
Kavi Arya (Indian Institute of Technology Bombay, India)
Krishna Lala (Indian Institute of Technology Bombay, India)
Piyush Manavar (Indian Institute of Technology Bombay, India)
Sachin Patil (Indian Institute of Technology Bombay, India)
Shailesh Jain (Indian Institute of Technology Bombay, India)

Emulating a Corporate Software Development Environment
Through Collaboration Between Student Projects in Six Courses................................................................................. 917
Laura Grabowski (University of Texas-Pan American, USA)
Christine F Reilly (University of Texas - Pan American, USA)
Wendy A Lawrence Fowler (The University of Texas-Pan American, USA)
Friday, October 24

**CBL4: Case Studies in Computer Based Learning**
9:00 AM - 10:30 AM
Room: Patio 3

**Desktop vs. Mobile: A Comparative Study of Augmented Reality Systems for Engineering Visualizations in Education** ................................................................. 924
Jorge D. Camba (Texas A&M University, USA)
Manuel Contero (Universitat Politècnica de València, Spain)
Gustavo Salvador-Herranz (Universidad CEU Cardenal Herrera, Spain)

**Intelligent Tutoring Interface for Technology Enhanced Learning in a Course of Computer Network Design** .......... 932
Elena Verdu Pérez (Universidad de Valladolid, Spain)
Luisa Regueras (Universidad de Valladolid, Spain)
María Jesús Verdu Pérez (Universidad de Valladolid, Spain)
Juan Pablo de Castro Fernández (University of Valladolid, Spain)
Dan Kohen-Vacs (Holon Institute of Technology, Israel)
Eran Gal (Holon Institute of Technology, Israel)
Michaela Ronen (Holon Institute of Technology, Israel)

**Programming web-course analysis: how to introduce computer programming?** ................................................................. 939
Romenig Ribeiro (University of São Paulo, Brazil)
Leóidas O Brandão (University of São Paulo, Brazil)
Tulio Faria (University of São Paulo, Brazil)
Ana rosa A. F. Brandão (University of São Paulo, Brazil)

**Learning and Practicing Object-Oriented Programming Using a Collaborative Web-based IDE** ................................. 947
Vu Nguyen (University of Science, VNU-HCMC, Vietnam)
Hai H Dang (University of Science, VNU-HCMC, Vietnam)
Kha N Do (University of Science, VNU-HCMC, Vietnam)
Tran Thu (University of Science, VNU-HCMC, Vietnam)

**Adaptive Learning in Computing for non-native Speakers** ................................................................................................. 956
Yann Rimbaud (Edinburgh Napier University, United Kingdom)
Tom G McEwan (Edinburgh Napier University, United Kingdom)
Alistair Lawson (Edinburgh Napier University, United Kingdom)
Sandra Cairncross (Edinburgh Napier University, United Kingdom)

**Analysis of Self-Regulated Learning Strategies Oriented to the Design of Software Support** ........................................... 960
Mario Manso Vazquez (University of Vigo, Spain)
Manuel Caeiro (University of Vigo, Spain)
Martin Llamas-Nistal (University of Vigo, Spain)

**EER4: Creativity and Innovativeness in Engineering**
Chair: Stuart Kellogg
9:00 AM - 10:30 AM
Room: Aranjuez

**Evaluation of a Distributed Collaborative Workspace as a Creativity Tool in the Context of Design Education** .......... 969
Gustavo Salvador-Herranz (Universidad CEU Cardenal Herrera, Spain)
Manuel Bañó-Hernández (Universidad CEU Cardenal Herrera, Spain)
Manuel Contero (Universitat Politècnica de València, Spain)
Jorge D. Camba (Texas A&M University, USA)
Creativity, Innovation, and Ingenuity Summer Enrichment Program -
Collaborating with a Cultural Institution and Preliminary Assessment........................................................................... 976
Andrew L. Gerhart (Lawrence Technological University, USA)
Donald D. Carpenter (Lawrence Technological University, USA)

The relationship between creative self-concepts, perceptions of global readiness, and travel experiences of
engineering students........................................................................................................................................................ 981
Sarah Zappe (Penn State University, USA)
Philip Reeves (Penn State University, USA)
Irene Mena (Penn State University, USA)
Thomas Litzinger (Penn State University, USA)

Cultures of Innovation Among Chemical, Civil, and Mechanical Engineering Students: A Qualitative Study........ 988
Nicholas D Fila (Purdue University, USA)
Senay Purzer (Purdue University, USA)
Rami Chakroun (Purdue University, USA)

Characterizing Engineering Innovativeness through a Modified Delphi Study........................................................... 995
Daniel Ferguson (Purdue University, USA)
Senay Purzer (Purdue University, USA)
Matthew W Ohland (Purdue University, USA)
Kathryn Jablokow (Pennsylvania State University, USA)
Jessica Menold (Pennsylvania State University, USA)

ETH: Defining and Assessing Engineering Ethics in an International Context
9:00 AM - 10:30 AM
Room: El Escorial

Defining and Assessing Engineering Ethics in an International Context ........................................................................ 999
Carla Zoltowski (Purdue University, USA)
William Oakes (Purdue University, USA)
Patrice Buzzanell (Purdue University, USA)
Qin Zhu (Purdue University, USA)
Megan Kenny Feister (Purdue University, USA)

FYE2: First Year Engineering 2
Chair: Catherine E. Brawner
9:00 AM - 10:30 AM
Room: Doblon

First Year Engineering Experience at Ferdowsi University of Mashhad................................................................. 1001
Mohammad Molavi Kakhki (Ferdowsi University of Mashhad, Iran)
Asad Azemi (Pennsylvania State University, Brandywine Campus, USA)

Promoting positive start of electrical engineering studies - a teacher's perspective............................................. 1004
Sami Kujala (Aalto University, Finland)
Anu Lehtovuori (Aalto University, Finland)
Mikko Honkala (Aalto University, Finland)

First-Year Engineering Students’ Nanotechnology Awareness, Exposure and
Motivation Before and After Educational Interventions......................................................................................... 1012
Oguz Hanoglu (Purdue University, USA)
Anna Douglas (Purdue University, USA)
Krishna Madhavan (Purdue University, USA)
Heidi Diefes-Dux (Purdue University, USA)
Enhancing an introductory programming course with physical computing modules ................................................................. 1019
Miguel Rubio (University of Granada, Spain)
Rocio Romero-Zaliz (University of Granada, Spain)
Carolina Mañoso Hierro (UNED - Universidad Nacional de Educación a Distancia, Spain)
Ángel Pérez de Madrid y Pablo (UNED - Universidad Nacional de Educación a Distancia, Spain)

First-Year Engineering Students' Self-Reported Knowledge of Nanotechnology -
The Development of a Coding Scheme ................................................................................................................................. 1027
Oguz Hanoglu (Purdue University, USA)
Kelsey J Rodgers (Purdue University, USA)
Yi Kong (Purdue University, USA)
Krishna Madhavan (Purdue University, USA)
Heidi Diefes-Dux (Purdue University, USA)

GBL3: Diverse Perspectives on Game Based Learning
Chair: Oscar Coltell
9:00 AM - 10:30 AM
Room: La Granja
Proposal of a computerized environment to support the development of game-based learning ............................................. N/A
Joao Coelho Neto (Northern Paraná Public University, Brazil)
Sheila Reinehr (Pontifical Catholic University, Brazil)
Andreia Malucelli (Pontifical Catholic University, Brazil)

Designing Serious Games for Learning Support in Medicine Studies:
A Specific Method to Elicit and Formalize Requirements ........................................................................................................ 1039
Oscar Coltell (Universitat Jaume I, Spain)
Ximo Granell (Universitat Jaume I, Spain)
Ricardo Tosca (Universitat Jaume I, Spain)
Pedro Latorre (Universitat Jaume I, Spain)
José Sánchez (Universitat Jaume I, Spain)
Luis Vicente Lizán (Universitat Jaume I, Spain)
Francisco Ros-Bernal (Universitat Jaume I, Spain)
Conrado Martínez-Cadenas (Universitat Jaume I, Spain)

Updating Aristotle, Freytag & Campbell With Lakoff and Frames: Designing Interactive Narratives In Games.... 1043
Gordon Goodman (Rochester Institute of Technology, USA)
David Simkins (Rochester Institute of Technology, USA)

Physical Response to Feedback in Game-Based Learning ................................................................................................. 1050
Kelsey J Rodgers (Purdue University, USA)
Mariana Tafur (Purdue University, USA)
Farshid Marbouti (Purdue University, USA)
Justin Seipel (Purdue University, USA)

Engineering education through an intercontinental PLM collaborative project: The Global Factory Case Study .. 1054
Ricardo Mejía-Gutiérrez (Universidad EAFIT, Colombia)
Ricardo Carvajal-Arango (Universidad EAFIT, Colombia)
Julien Zins (Ecole Nationale d’Ingenieurs de Metz, France)

GDI4: Overcoming Gender, Diversity, and Inclusivity as Barriers to Education
Chair: Oladipo Onipede
9:00 AM - 10:30 AM
Room: Patio 1
The Effect of Institution Mission Drift on STEM Faculty Career Advancement at a Striving University ............... 1062
DeLois Kijana Crawford (Rochester Institute of Technology, USA)

October 22-25, 2014 Madrid, Spain
2014 IEEE Frontiers in Education Conference
Ix
Empowering Early Mastery of Spatial Visualization Skills in Underrepresented Minority Engineering Students... 1068
Olufunmilayo Adebayo (Cornell University, USA)
Emily Farrar (Cornell University, USA)
Rick Evans (Cornell University, USA)
Tyi McCray (Cornell University, USA)
Traci Nathans-Kelly (Cornell University, USA)

Promoting Inclusive Design Practice at the Global Game Jam: A Pilot Evaluation................................. 1076
Michael Scott (Brunel University, United Kingdom)
Gheorghita Ghinea (Brunel University, United Kingdom)
Ian Hamilton (Independent Accessibility Consultant, United Kingdom)

Finding Effective Ways to Teach Non-traditional Students: A Different Model of Teaching and Learning........ 1080
Sara Hooshangi (The George Washington University, USA)

Getting Better With Age: Older Students Achieve Higher Grades and Graduation Rates............................. 1083
Jacqueline McNeil (Purdue University, USA)
Russell Long (Purdue University, USA)
Matthew W Ohland (Purdue University, USA)

MINI WS: Mini-Workshop - Inquiry Based Learning Activities: Hands on Activities to Improve Conceptual Understanding
9:00 AM - 10:30 AM
Room: El Jardin

Mini-Workshop - Inquiry Based Learning Activities: Hands on Activities to Improve Conceptual Understanding
James Widmann (California Polytechnic State University, USA)
Brian Self (California Polytechnic State University, USA)
Michael Prince (Bucknell University, USA)

PRO4: Techniques and Tools to Teach Professional Skills
Chair: Karl O. Jones
9:00 AM - 10:30 AM
Room: Comendador

Developing Professional Skills at Tertiary Level: A Model to Integrate Competencies across the Curriculum...... 1090
Fermin Sanchez (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Antonia Soler (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
David Lopez (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Carme Martin (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Alicia Ageno (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Lluis Belanche Muñoz (Universitat Politècnica de Catalunya, Spain)
Jose Cabre (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Erik Cobo (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Rafel Farré (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Jordi Garcia (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Pere Marès (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)

Instruction in Software Project Communication through Guided Inquiry and Reflection ............................... 1099
Shreya Kumar (Michigan Technological University, USA)
Charles Wallace (Michigan Technological University, USA)
An Immersive Platform for Collaborative Projects ................................................................. 1108
Lisa Dow (University of St Andrews, United Kingdom)
Anne Campbell (University of St Andrews, United Kingdom)
Alan H. D. Miller (University of St Andrews, United Kingdom)
John McCaffery (University of St Andrews, United Kingdom)
Iain Oliver (University of St Andrews, United Kingdom)
Sarah Kennedy (University of St Andrews, United Kingdom)
Colin Allison (University of St Andrews, United Kingdom)

Transversal Competencies of Electrical and Computing Engineers considering market demand .......... 1117
Leandro Yanaze (Polytechnical School of University of Sao Paulo, Brazil)
Roseli Lopes (Polytechnical School of University of Sao Paulo, Brazil)

Developing Engineering Students’ Language and Cultural Skills for Academic and Professional Success .... 1121
Laura Hahn (University of Illinois at Urbana-Champaign, USA)
LuAnn Sorenson (University of Illinois at Urbana-Champaign, USA)

REM2: Exploring Learning Opportunities using Remote Laboratories
Chair: Hamadou Saliah-hassane
9:00 AM - 10:30 AM
Room: Escudo

Educational web platform for performing the engineering experimental work ........................................ 1125
Itziar Martija (University of the Basque Country, Spain)
Francisco J. Maseda (University of the Basque Country, Spain)
Irene Martija (University of the Basque Country, Spain)

Mobile open online laboratories:
A way towards connectionist massive online laboratories with x-API (c-MOOLs) ........................................ 1129
Hamadou Saliah-hassane (TELUQ - University of Quebec, Canada)
Adrien Reuzeau (Université de Rennes 1, France)

Simplifying the Implementation of Educational Online Laboratories ......................................................... 1136
Danilo G. Zutin (Carinthia University of Applied Sciences, Austria)
Amir Mujkanovic (Carinthia University of Applied Science, Austria)
Michael Auer (Carinthia University of Applied Science, Austria)

An Automatic Assessment Model for Remote Laboratories ..................................................................... 1139
Susana Romero (University of Deusto, Spain)
Mariluz Guenaga (Deusto Institute of Technology – DeustoTech, Spain)
Javier Garcia-Zubia (University of Deusto, Spain)
Pablo Orduña (Deusto Institute of Technology - DeustoTech, University of Deusto, Spain)

Remote Laboratories for Renewable Energy Courses at Jordan Universities .............................................. 1143
A. Y. Al-Zoubi (Princess Sumaya University for Technology, Jordan)
Bashar Hammad (The Hashemite University, Jordan)
Salvador Ros (Spanish University for Distance Education - UNED, Spain)
Llanos Tobarra (Spanish University for Distance Education - UNED, Spain)
Roberto Hernandez (Spanish University for Distance Education - UNED, Spain)
Rafael Pastor Vargas (Spanish University for Distance Education - UNED, Spain)
Manuel Castro (Spanish University for Distance Education - UNED, Spain)
Teaching Effective Requirements Engineering for Large-scale Software Development with Scaffolding

Maria Feldgen (Universidad de Buenos Aires, Argentina)
Osvaldo Clua (Universidad de Buenos Aires, Argentina)

Several Issues and Possible Solutions in Compulsory Project-based Course

Ya Zhou (Beijing Institute of Technology, P.R. China)
Yuejin Zhao (Beijing Institute of Technology, P.R. China)
Yao Hu (Beijing Institute of Technology, P.R. China)
Liquan Dong (Beijing Institute of Technology, P.R. China)
Ming Liu (Beijing Institute of Technology, P.R. China)
Dayuan Yan (Beijing Institute of Technology, P.R. China)

xPBL: a Methodology for Managing PBL when Teaching Computing

Simone Santos (UFPE, Brazil)
Felipe Soares (CESAR, Brazil)
W. Lins (CESAR, Brazil)

Improving Communication Skills: Students' Viewpoint on a Content & Language Integrated Learning Project

Montserrat Alsina (Universitat Politècnica de Catalunya-BarcelonaTech, Spain)
Jordi Fortuny-Santos (Universitat Politècnica de Catalunya-BarcelonaTech, Spain)
Conxita Lao-Luque (Universitat Politècnica de Catalunya-BarcelonaTech, Spain)
Francesc Xavier de las Heras- Cisa (Universitat Politècnica de Catalunya-BarcelonaTech, Spain)

An Industry-Mentored Undergraduate Software Engineering Project

Azim Abdool (The University of the West Indies, Trinidad and Tobago)
Akash Pooransingh (The University of the West Indies, Trinidad and Tobago)

The Learner Experience of Student-Led International Group Project Work in Software Engineering

Roger McDermott (Robert Gordon University, United Kingdom)
Julian Bass (Robert Gordon University, United Kingdom)
JayPrakash Lalchandani (International Institute for Information Technology, India)

Subject-Level Quality Assurance In Computing: Experiences From Three National Perspectives

Roger McDermott (Robert Gordon University, United Kingdom)
Mats Daniels (Uppsala University, Sweden)
Marta Lárusdóttir (Reykjavik University, Iceland)

From employability attributes to professional identity: students transitioning to the workplace

Sally Smith (Edinburgh Napier University, United Kingdom)
Emilia Sobolewska (Edinburgh Napier University, United Kingdom)
Ian Smith (Edinburgh Napier University, United Kingdom)

Using mobile devices and internet technologies in problem-based learning: design of a suitable active and collaborative learning environment in engineering education

Carlos Efrén Mora Luís (La Laguna University, Spain)
Jorge Martín-Gutierrez (La Laguna University, Spain)
Antonio Manuel González Marrero (La Laguna University, Spain)
Design of a competences based teaching model supported in the integration of repositories and LMS platforms for the Automatic Control of Processes course ................................................................. 1211
Isabel Cristina Gómez Galvis (EAFIT University, Colombia)
Adalberto Gabriel Díaz Torres (EAFIT University, Colombia)
Claudia María Zea Restrepo (EAFIT University, Colombia)
Luis Felipe Zapata Rivera (EAFIT University, Colombia)

A Practical Guide for Novice Supervisors of Master's Thesis ................................................................. 1218
Alicia Triviño (University of Malaga, Spain)
Sebastian Rivas (University of Malaga, Spain)

Pursuing the Frontiers: The History and Future of the Frontiers in Education Conference
11:00 AM - 12:30 PM
Room: El Jardin

Pursuing the Frontiers: The History and Future of the Frontiers in Education Conference ............................ 1222
Larry Richards (University of Virginia, USA)

CBL5: Models and Methods in Computer Based Learning
Chair: Pramod Abichandani
11:00 AM - 12:30 PM
Room: Patio 3

Enhancing web-based learning resources with quizzes through an Authoring Tool and an Audience Response System ........................................................................................................... 1226
Aldo Gordillo (Universidad Politécnica de Madrid, Spain)
Enrique Barra (Universidad Politécnica de Madrid, Spain)
Juan Quemada Vives (Universidad Politécnica de Madrid, Spain)

Student Perceptions of Indexed, Searchable Videos of Faculty Lectures ......................................................... 1234
Leccia Barker (University of Texas at Austin, USA)
Christopher L Hovey (Northeastern University, USA)
Jaspal Subhlok (University of Houston, USA)
Tayfun Tuna (University of Houston, USA)

iPlan: a model of lesson plans to help teaching process in Web learning environment.................................... 1242
Reginaldo do Prado (University of São Paulo, Brazil)
Leônidas O Brandão (University of São Paulo, Brazil)
Anarosa A. F. Brandão (University of São Paulo, Brazil)

Performance Evaluation of an Intelligent Multimedia Learning Assistant Platform ....................................... 1249
Chenn-Jung Huang (National Dong Hwa University, Taiwan)
Shun-Chih Chang (National Dong Hwa University, Taiwan)
Heng-Ming Chen (National Dong Hwa University, Taiwan)
Chao-Yi Chen (National Dong Hwa University, Taiwan)

A Cloud Enabled Virtual Reality Based Pedagogical Ecosystem for Wind Energy Education ........................ 1256
Pramod Abichandani (Drexel University, USA)
William Fligor (Drexel University, USA)
Eli Fromm (Drexel University, USA)

From 2D to 3D: Teaching terrain representation in engineering studies through Augmented Reality: Comparative versus 3D pdf .................................................................................................. 1263
Francisco Javier Ayala Álvarez (I.E.S. Politécnico Jesús Marín, Spain)
Elidia Blázquez (Universidad de Málaga, Spain)
Francisco Montes Tubio (Universidad de Córdoba, Spain)
CUR2: Computer Science and Software Engineering Curricula Design 2
11:00 AM - 12:30 PM
Room: Doblon

Case studies in computing education: presentation, evaluation and assessment of four case study-based course design and delivery models
Ilse Baumgartner (Singapore Management University, Singapore)
Venky Shankararaman (Singapore Management University, Singapore)

Dutch-Russian Double Degree Master's Program Curricula in Computational Science and High Performance Computing
Anna Bilyatdinova (ITMO University, Russia)
Alexey Dukhanov (ITMO University, Russia)
Klavdiya Bochenina (ITMO University, Russia)
Valeria V. Krzhizhanovskaya (University of Amsterdam, The Netherlands)
Alexander Boukhanovsky (ITMO University, Russia)
Peter Sloot (University of Amsterdam, The Netherlands)

RIT's New Minor in Free and Open Source Software and Free Culture: A Five Year Journey Driven By Student-Centered, Applied Research
Stephen Jacobs (Rochester Institute of Technology, USA)
Amit Ray (Rochester Institute of Technology, USA)
Jon Schull (Rochester Institute of Technology, USA)

Diversifying Cybersecurity Education: A Non-Technical Approach to Technical Studies
Hwee-Joo Kam (Ferris State University, USA)
Pairin Katerattanakul (Ferris State University, USA)

Explorations in Computing: Could this be the Key to Retention?
Linda Ott (Michigan Technological University, USA)

EER5: Modeling and Predicting Student Behavior
Chair: Laura R. Hanlan
11:00 AM - 12:30 PM
Room: Aranjuez

SETAP: Software Engineering Teamwork Assessment and Prediction Using Machine Learning
Dragutin Petkovic (San Francisco State University, USA)
Marc Sosnick-Pérez (San Francisco State University, USA)
Shihong Huang (Florida Atlantic University, USA)
Rainer Todtenhofer (University of Applied Science, Fulda, Germany)
Kazunori Okada (San Francisco State University, USA)
Swati Arora (San Francisco State University, USA)
Ramasubramanian Sreenivasan (San Francisco State University, USA)
Lorenzo Flores (San Francisco State University, USA)
Sonal Dubey (San Francisco State University, USA)

Predicting Students' Performance on Intelligent Tutoring System - Personalized Clustered BKT (PC-BKT) Model
Prema Nedungadi (Amrita University, India)
Remya MS (Amrita University, India)
Student Attitudes and Measures of Success in Information Seeking in an Introductory Mechanical Engineering Design Course
Laura R. Hanlan (Worcester Polytechnic Institute, USA)
Rebecca Ziino (Worcester Polytechnic Institute, USA)
Allen Hoffman (Worcester Polytechnic Institute, USA)

Academic Predictors of Cooperative Education Participation
Nichole Ramirez (Purdue University, USA)
Joyce B. Main (Purdue University, USA)
Trina Fletcher (Purdue University, USA)
Matthew W Ohland (Purdue University, USA)

Measuring the Relationship between Study Habits and Preferred Learning Style in Higher Education
Elena Fitkov-Norris (Kingston University, United Kingdom)
Ara Yeghiazarian (Kingston University, United Kingdom)

GBL4: Game Based Learning, Theory and Applications
11:00 AM - 12:30 PM
Room: La Granja

Evaluating Software Engineering Simulation Games: the UGALCO framework
Daniela Peixoto (Centro Federal de Educação Tecnológica, Brazil)
Rodolfo Resende (Universidade Federal de Minas Gerais, Brazil)
Clarindo Pádua (Universidade Federal de Minas Gerais, Brazil)

An Extensible Online Environment for Teaching Data Science Concepts through Gamification
Paul Anderson (College of Charleston, USA)
Clayton Turner (College of Charleston, USA)
Jacob Dierksheide (College of Charleston, USA)
Renee McCauley (College of Charleston, USA)

A mobile-device based serious gaming approach for teaching and learning Java programming
Tobias Jordine (Stuttgart Media University, Germany)
Ying Liang (University of the West of Scotland, United Kingdom)
Edmund Ihler (Stuttgart Media University, Germany)

Interactive Visualizations for Teaching Quantum Mechanics and Semiconductor Physics
Rose Peng (Georgia Institute of Technology, USA)
William Dorn (Georgia Institute of Technology, USA)
Azad Naeemi (Georgia Institute of Technology, USA)
Nassim JafariNaimi (Georgia Institute of Technology, USA)

GDI: Special Session - "Stereotype Threat" and my Students: What can I do about it?
11:00 AM - 12:30 PM
Room: El Escorial

Special Session - "Stereotype Threat" and my Students: What can I do about it?
Elizabeth A. Eschenbach (Humboldt State University, USA)
Mary Vinroche (Humboldt State University, USA)
Susan M. Lord (University of San Diego, USA)
Michelle Madsen Camacho (University of San Diego, USA)
### HFC2: Flipped Classroom in Practice

**Chair:** Luis M. Sanchez Ruiz  
**11:00 AM - 12:30 PM**  
**Room:** Escudo

#### Engineering Teaching Methods using Hybrid Technologies based on the Motivation and Assessment of Student's Profiles

David Fonseca (Ramon Llull University, Spain)  
Sergi Villagrasa (Ramon Llull University, Spain)  
Francesc Valls (Universitat Politècnica de Catalunya, Spain)  
Ernest Redondo (Universitat Politècnica de Catalunya, Spain)  
August Climent (UOLS, Andorra)  
Lluis Vicent (UOLS, Andorra)

#### Engaging students in creative learning tasks with social networks and video-based learning

Jaime Urquiza-Fuentes (Universidad Rey Juan Carlos, Spain)  
Isidoro Hernán (Universidad Rey Juan Carlos, Spain)  
Estefanía Martín (Universidad Rey Juan Carlos, Spain)

#### B-Learning of Photovoltaics Systems using Orcad PSpice

Juan Aguilar-Peña (University of Jaén, Spain)  
Francisco Muñoz-Rodriguez (University of Jaén, Spain)  
Catalina Rus-Casas (University of Jaén, Spain)

#### Enhancing Video Lectures with Digital Footnotes

Viraj Kumar (PES University, India)

#### Teaching Electric Circuits Using a Flipped Classroom Approach

Asad Azemi (Pennsylvania State University, USA)

---

### PRE1: Research and Practice in Precollege Education

**Chair:** Mary M Capraro  
**11:00 AM - 12:30 PM**  
**Room:** Comendador

#### Science, Technology, Engineering and Mathematics (STEM) Education:  
*A Longitudinal Examination of Secondary School Intervention*

Sandra B Nite (Texas A&M University, USA)  
Jim Morgan (Texas A&M University, USA)  
Mary M Capraro (Texas A&M University, USA)  
Robert M Capraro (Texas A&M University, USA)  
Cheryl A Peterson (Texas A&M University, USA)

#### A Qualitative Study on the Effects of Participation in Pre-College Engineering Programs on First-Year Engineering Students

Noah Salzman (Purdue University, USA)  
Monica Cardella (Purdue University, USA)  
Matthew W Ohland (Purdue University, USA)
STEM Integration: Evidence of Student Learning in Design-Based Curricula ....................................................... 1393
Tamara J. Moore (Purdue University, USA)
Morgan Hynes (Purdue University, USA)
Senay Purzer (Purdue University, USA)
Aran Glancy (University of Minnesota, USA)
Emilie Siverling (Purdue University, USA)
Kristina Tank (University of Minnesota, USA)
Corey A Mathis (Purdue University, USA)
Selcen Guzey (University of Minnesota, USA)

What motivates STEM teachers to attend professional development? A case study in Chilian high schools .......... 1400
Gina C. Adam (University of California, Santa Barbara, USA)
Vanessa Natalie Dominguez (University of California, Santa Barbara, USA)
Danielle B. Harlow (University of California, Santa Barbara, USA)

Might Young Makers Be the Engineers of the Future? ............................................................................... 1408
Shawn Jordan (Arizona State University at the Polytechnic Campus, USA)
Micah Lande (Arizona State University at the Polytechnic Campus, USA)

SBM1: Student Retention and Persistence
Chair: Lisa Zidek
11:00 AM - 12:30 PM
Room: Patio 1

Understanding the use of paper and online logbooks for final year undergraduate engineering projects .......... 1412
Manish Malik (University of Portsmouth, United Kingdom)

Building motivation by student-teaching ........................................................................................................ 1416
John Pollard (British University in Egypt, Egypt)
Sara Al Menabawy (British University in Egypt, Egypt)

Prediction of the Change of Learners' Motivation in Programming Education for Non-Computing Majors .......... 1421
Hidekuni Tsukamoto (Osaka University of Arts, Japan)
Yasuhiro Takemura (Osaka University of Arts, Japan)
Hideo Nagumo (Niigata Seiryo University, Japan)
Akito Monden (Nara Institute of Science and Technology, Japan)
Ken-ichi Matsumoto (Nara Institute of Science and Technology, Japan)

Motivations and Experiences of Older Transfer Students in Engineering ......................................................... 1428
Catherine E. Brawner (Research Triangle Educational Consultants, USA)
Catherine Mobley (Clemson University, USA)

Leveraging student motivation in engineering skills acquisition ........................................................................ 1436
Jeevan Persad (University of the West Indies at St. Augustine, Trinidad and Tobago)
Daniel Ringis (University of the West Indies at St. Augustine, Trinidad and Tobago)
Cathy-Ann Radix (The University of the West Indies at St. Augustine, Trinidad and Tobago)

Scratching the surface of digital literacy... but we need to go deeper ............................................................... 1440
Jon Bustillo (University of the Basque Country, Spain)
Pablo Garaizar (University of Deusto, Spain)
SCL4: Reflection and Student-centric Learning
Chair: Robert Craig
11:00 AM - 12:30 PM
Room: Alcalá

Implementing Reflection In Technical Courses
Luciana Barroso (Texas A&M University, USA)
Jim Morgan (Texas A&M University, USA)

Evaluating Effectiveness of Active Learning in Computer Science using Metacognition
Murali Mani (University of Michigan-Flint, USA)
Nuha Alkabour (University of Michigan-Flint, USA)
Damilola Alao (University of Michigan-Flint, USA)

Which hat are you wearing today? Enabling perspectives while learning computer science
Abhay Doke (Tata Consultancy Services Limited, India)
Gaurav Kumar Singh (Tata Consultancy Services Limited, India)
Varun Kumar (Tata Consultancy Services Limited, India)
Savita Bhat (Tata Consultancy Services Limited, India)
Niranjan Pedanekar (Tata Consultancy Services Limited, India)

Transforming Challenges into Reflections: Enabling Metacognitive Development
Jordyn Burger (Olin College of Engineering, USA)
Paige Cote (Olin College of Engineering, USA)
Nitya Dhanushkodi (Olin College of Engineering, USA)
Jonathan Stolk (Olin College of Engineering, USA)
Yevgeniya V Zastavker (Olin College of Engineering, USA)

Co-operative learning versus self-directed learning in engineering: student preferences and implications
Arthur Swart (Central University of Technology, South Africa)
Trudy Sutherland (Vaal University of Technology, South Africa)

TLE5: What do We Teach and How do Students Learn?
Chair: Diana Bairaktarova
11:00 AM - 12:30 PM
Room: La Galería

Generation of Critical Mass in Education: An approach based on multiple vortexes
Jose Reginaldo Hughes Carvalho (Federal University of Amazonas, Brazil)
Elaine H. T. de Oliveira (Federal University of Amazonas, Brazil)
Alessandra Silva (Samsung Eletrônica da Amazônia (SEDA), Brazil)

Combining Thermodynamics and Public Policy: Exploring the Benefits of this Alternative Instructional Method
Ryan Muckel (Rochester Institute of Technology, USA)
Margaret Bailey (Rochester Institute of Technology, USA)

Development of Low-Cost Robot Manipulators for Kinematic Control Practices
José Alberto Naves Cocota, Jr. (Universidade Federal de Ouro Preto, Brazil)
Tiago Pinheiro dos Santos (Universidade Federal de Ouro Preto, Brazil)
Paulo Henrique Magalhaes (Universidade Federal de Ouro Preto, Brazil)
Thiago D'Angelo (Universidade Federal de Ouro Preto, Brazil)
Luciana Castanheira (Universidade Federal de Ouro Preto, Brazil)

Brain-based Programming continued
Barbara Sabitzer (Alpen-Adria-Universität Klagenfurt, Austria)
Stefan Pasterk (Alpen-Adria-Universität Klagenfurt, Austria)
Critical Thinking, Peer-Writing, and the Importance of Feedback
Ása Cajander (Uppsala University, Sweden)
Mats Daniels (Uppsala University, Sweden)
Anne-Kathrin Peters (Uppsala University, Sweden)
Roger McDermott (Robert Gordon University, United Kingdom)

ASM1: Novel Assessment Approaches
Chair: Jia-Ling Lin
2:30 PM - 4:00 PM
Room: Patio 3

Designing Assessments that Mimic Employment Scenarios, Engage Students and Expand Students' Skills
Karl O. Jones (Liverpool John Moores University, United Kingdom)
Kevin Johnston (Liverpool John Moores University, United Kingdom)
Colin Robinson (Liverpool John Moores University, United Kingdom)
Rebecca Bartlett (Liverpool John Moores University, United Kingdom)
Marya Burgess (BBC, United Kingdom)

The Evolution of a Criterion Referenced System of Grading for Engineering Science Coursework
John Heywood (The University of Dublin, Ireland)

Digital Ink for Cognitive Assessment of Computational Thinking
Ana Paula Ambrosio (Federal University of Goias, Brazil)
Cleon Pereira, Jr. (Federal University of Goias, Brazil)
Fouad Georges (University Salgado de Oliveira, Brazil)

Academic performance assessment using Augmented Reality in engineering degree course
Albert Sánchez (Universitat Politècnica de Catalunya Barcelona Tech, Spain)
Ernest Redondo (Universitat Politècnica de Catalunya Barcelona Tech, Spain)
David Fonseca (Ramon Llull University, Spain)
Isidro Navarro (Ramon Llull University, Spain)

An approach to Assessment of Knowledge Acquisition by using Three-Dimensional Virtual Learning Environment
Eunice Nunes (Federal University of Mato Grosso, Brazil)
Romero Tori (University of São Paulo, Brazil)
Fatima Nunes (University of São Paulo, Brazil)
Licinio Roque (University of Coimbra, Portugal)

CUR3: Civil, Chemical, and Mechanical Engineering Curricula Design
Chair: Alicia Triviño
2:30 PM - 4:00 PM
Room: Doblon

Evaluation of a New Approach to Life-Long Learning in Civil and Environmental Engineering Curricula
Diane Bondehagen (Florida Gulf Coast University, USA)
Claude Villiers (Florida Gulf Coast University, USA)
Robert O'Neill (Florida Gulf Coast University, USA)

Developing Computer Based Laboratory Exercises for an MEP Course In A Construction Science and Management Program
Rogelio Palomera-Arias (University of Texas at San Antonio, USA)

October 22-25, 2014 Madrid, Spain
2014 IEEE Frontiers in Education Conference
Data-driven Curriculum Redesign in Civil Engineering ................................................................. 1555
Debra Fowler (Texas A&M University, USA)
Whitney Anthony (Texas A&M University, USA)
Nathaniel Poling (Texas A&M University, USA)
Jim Morgan (Texas A&M University, USA)
Kelly Brumbelow (Texas A&M University, USA)

Engineering a Discipline-Specific Communication Course in Chemical Engineering ...................... 1564
Elif Eda Miskioglu (The Ohio State University, USA)
David Wood (The Ohio State University, USA)

Implementing a Competitive Learning Framework in Chemical Engineering Degree in Spain and its Applicability on an Inter-University Scenario................................. 1568
Alicia Triviño (Universidad de Malaga, Spain)
Ernesto De la Rubia (Universidad de Malaga, Spain)
Francisco-Angel Moreno (Universidad de Malaga, Spain)
Francisco Javier Lopez-Martinez (Universidad de Malaga, Spain)
Juan José Sánchez-Martínez (Universidad de Malaga, Spain)

DIS2: Assessing Student Success Factors in Distance Learning
Chair: Anurima Chatterjee
2:30 PM - 4:00 PM
Room: Escudo

Recommending Learning Objects Based on Utility and Learning Style ............................................... 1572
Grace Borges (UFABC, Brazil)
Itana Stiubiener (UFABC, Brazil)

What is Learning Presence and What Can it Tell Us About Success in Learning Online? ..................... 1581
Ruth E H Wertz (Valparaiso University, USA)

Social, Cognitive, Teaching, and Metacognitive Presence in General and Focus Group Discussion: Case Study in Blended e-Learning Linear Algebra Class ............................................. 1587
Kasiyah Junus (Universitas Indonesia, Indonesia)
Lia Sadita (Universitas Indonesia, Indonesia)
Heru Suhartanto (Universitas Indonesia, Indonesia)

A learner profile analysis based on competences to improve online teaching strategies ..................... 1593
Ana-Elena Guerrero-Roldán (Universitat Oberta de Catalunya, Spain)
Elena Rodriguez-Gonzalez (Universitat Oberta de Catalunya, Spain)

Bridging Achievement Gaps Amongst School Students through a Technology-based Blended Learning Model.. 1599
Anurima Chatterjee (Educational Initiatives Pvt. Ltd., India)
Pranav Kothari (Educational Initiatives Pvt. Ltd., India)

EER/SCL: Designing and Refining Reflection Activities for Engineering Education
2:30 PM - 4:00 PM
Room: El Escorial

Designing and Refining Reflection Activities for Engineering Education ............................................. 1607
Jennifer Turns (University of Washington, USA)
Brook Sattler (University of Washington, USA)
Anette Kolmos (Aalborg University, Denmark)
EER6: Engineering Education Research Methods and Methodologies
Chair: Adam R Carberry
2:30 PM - 4:00 PM
Room: Aranjuez

Using Realtime Transcription to do Member-Checking During Interviews........................................................... 1611
Mel Chua (Purdue University, USA)
Robin Adams (Purdue University, USA)

Well, That Didn't Work A Troubled Attempt to Quantitatively Measure Engineering Students' Lifelong Learning Development Over Two Years of College........................................................... 1614
Jonathan Stolk (Franklin W. Olin College of Engineering, USA)
Robert Martello (Franklin W. Olin College of Engineering, USA)
Kathleen Koehler (LASPAU Academic and Professional Programs for the Americas, USA)
Katherine Chen (California Polytechnic State University at San Luis Obispo, USA)
Roberta Herter (California Polytechnic State University at San Luis Obispo, USA)

From Methods to Methodology: Reflection on Keeping the Philosophical Commitments of Interpretative Phenomenological Analysis ................................................................................................................................. 1622
James Huff (Harding University, USA)
Jonathan Smith (Birkbeck College, University of London, United Kingdom)
Brent Jesiek (Purdue University, USA)
Carla Zoltowski (Purdue University, USA)
William Graziano (Purdue University, USA)
William Oakes (Purdue University, USA)

Application of Design Research Methodology to a Context-Sensitive Study in Engineering Education.................... 1631
Rémy Crepon (Universidad Complutense Madrid (UCM), Spain)

Evaluation of a simulation platform for interaction training: a multi-phased methodology...................................... 1635
Miguel Monasor (Lero, University of Limerick, Ireland)
Aurora Vizcaíno (University of Castilla-La Mancha, Spain)
Mario Piattini (University of Castilla-La Mancha, Spain)
John Noll (University of Limerick, Ireland)
Sarah Beecham (University of Limerick, Ireland)

FAC3: Faculty Development: Initiatives and Research
Chair: Uma Garimella
2:30 PM - 4:00 PM
Room: La Granja

Moving Towards Outcome-based Education - Faculty Development Initiatives ........................................................... 1643
Uma Garimella (Nalla Malla Reddy Engineering College, India)
Divya Nalla (Nalla Malla Reddy Engineering College, India)

Fostering teacher motivation for training using Massive Open Online Courses.................................................... N/A
Zoraida Callejas (University of Granada, Spain)
Belen Prados-Suarez (University of Granada, Spain)

What are the significant factors that have influenced the adoption of Moodle by staff in a Māori tertiary institution? ........................................................................................................... 1654
Tane R Kaka (Te Wānanga o Aotearoa, New Zealand)

The Lighthouse Project: Researching Educator Professional Development for Diversity in Computing ................. N/A
Kathryn Cooke (University of Virginia, USA)
Joanne Cohoon (University of Virginia, USA)
James Cohoon (University of Virginia, USA)
The Quest for the Mythical Phoenix: Attendee Narratives at an Engineering Education Faculty Workshop .......... 1662
Mel Chua (Purdue University, USA)
Emily Dringenberg (Purdue University, USA)

INT: Special Session: Potential Futures for Engineering Education through Scenario Planning
2:30 PM - 4:00 PM
Room: El Jardin

Special Session: Potential Futures for Engineering Education through Scenario Planning ............................... 1666
Jeffrey E Froyd (Texas A&M University, USA)
Susan M. Lord (University of San Diego, USA)
Matthew W Ohland (Purdue University, USA)
Kishore Prahallad (International Institute of Information Technology, India)
Euan Lindsay (Charles Sturt University, Australia)
Burton Dicht (IEEE, USA)

PRE2: Programs and Activities in Precollege Education
Chair: Rosa Maria Vasconcelos
2:30 PM - 4:00 PM
Room: Comendador

DISSECT: An Experiment in Infusing Computational Thinking in K-12 Science Curricula ................................. 1668
Kenza Arraki (New Mexico State University, USA)
Kasha Blair (New Mexico State University, USA)
Taylor Burgett (New Mexico State University, USA)
Jessica Greenling (New Mexico State University, USA)
Jessica Haebel (New Mexico State University, USA)
G. Lee (New Mexico State University, USA)
Amanda Peel (New Mexico State University, USA)
Victor Szczechanski (New Mexico State University, USA)
Enrico Pontelli (New Mexico State University, USA)
Sarah Hug (University of Colorado at Boulder, USA)

Classroom Makerspaces: Identifying the Opportunities and Challenges ............................................................... 1677
Avneet Hira (Purdue University, USA)
Cole Joslyn (Purdue University, USA)
Morgan Hynes (Purdue University, USA)

SM4T: Scratch MOOC for Teens A pioneer pilot experience in Uruguay ................................................................. 1682
Inés Friss de Kereki (Universidad ORT Uruguay, Uruguay)
Víctor Paulós (Universidad ORT Uruguay, Uruguay)

Increasing 11th Grader's Interest in STEM Majors via a NAE Grand Challenge:
Securing Cyberspace-Themed Project ......................................................... 1686
Donald Fehlinger, Jr. (Drexel University, USA)
Jessica Ward (Drexel University, USA)
Adam Fontecchio (Drexel University, USA)

Embedding Android Signal Processing Apps in a High School Math Class - An RET Project ......................... 1689
Mahesh Banavar (Arizona State University, USA)
Deepta Rajan (Arizona State University, USA)
Andrew Strom (Corona Del Sol High School, USA)
Photini Spanias (Arizona State University, USA)
Xue Zhang (Arizona State University, USA)
Henry Braun (Arizona State University, USA)
Andreas Spanias (Arizona State University, USA)
SBM2: Student Motivation
Chair: Margaret D. Sullivan
2:30 PM - 4:00 PM
Room: Patio 1

Results of a Large-Scale, Multi-Institutional Study of Undergraduate Retention in Computing ........................................... 1693
Lecia Barker (University of Texas at Austin, USA)
Christopher L Hovey (Northeastern University, USA)
Leisa Thompson (University of Virginia, USA)

First Generation College Students' Access to Engineering Social Capital:
Towards Developing a Richer Understanding of Important Alters ................................................................. 1701
Aubrie L Pfirman (Clemson University, USA)
Matthew Miller (Clemson University, USA)
Gerardo Santana Alvarez (Clemson University, USA)
Julie Martin (Clemson University, USA)

Using reflective practices to reduce dropout rates among first year students
at a University of Technology, a South African perspective ........................................................................ 1708
Rangith Kuriakose (Central University of Technology, South Africa)
Hermanus Vermaak (Central University of Technology, South Africa)

Black Engineering Transfer Students: What Explains Their Success? ............................................................. 1714
Clemencia Cosentino (Mathematica Policy Research, USA)
Margaret D Sullivan (Mathematica Policy Research, USA)
Nikhil Gahlawat (Mathematica Policy Research, USA)
Matthew W Ohland (Purdue University, USA)
Russell Long (Purdue University, USA)

Developing a Culture of Support for Recruitment and Retention of American Indian Students ....................... 1719
Carter Kerk (South Dakota School of Mines and Technology, USA)
Stuart Kellogg (South Dakota School of Mines and Technology, USA)

SCL6: Impact of Student-centric Learning
Chair: James Widmann
2:30 PM - 4:00 PM
Room: Alcalá

The Impact of active learning strategies in second cycle students of an engineer course: a case study ........... 1725
Cristina Gaspar Oliveira (Universidade de Aveiro, Portugal)
Paulo André (Universidade de Lisboa, Portugal)

Developing a Smart Grid Cybersecurity Education Platform and a Preliminary Assessment of Its First Application ......................................................... 1732
Timothy Yardley (University of Illinois at Urbana-Champaign, USA)
Suleyman Uludag (The University of Michigan - Flint, USA)
Klara Nahrstedt (University of Illinois at Urbana-Champaign, USA)
Peter Sauer (University of Illinois at Urbana-Champaign, USA)

Content Recommendation in an Inquiry-based Learning Environment .............................................................. 1741
Otavio Acosta (Federal University of Rio Grande do Sul, Brazil)
Patricia Behar (Federal University of Rio Grande do Sul, Brazil)
Eliseo Reategui (Federal University of Rio Grande do Sul, Brazil)

Initial motivation and progress with doctoral studies in computer science -
A case study from a Finnish university .............................................................................................................. 1747
Sami Kollanus (Univ. of Jyväskylä, Finland)

October 22-25, 2014 Madrid, Spain
2014 IEEE Frontiers in Education Conference
Learning Fundamental Mechanics Relationships Using Inquiry-Based Learning Activities
Brian Self (California Polytechnic State University, USA)
James Widmann (California Polytechnic State University, USA)

A Systematic Mapping Study on Practical Approaches to Teaching Software Engineering
Maira Marques Samary (Universidad de Chile, Chile)
Alcides Quispe (Universidad de Chile, Chile)
Sergio Ochoa (Universidad de Chile, Chile)

TLE6: Technologies and Practices for Teaching and Learning Engineering
Chair: Adrian Rusu
2:30 PM - 4:00 PM
Room: La Galería

Developing Novel Practices of Somatic Learning to Enhance Empathic Perspective-Taking for Ethical Reasoning and Engineering Design
Holly Jaycox (Purdue University, USA)
Justin Hess (Purdue University, USA)
Carla Zoltowski (Purdue University, USA)
Andrew O. Brightman (Purdue University, USA)

A Service-Oriented Reference Architecture for Mobile Learning Environments
Nemesio Duarte Filho (University of São Paulo, Brazil)
Ellen Barbosa (University of São Paulo, Brazil)

Is a Mac "PC" in Engineering?
Cory Brozina (Virginia Tech, USA)
Courtney Smith (Virginia Tech, USA)
Suzanne Nicewonder (Virginia Tech, USA)
Ben Lutz (Virginia Tech, USA)

Deployment and Analysis of Lecture Recording in Engineering Education
Carlos Turro (Universitat Politècnica de València, Spain)
Ignacio Despujol (Universitat Politècnica de València, Spain)
Aristóteles Cañero (Universitat Politècnica de València, Spain)
Jaime Busquets (Universitat Politècnica de València, Spain)

Interdisciplinary Faculty-Faculty Collaborations for the Development of Learning Technologies
Adrian Rusu (Rowan University, USA)
Matthew Bealor (Rowan University, USA)
Hector Lopez (Rowan University, USA)

ASM2: Uses of Assessment to Promote Learning
5:00 PM - 6:30 PM
Room: Patio 3

The Effects of Test-Enhanced Learning on Student Learning in an Electric Circuits Course
Archie Holmes (University of Virginia, USA)

Including Peer and Self-Assessment in a Continuous Assessment Scheme in Electrical and Electronics Engineering Courses
Juan Carlos Gonzalez de Sande (Universidad Politecnica de Madrid, Spain)
Adarsh Murthy (National Institute of Technology Karnataka-Surathkal, Mangalore, India)
Promoting student commitment and responsibility through self- and peer-assessment ......................................................... 1811
Carlos Serra-Toro (Universitat Jaume I, Spain)
V. Javier Traver (Universitat Jaume I, Spain)
Juan C Amengual (Universitat Jaume I, Spain)

Redesign the Engineering Teaching and Assessment Methods to 
Provide More Information to Improve Students’ Learning ................................................................. 1815
Omar M. Ashour (Pennsylvania State University, The Behrend College, USA)
Shraddha Sangellkar (Pennsylvania State University, The Behrend College, USA)
Russell L. Warley (Pennsylvania State University, The Behrend College, USA)
Oladipo Onipede (Pennsylvania State University, The Behrend College, USA)

Prediction of students’ academic performance:
Adapt a methodology of predictive modeling for a small sample size ................................................................. 1821
John Mativo (University Of Georgia, USA)
Shaobo Huang (University of Southern California, USA)

CUR4: Using Learning Theories to Guide Curriculum Design
5:00 PM - 6:00 PM
Room: Doblon

100% PBL Curriculum Startup Phase Complete ................................................................. 1824
Ron Ulseth (Itasca Community College, USA)
Bart Johnson (Itasca Community College, USA)

Upgrading the Engineering Curriculum Through Thematic Learning Modules ................................................................. 1832
Fazeel Khan (Miami University, USA)
Kumar Singh (Miami University, USA)

Using a cyclic model of knowledge transfer for the development of transdisciplinary learning environments ................................................................. 1836
Klavdiya Bochenina (ITMO University, Russia)
Irina Boukhanovskaya (ITMO University, Russia)
Anna Bilyatdinova (ITMO University, Russia)
Alexey Dukhanov (ITMO University, Russia)
Anna Lutsenko (ITMO University, Russia)

A Practice-then-Apply Scaffolding Approach to Engineering Design Education ................................................................. 1845
Adam R Carberry (Arizona State University, USA)
Nathan Johnson (Arizona State University, USA)
Mark Henderson (Arizona State University, USA)

Designing a Blended Learning Curriculum in the Development of Video Games ................................................................. 1848
Angela Restrepo (Universidad de los Andes, Colombia)
Pablo Figueroa (Universidad de los Andes, Colombia)

DIS3: Distance Education in Multiple Disciplines
Chair: Bridget Benson
5:00 PM - 6:30 PM
Room: Escudo

Experience with Teaching Digital Design Online ................................................................. 1851
Bridget Benson (California Polytechnic State University, USA)
Bryan Mealy (California Polytechnic State University, USA)

Efficacy of an Online Writing Program on URM Students in Engineering ................................................................. 1858
Patricia R Backer (San Jose State University, USA)

October 22-25, 2014 Madrid, Spain
2014 IEEE Frontiers in Education Conference
xcvi
Online Resource Platform for Mathematics Education
Edmund Nevin (Dublin Institute of Technology, Ireland)
Marisa Llorens (Dublin Institute of Technology, Ireland)
Eileen Mageean (Dublin Institute of Technology, Ireland)

The Use of Self-Monitoring Tools for Linear Algebra Course in Student Centered e-Learning Environment
Kasiyah Junus (Universitas Indonesia, Indonesia)
Harry Santoso (Universitas Indonesia, Indonesia)
Lia Sadita (Universitas Indonesia, Indonesia)

Comparison of the Impact of Two Research Experiences for Undergraduate Programs on Preparing Students for Global Workforces
Gisele Ragusa (University of Southern California, USA)
Cheryl Matherly (University of Tulsa, USA)
Sarah R. Phillips (Rice University, USA)

EER7: Reflection and Metacognition
Chair: Chris Venters
5:00 PM - 6:30 PM
Room: Aranjuez

"I Just Google It": A Qualitative Study of Information Strategies in Problem Solving Used by Upper and Lower Level Engineering Students
Anna Douglas (Purdue University, USA)
Connor Rohan (Purdue University, USA)
Michael Fosmire (Purdue University, USA)
Casey Smith (Purdue University, USA)
Amy S Van Epps (Purdue University, USA)
Senay Purzer (Purdue University, USA)

Using the Engineering Design Process as a Metacognitive Learning Strategy to Improve Student Performance
Peter Shull (Penn State University, USA)

Reflecting on Engineering Concepts: Effects on Critical Thinking
Polly Piergiovanni (Lafayette College, USA)

Using Cooperative Learning to Enhance Critical Reflection
Meriel Huggard (Trinity College Dublin, Ireland)
Frank Boland (Trinity College Dublin, Ireland)
Ciaran Mc Goldrick (Trinity College Dublin, Ireland)

Writing and Conceptual Knowledge in Statics: Does Learning Approach Matter?
Chris Venters (East Carolina University, USA)
Lisa McNair (Virginia Polytechnic Institute and State University, USA)
Marie Paretti (Virginia Polytechnic Institute and State University, USA)

FAC2: Supporting and Empowering Faculty
Chair: Luis Amaral
5:00 PM - 6:30 PM
Room: La Granja

Potential Minimum Viable Value Propositions for Engineering Education Scholarship
Jeffrey E Froyd (Texas A&M University, USA)
R Cheville (Bucknell University, USA)
Thomas Siller (Colorado State University, USA)
New Faculty Development: Creating a Community of Practice
Mary Lynn Brannon (The Pennsylvania State University, USA)
Sarah Zappe (The Pennsylvania State University, USA)

A Program Designed to Empower Engineering Educators
Melany M Ciampi (Safety, Health and Environment Research Organization, Brazil)
Claudio R Brito (Science and Education Research Council, Brazil)
Luís Amaral (University of Minho, Portugal)
Rosa Maria Vasconcelos (University of Minho, Portugal)
Victor F. A. Barros (Science and Education Research Council, Portugal)

An Examination of the Climate for Quality Teaching in Engineering
Jacqueline McNeil (Purdue University, USA)
Catherine E. Brawner (Research Triangle Educational Consultants, USA)
Matthew W Ohland (Purdue University, USA)

A Higher Education Social Network to Share and Promote Teaching Innovation Experiences
Lina García-Cabrera (University of Jaén, Spain)
José Ramón Balsas Almagro (University of Jaén, Spain)
Ildefonso Ruano Ruano (University of Jaén, Spain)

PHI: Special Session: Agents for STEM Change - Articulating the Goals of Our Community
5:00 PM - 6:30 PM
Room: El Jardin

Special Session: Agents for STEM Change - Articulating the Goals of Our Community
Rebecca Bates (Minnesota State University, Mankato, USA)
R Cheville (Bucknell University, USA)
Jennifer Karlin (SD School of Mines and Technology, USA)
Lisa Benson (Clemson University, USA)
Cynthia Finelli (University of Michigan, USA)
Susan M. Lord (University of San Diego, USA)

PRE: Pre-College (K-12) Engineering Education: Getting Them Early ... and Keeping Them!
5:00 PM - 6:30 PM
Room: El Escorial

Middle School Students' Understanding and application of the Engineering Design Process
Linda S. Hirsch (New Jersey Institute of Technology, USA)
Suzanne Berliner Heyman (New Jersey Institute of Technology, USA)
John Carpinelli (New Jersey Institute of Technology, USA)
Howard Kimmel (New Jersey Institute of Technology, USA)
STEM Integration in the Middle Grades: A Case Study of Teacher Implementation ................................................ 1960
Tamara J. Moore (Purdue University, USA)
Corey A Mathis (Purdue University, USA)
Selcen Guzey (University of Minnesota, USA)
Aran Glancy (University of Minnesota, USA)
Emilie Siverling (Purdue University, USA)

Initial Findings of High School Pre-engineering and Non-engineering Students' Design Cognition ................. 1968
Matthew Lammi (NC State University, USA)
John Wells (Virginia Polytechnic Institute & State University, USA)
Cameron Denson (NC State University, USA)
Marie Paretti (Virginia Polytechnic Institute & State University, USA)
Christopher Williams (Virginia Polytechnic Institute & State University, USA)
John Gero (George Mason University, USA)

Development of Non-Cognitive Skills in Minority Engineering Outreach Programs................................................. 1972
Tasha Zephirin (Purdue University, USA)
DeLean Tolbert (Purdue University, USA)
Darryl Dickerson (Purdue University, USA)
Freddy Solis (Purdue University, USA)

SBM3: Student Beliefs, Motivation, and Persistence Through the College Years
Chair: Rodany A. Merida
5:00 PM - 6:30 PM
Room: Patio 1

Attitude towards Capstone Project: Looking from Gender and Stage Perspectives .................................................... 1976
Rex Bringula (University of the East, Philippines)
Rodany A Merida (University of the East, Philippines)
John Benedic Enriquez (University of the East, Philippines)
Gil Francis Abinal (University of the East, Philippines)
Jose Mari Ramos (University of the East, Philippines)

The Use of Physiological Tools to Identify Changes in Affective Responses for Graduate Students Recently Admitted into a Scientific Discipline ........................................................... 1983
Idalis Villanueva (Utah State University, USA)
Adam Raikes (Utah State University, USA)
Nathan Ruben (Utah State University, USA)
Sydney Schaefer (Utah State University, USA)
Jake Gunther (Utah State University, USA)

That's Not My Style: Understanding the Correlation of Learning Style Preferences, Self-Efficacy, and Student Performance in an Introductory Chemical Engineering Course ............................ 1988
Elif Eda Miskioglu (The Ohio State University, USA)
David Wood (The Ohio State University, USA)

The Development of a Virtual Socializer-Based Intervention Targeting Low-Achieving Second-Year Engineering Students ................................................................. 1991
Kevin Sevilla (The University of Queensland, Australia)
Marie Paretti (Virginia Tech, USA)

Development of an Instrument to Measure the Self-efficacy of Teaching Engineering Design (SETED) ............. 1996
Erik Ward (NC State University, USA)
Matthew Lammi (NC State University, USA)
The Impacts of Service Learning on Students and Community Members: Lessons from Design Projects for Older Adults

Caitrin Lynch (Olin College of Engineering, USA)
Lynn Andrea Stein (Olin College of Engineering, USA)
Sharon Grimshaw (Olin College of Engineering, USA)
Elizabeth Doyle (Olin College of Engineering, USA)
Lois Camberg (Olin College of Engineering, USA)
Ela Ben-Ur (Olin College of Engineering, USA)

Engineering for Development: An International Service Learning Collaboration

Miguel A. Pando (University of North Carolina at Charlotte, USA)
Brett Tempest (University of North Carolina at Charlotte, USA)
Marcial Blondet (Catholic University of Peru (PUCP), Peru)
Sandra Dika (University of North Carolina at Charlotte, USA)

Engineers Without Borders: An Empirical Investigation of Member's Defining Characteristics

Daniel Knight (University of Colorado Boulder, USA)
Kaitlin Litchfield (University of Colorado at Boulder, USA)
Amy Javernick-Will (University of Colorado Boulder, USA)

Cultural Considerations in Service Learning with American Indian Reservation Community Stakeholders

Jennifer Benning (South Dakota School of Mines and Technology, USA)
Andrea Surovek (South Dakota School of Mines and Technology, USA)
Daniel Dolan (South Dakota School of Mines and Technology, USA)
Lyle Wilson (Oglala Lakota College, USA)
Andrew Thompson (Oglala Lakota College, USA)
Rob Pyatt (University of Colorado Boulder, USA)

Preliminary Results of a Freshmen Capstone Project to Design Educational Modules for Teachers in the Dominican Republic

David Reeping (Ohio Northern University, USA)
John K. Estell (Ohio Northern University, USA)
Kenneth Reid (Virginia Tech, USA)

Making Examinations 'More Enjoyable'

Karl O. Jones (Liverpool John Moores University, United Kingdom)
John Skiffington (Liverpool John Moores University, United Kingdom)
Rebecca Bartlett (Liverpool John Moores University, United Kingdom)

Improving the Student Academic Experience through Lean Engineering Principles

Denise R. Simmons (Virginia Tech, USA)
Glenda Young (Virginia Tech, USA)

How to make a distributed programming course a big fun

Evgeny Osipov (Lulea University of Technology, Sweden)
Arash Mousavi (Lulea University of Technology, Sweden)
Enhanced learning by promoting engineering competencies ................................................................. 2044
Sofia Cassel (Uppsala University, Sweden)
Aletta Nylén (Uppsala University, Sweden)
Björn Victor (Uppsala University, Sweden)

A Recommendation System to Support the Students Performance in Programming Contests .................. 2050
Lilian Paula (Federal Institute of Education, Science and Technology of the South of Minas Gerais, Brazil)
Aracele Fassbinder (Federal Institute of Education, Science and Technology of the South of Minas Gerais, Brazil)
Ellen Barbosa (University of São Paulo, Brazil)

Saturday, October 25

**ASM3: Evaluation of Assessment Approaches and Instruments**
9:00 AM - 10:30 AM
Room: Patio 3

Assessing the Assessment - Insights into CS1 Exams ........................................................................ 2058
Ela Zur (The Open University of Israel, Israel)
Tamar Vilner (The Open University of Israel, Israel)

A Multi-Perspective Framework for Evaluating Software Engineering Education by Assessing Students' Competencies ................................................................................................. 2065
Yvonne Sedelmaier (Coburg University of Applied Sciences and Arts, Germany)
Dieter Landes (Coburg University of Applied Sciences and Arts, Germany)

Development and Validation of a Nano Size and Scale Instrument (NSSI) .................................................. 2073
Yi Kong (Purdue University, USA)
Heidi Diefes-Dux (Purdue University, USA)
Kelsey J Rodgers (Purdue University, USA)
Anna Douglas (Purdue University, USA)
Krishna Madhavan (Purdue University, USA)

A case study of using multiple choice questions, supported by ICT, in an introductory Physics course for engineers ......................................................................................................................... 2077
Diana Urbano (Universidade do Porto, Portugal)
Cristina Gaspar Oliveira (Universidade de Aveiro, Portugal)
Paulo Coelho Oliveira (Instituto Superior de Engenharia do Porto, Portugal)

Items' difficulty level determination based on a Statics test with parameters variation ................................ 2081
Andrés Restrepo (EAFIT University, Colombia)
Jorge L. Restrepo (EAFIT University, Colombia)
Jaime Barbosa (EAFIT University, Colombia)

**CSC1: Computer Science Teaching**
9:00 AM - 10:30 AM
Room: Doblon

Open Hardware Platforms in a First Course of the Computer Engineering Undergraduate Program ............ 2085
Ricardo Santos (Federal University of Mato Grosso do Sul, Brazil)
Using Cybersecurity as an Engineering Education Approach on Computer Engineering to Learn about Smart Grid Technologies and the Next Generation of Electric Power Systems

Daniel Navarro (University of Puerto Rico-Mayaguez, Puerto Rico)
Jean Mendez (University of Puerto Rico-Mayaguez, Puerto Rico)
Kidany Berrios (University of Puerto Rico-Mayaguez, Puerto Rico)
Eduardo Ortiz-Rivera (University of Puerto Rico-Mayaguez, Puerto Rico)
Emmanuel Arzuaga (University of Puerto Rico-Mayaguez, USA)

Augmented Learning Roads for Internet Routing

John McCaffery (University of St Andrews, United Kingdom)
Alan H. D. Miller (University of St Andrews, United Kingdom)
Iain Oliver (University of St Andrews, United Kingdom)
Colin Allison (University of St Andrews, United Kingdom)

SCAM, a Flexible, Scheme-like Language for Teaching Programming Language Concepts

John Lusth (The University of Alabama, USA)

Active learning method in "System Analysis and Control" area

Dmitry Nikolaevich Bazylev (ITMO University, Russia)
Alexey Margun (ITMO University, Russia)
Konstantin Žimenko (ITMO University, Russia)
Alexandr Shehukin (ITMO University, Russia)
Artem Kremlev (ITMO University, Russia)

DIS4: Computer Tools for Distance Education 1
9:00 AM - 10:30 AM
Room: Escudo

The usefulness of Usability and User Experience evaluation methods on an e-Learning platform development from a developer's perspective: A case study

Aldo Gordillo (Universidad Politécnica de Madrid, Spain)
Enrique Barra (Universidad Politécnica de Madrid, Spain)
Sandra Aguirre Herrera (Universidad Politécnica de Madrid, Spain)
Juan Quemada Vives (Universidad Politécnica de Madrid, Spain)

MobiMonitor: a Mobile App for Monitoring Distance Courses in the Amazon Region

Ketlen K. Teles Lucena (Federal University of Amazonas, Brazil)
Jath da Silva e Silva (Federal University of Amazonas, Brazil)
Vitor Brengartner (Federal University of Amazonas, Brazil)
Elaine H. T. de Oliveira (Federal University of Amazonas, Brazil)
Bruno Gadelha (Federal University of Amazonas, Brazil)

An Agent-based Tutoring System for Learning Propositional Logic Using Multiple Linked Representations

Evandro Costa (Federal University of Alagoas, Brazil)
Emanuele Tuane Silva (Federal University of Alagoas, Brazil)
Anderson Santos (Federal University of Alagoas, Brazil)
Alexandre Carlos Santos Azevedo (Federal University of Alagoas, Brazil)
Priscylla Silva (Federal University of Alagoas, Brazil)
Marlos Silva (Federal Institute of Education, Science and Technology, Brazil)
Hemilis Rocha, HJ (Federal University of Alagoas, Brazil)
Caroline Lima (Federal University of Alagoas, Brazil)
Computer Networks Virtualization with GNS3:
Evaluation a solution to optimize resources and achieve a distance learning .......................................................... 2141
Pablo Gil (University of Alicante, Spain)
Gabriel Jesus Garcia (University of Alicante, Spain)
Angel Delgado (University of Alicante, Spain)
Rosa Medina (University of Alicante, Spain)
Antonio Calderon (University of Alicante, Spain)
Patricia Marti (University of Alicante, Spain)

Keyword Extraction for Mining Meaningful Learning-Contents on the Web Using Wikipedia........................................ 2145
Tetsuya Toyota (National Institute of Informatics, Japan)
Yuan Sun (National Institute of Informatics, Japan)

EER8: Problem Solving, Mathematics and Design
Chair: Robert M Capraro
9:00 AM - 10:30 AM
Room: Aranjuez

Monica Cardella (Purdue University, USA)
DeLean Tolbert (Purdue University, USA)

Cognitive Strategies and Misconceptions in Introductory Statics Problems ............................................................... ........ 2152
Wade Goodridge (Utah State University, USA)
Idalis Villanueva (Utah State University, USA)
Benjamin Call (Utah State University, USA)
Maria Valladares (Utah State University, USA)
Nicholas J. A. Wan (Utah State University, USA)
Christopher Green (Utah State University, USA)

Identifying the variation of experiences when dealing with problems in complex systems ........................................ 2156
John Mendoza-Garcia (Purdue University / Pontificia Universidad Javeriana, USA)
Monica Cardella (Purdue University, USA)
William Oakes (Purdue University, USA)

Pathways to Engineering: Mathematics as a Mediator of Engineering Success ...................................................... .. 2160
Sandra B Nite (Texas A&M University, USA)
Jim Morgan (Texas A&M University, USA)
Mary M Capraro (Texas A&M University, USA)
Robert M Capraro (Texas A&M University, USA)
Cheryl A Peterson (Texas A&M University, USA)

An Examination of Mathematics Preparation For and Progress Through Three Introductory Computer Science Courses............................................................................ ................ 2165
Christine F Reilly (University of Texas - Pan American, USA)
Emmett Tomai (University of Texas - Pan American, USA)
FAC1: Faculty Roles
9:00 AM - 10:30 AM
Room: La Granja

Epistemological Frames of Graduate Teaching Assistants and Instructors in Studio-Based Engineering Classes
Christina Smith (Oregon State University, USA)
Debra Gilbuena (Oregon State University, USA)
Devlin Montfort (Oregon State University, USA)
Milo Koretsky (Oregon State University, USA)

Practical implications in engineering education: Who is supposed to do what?
Jennifer Turns (University of Washington, USA)
Drew Paine (University of Washington, USA)
Brook Sattler (University of Washington, USA)

On the Role of a "Caring" Professor in Developing a Proper Learning Environment
Waddah Akili (Geotechnical Engineering, USA)

A Self-Assessment of the Use of Evidence-Based Instructional Practices in Engineering
Sarah Zappe (Pennsylvania State University, USA)
Daniel Merson (Pennsylvania State University, USA)
Kirsten Hochstedt (Pennsylvania State University, USA)
Lindsey Schrott (Pennsylvania State University, USA)
Thomas Litzinger (Pennsylvania State University, USA)

Making Teachers from Students: How Learning Environments May Foster an Interest in Teaching
Adam Coppola (Olin College of Engineering, USA)
Yevgeniya V Zastavker (Olin College of Engineering, USA)
Jeremy M Goodman (Olin College of Engineering, USA)
Rebecca Christianson (Olin College of Engineering, USA)
Anne LoVerso (Olin College of Engineering, USA)
Cecelia Auerswald (Olin College of Engineering, USA)
Doyung Lee (Olin College of Engineering, USA)

INT1: International Dimensions of Engineering Education
9:00 AM - 10:30 AM
Room: La Galería

Parallel Virtual Urban Workshop: A "reasonable-cost" methodology for academic internationalization in problem-solving oriented postgraduate subjects
Ester Higueras (Technical University of Madrid, Spain)
Jose Fernández-Güell (Technical University of Madrid, Spain)
Francisco Lamíquiz (Technical University of Madrid, Spain)
Marcela Riva Monti (Technical University of Madrid, Spain)

Engineering International Programs at the Public University of Navarre: a satisfactory on-going experience in a context of industrial globalization
Pablo Sanchis (Public University of Navarre, Spain)
Antonio J López-Martín (Public University of Navarre, Spain)
Jesús López-Taberna (Public University of Navarre, Spain)
Gurutze Pérez-Artieda (Public University of Navarre, Spain)
Eugenio Gubía (Public University of Navarre, Spain)
Edurne Barrenechea (Public University of Navarre, Spain)
David Astrain (Public University of Navarre, Spain)
Daniel Morato (Public University of Navarre, Spain)
Ignacio R. Matias (Public University of Navarre, Spain)
Opening up an interuniversity collaboration among Catalan university academic staff

The case of CIRAX pilot experience .............................................................................................................. 2218
Teresa Sancho-Vinuesa (Universitat Oberta de Catalunya, Spain)
M. Rosa Estela (Universitat Politècnica de Catalunya, Spain)
Joana Villalonga Pons (Universitat Oberta de Catalunya (UOC), Sweden)
Clàudia Sánchez-Bonvehí (Consorci de Serveis Universitaris de Catalunya, Spain)

Thinking out of the box: C-projectors and morphological overview .......................................................... 2226
Wim Zeiler (University of Technology Eindhoven, The Netherlands)

MINI WS: Special Session on Design & Failure: How Philosophy and Belief Impact Design Education
9:00 AM - 10:30 AM
Room: El Jardin

Special Session on Design & Failure: How Philosophy and Belief Impact Design Education.......................... 2234
Stephen Frezza (Gannon University, USA)
Mani Mina (Iowa State University, USA)

PRE4: Delivery Techniques for Precollege Education
Chair: Ann Kaiser
9:00 AM - 10:30 AM
Room: Comendador

CorePal: A standards-based content hub for STEM fields ............................................................................ 2238
Smitesh Bakrania (Rowan University, USA)
Krishan Bhatia (Rowan University, USA)
Kauser Jahan (Rowan University, USA)

A Mobile Program for Enhancing Engineering Education ........................................................................... 2243
Kauser Jahan (Rowan University, USA)
Nancy K DeJarnette (Rowan University, USA)

Pathways To Effective K-12 STEM Programs................................................................................................. 2248
Howard Kimmel (New Jersey Institute of Technology, USA)
Levelle Burr-Alexander (New Jersey Institute of Technology, USA)
Linda S. Hirsch (New Jersey Institute of Technology, USA)
Ronald Rockland (New Jersey Institute of Technology, USA)
John Carpinelli (New Jersey Institute of Technology, USA)
Marie Aloia (Bayonne High School, USA)

Using K-12 STEM education and outreach to inspire student-driven leadership initiatives in Singapore ............ 2254
Dara R Fisher (Harvard University, USA)
Aikaterini Bagiati (Massachusetts Institute of Technology, USA)
John Brisson (Massachusetts Institute of Technology, USA)

Constructivist Learning Environments to Bridge the Gap from High School to Engineering University Degrees ............................................................................................................. N/A
Inmaculada Calet (University of Granada, Spain)
Belen Prados-Suarez (University of Granada, Spain)
Zoraida Callejas (University of Granada, Spain)
SBM4: Student Beliefs, Motivation, and Persistence in Precollege and the First Year of University Study
Chair: Eugenia Fernandez
9:00 AM - 10:30 AM
Room: Patio 1

An Award Winning Program for Increasing Participation in STEM ................................................................. 2270
Peggy Doerschuk (Lamar University, USA)
Cristian Bahrim (Lamar University, USA)
Jennifer Daniel (Lamar University, USA)
Joseph Kruger (Lamar University, USA)
Judith Mann (Lamar University, USA)
Christopher Martin (Lamar University, USA)

Changes in Student Goal Orientation Across the Semester in Undergraduate Computer Science Courses .......... 2278
Melissa Patterson Hazley (University of Nebraska - Lincoln, USA)
Duane F Shell (University of Nebraska-Lincoln, USA)
Leen-Kiat Soh (University of Nebraska-Lincoln, USA)
Lee Miller (University of Nebraska-Lincoln, USA)
Vlad Chiriacescu (University of Nebraska-Lincoln, USA)
Elizabeth Ingraham (University of Nebraska - Lincoln, USA)

Early Course and Grade Predictors of Persistence in Undergraduate Engineering Majors ..................................... 2285
James Middleton (Arizona State University, USA)
Stephen Krause (Arizona State University, USA)
Sean Maass (Arizona State University, USA)
Kendra Beeley (Arizona State University, USA)
James Collofello (Arizona State University, USA)
Robert Culbertson (Arizona State University, USA)

Student Performance in First Year, Mathematics, and Physics Courses: Implications for Success in the Study of Electrical and Computer Engineering ......................................................... 2292
Jane Simpson (Indiana University-Purdue University Indianapolis, USA)
Eugenia Fernandez (Indiana University-Purdue University Indianapolis, USA)

SER2: Service Learning Challenges
9:00 AM - 10:30 AM
Room: Alcalá

Gender and Volunteer Computing ..................................................................................................................... 2296
Feng Raoking (University of Virginia, USA)
Joanne Cohoon (University of Virginia, USA)
Kathryn Cooke (University of Virginia, USA)
Michela Taufer (University of Delaware, USA)
Trilce Estrada (University of New Mexico, USA)

Impact of Team-Based Learning on Promoting Creative Thinking in Undergraduate Engineering Students ....... 2301
Homero Murzi (National University of Tachira (UNET), USA)
Omar Perez (University of the Andes (ULA), Venezuela)

Dissemination of Community Engagement in Engineering and Computing ..................................................... 2305
William Oakes (Purdue University, USA)
Carla Zoltowski (Purdue University, USA)
Maeve Drummond (Purdue University, USA)
Volunteerism in Engineering Outreach: Motivations and Surprising Outcomes for Undergraduate Mentors........ 2312
Leslie (To-Nhu) Nguyen (Rice University, USA)
Luz M. Rocha (Rice University, USA)
Chloe (Boi-Chau) Nguyen (Rice University, USA)
Brent C Houchens (Rice University, USA)
Angie M. Bautista-Chavez (Harvard University, USA)

Development and implementation of engineering modules into a
9th grade biochemistry class based on the NAE Grand Challenges................................................................. 2320
Kamau Wright (Drexel University, USA)
Stephanie Dunda (Science Leadership Academy, USA)
Jessica Ward (Drexel University, USA)
Mary Jo Grdina (Drexel University, USA)
Timothy Kurzweg (Drexel University, USA)

ASM4: Assessment in Engineering and Computer Science
11:00 AM - 12:30 PM
Room: Patio 3

Work integrated learning at a university of technology: assessment and management............................... 2327
Rangith Kuriakose (Central University of Technology, South Africa)
Arthur Swart (Central University of Technology, South Africa)
Towards the use of an automatic assessment system in the teaching of software testing.............................. 2333
Draylson Souza (University of São Paulo, Brazil)
Bruno Oliveira (University of São Paulo, Brazil)
José Maldonado (University of São Paulo, Brazil)
Simone Souza (University of São Paulo, Brazil)
Ellen Barbosa (University of São Paulo, Brazil)

Test Anxiety and Online Testing: A Study............................................................. 2341
Amruth N. Kumar (Ramapo College of New Jersey, USA)

Motivation-Participation Conflation:
Investigating Response Bias in Intra-Semester Longitudinal Class Surveys.............................................. 2347
Alex Dillon (Franklin W. Olin College of Engineering, USA)
Jonathan Stolk (Franklin W. Olin College of Engineering, USA)

CAP1: The Capstone Experience
Chair: Vasiliki Ikonomidou
11:00 AM - 12:30 PM
Room: Alcalá

Evaluation and assessment of professional skills in the Final Year Project.............................. 2352
Fermin Sanchez (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Juan Climent (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Julita Corbalan (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Pau Fonseca i Casas (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)
Jordi Garcia (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
José R. Herrero (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Xavier Llinàs (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Horacio Rodriguez (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Maria-Ribera Sancho (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Marc Alier (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
Jose Cabre (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
David Lopez (Universitat Politecnica de Catalunya - BarcelonaTech, Spain)
A Methodology to Introduce Sustainability into the Final Year Project to Foster Sustainable Engineering Projects

David Lopez (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)
Fermin Sanchez (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)
Eva Vidal (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)
Josep Pegueroles (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)
Marc Alier (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)
Jose Cabre (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)
Jordi Garcia (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)
Helena Garcia (Universitat Politècnica de Catalunya - BarcelonaTech, Spain)

Advantages of Agile Methodologies for Software and Product Development in a Capstone Design Project

Diane Rover (Iowa State University, USA)
Curtis Ullerich (Google, USA)
Ryan Scheel (Garmin, USA)
Julie Wegter (Epic Systems, USA)
Cameron Whipple (The Boeing Company, USA)

An Effective Structure for a Senior-Level Capstone Design Course

Karl Cox (Virginia Tech, USA)
Paul Plassmann (Virginia Tech, USA)

Project Ownership and Student Performance in User-Centered Senior Design Projects

Vasiliki Ikonomidou (George Mason University, USA)
Caitlin Laurence (George Mason University, USA)
Nathalia Peixoto (George Mason University, USA)

How to produce quality theses at universities in a large scale SciPro IT system - Supporting the Scientific Process

Henrik Hansson (Stockholm University, Sweden)

CUR5: Global Experiences in Curriculum Design
11:00 AM - 12:30 PM
Room: Doblon

In Search of High Quality in Postsecondary Education in Colombia

Jesus Alfonso Perez Gama (Fundación de Educación Superior San José, Colombia)
Andrey Ali Alvarez Gaitan (Fundación de Educación Superior San José, Colombia)
Guillermo Hoyos Gomez (Fundación de Educación Superior San José, Colombia)
Claudia Lucia Caro Gomez (Fundación de Educación Superior San José, Colombia)
Martha Isabel Rozo Arteaga (Fundación de Educación Superior San José, Colombia)
Alexis Mena Mena (Fundación de Educación Superior San José, Colombia)

Preparing Global Engineers: USA-India Academia & Industry led approach

Manoj Pokkiyarath (Amrita Vishwa Vidyapeetham University, India)
Raghu Raman (Amrita Vishwa Vidyapeetham University, India)
Krishnashree Achuthan (Amrita Vishwa Vidyapeetham University, India)
Bharat Jayaraman (University at Buffalo, USA)

An Innovation Model in Curriculum Design for Teaching Engineering at Universidad EAFIT

Claudia Maria Zea Restrepo (Universidad EAFIT, Colombia)
Alberto Rodriguez (Universidad EAFIT, Colombia)
Natalia Andrea Bueno Pizarro (Universidad EAFIT, Colombia)
Merging Pedagogical Approaches: University of Glasgow-UESTC Joint Education Programme in Electronics and Electrical Engineering
Kathleen Meehan (University of Glasgow, United Kingdom)
John H. Davies (University of Glasgow, United Kingdom)
Scott Roy (University of Glasgow, European Union)
John Marsh (University of Glasgow, United Kingdom)
Yun Li (University of Glasgow, United Kingdom)
Shiquan Gao (University of Electronic Science and Technology of China, P.R. China)
Dillon Zhou (University of Electronic Science and Technology of China, P.R. China)
Zhiqin Zhao (University of Electronic Science and Technology of China, P.R. China)
Xingang Liu (University of Electronic Science and Technology of China, P.R. China)
Fengwu Luo (University of Electronic Science and Technology of China, P.R. China)

Supporting the design and development of Project Based Learning courses
Javier García Martín (Universidad Politécnica de Madrid, Spain)
Carlos López López (Universidad Politécnica de Madrid, Spain)
Jorge E. Perez-Martínez (Universidad Politécnica de Madrid, Spain)

DIS5: Computer Tools for Distance Education 2
Chair: Hector R. Amado-Salvatierra
11:00 AM - 12:30 PM
Room: Escudo

No University Credit, No Problem? Exploring Recognition of Non-Formal Learning
William Jobe (Stockholm University, Sweden)

Overcoming LMS Internet Dependency
Alberto Castro, Jr. (Federal University of Amazonas, Brazil)
Rallyson Ferreira (Federal University of Amazonas, Brazil)

Digital Technologies for Doctoral Dialogues at a Distance
Marian Petre (The Open University, United Kingdom)
Shailey Minocha (The Open University, United Kingdom)
Leonor Barroca (The Open University, United Kingdom)

Teaching and Promoting Web Accessibility in Virtual Learning Environments
A staff training experience in Latin-America
Hector R. Amado-Salvatierra (Galileo University, Guatemala)
Rocael Hernandez-Rizzardini (Galileo University, Guatemala)
Jose Ramon Hilera (University of Alcala, Spain)

EER10: Out-of-School Time Learning Communities
Chair: Archie Holmes
11:00 AM - 12:30 PM
Room: Aranjuez

A Kit-based Approach to Preparing Undergraduate Students for Research
Micaela Aguilar (The University of Alabama, USA)
John Lusth (The University of Alabama, USA)
Sarah Dunlap (The University of Alabama, USA)
Debra McCallum (The University of Alabama, USA)
Susan Burkett (The University of Alabama, USA)

Making It Together, Locally: A Making Community Learning Ecology in the Southwest USA
Micah Lande (Arizona State University at the Polytechnic campus, USA)
Shawn Jordan (Arizona State University at the Polytechnic campus, USA)
Hackerspaces and Engineering Education
Cindy Harnett (University of Louisville, USA)
Thomas Tretter (University of Louisville, USA)
Stephanie Philipp (Miami University, USA)

Assessing the Functions: Understanding the Functions of an Undergraduate Research Mentor
Courtney Smith (Virginia Tech, USA)
Marie Paretti (Virginia Tech, USA)
William Hession (Virginia Tech, USA)
Leigh Ann Krometis (Virginia Tech, USA)

Hacker School Begins to Write a Book: A massive collaborative autoethnography by a maker community
Mel Chua (Hacker School, USA)

New teaching approaches and student motivation lead to documented gains in engineering education
Aljoscha Reinert (Hamburg University of Technology, Germany)
Nils Vollmann (Hamburg University of Technology, Germany)
Marco Heyder (Hamburg University of Technology, Germany)
Wolfgang Krautschneider (Hamburg University of Technology, Germany)

LANI: Assessing Student Performance Using Learning Analytics
Chair: Cory Brozina
11:00 AM - 12:30 PM
Room: La Granja

Predicting Students' grades Based on free style Comments Data by Artificial Neural Network
Shaymaa Sorour (Kafr Elsheik University, Japan)
Tsunenori Mine (Kafr University, Japan)
Kazumasa Goda (Kafr University, Japan)
Sachio Hirokawa (Kyushu University, Japan)

Using a Learning Analytics Tool for Evaluation in Self-Regulated Learning
Ana Rodriguez Grobas (University of Santiago de Compostela, Spain)
Borja Vazquez Barreiros (University of Santiago de Compostela, Spain)
Manuel Lama (University of Santiago de Compostela, Spain)
Adriana Gewerc (University of Santiago de Compostela, Spain)
Manuel Mucientes (University of Santiago de Compostela, Spain)

Monitoring Student Performance Using Data Clustering and Predictive Modelling
Alana Morais (Universidade Federal de Campina Grande, Brazil)
Joseana Araújo (Universidade Federal de Campina Grande, Brazil)
Evandro Costa (Universidade Federal de Alagoas, Brazil)

Learning Analytics for the Prediction of the Educational Objectives Achievement
Manuel Fernández-Delgado (University of Santiago de Compostela, Spain)
Manuel Mucientes (University of Santiago de Compostela, Spain)
Borja Vazquez Barreiros (University of Santiago de Compostela, Spain)
Manuel Lama (University of Santiago de Compostela, Spain)

MINI WS: A Student-Centered Approach to Designing Teaming Experiences
11:00 AM - 12:30 PM
Room: El Jardin

A Student-Centered Approach to Designing Teaming Experiences
Jessica Townsend (Olin College of Engineering, USA)
Lynn Andrea Stein (Olin College of Engineering, USA)
Mark Somerville (Olin College of Engineering, USA)
PRE5: Teachers in Precollege Education
Chair: Nancy K. DeJarnette
11:00 AM - 12:30 PM
Room: Comendador

Engineers as Second-Career Teachers: The Perceived Contribution of Engineering Education and Career to Teaching
Orna Muller (ORT Braude College of Engineering, Israel)
Yael Furman Shaharabani (ORT Braude College of Engineering, Israel)
Miri Shacham (ORT Braude College of Engineering, Israel)

Investigation of Pre-University Pathways into Engineering
Marisa Exter (Purdue University, USA)
Ji Hyun Yu (Purdue University, USA)
Todd P Shuba (Purdue University, USA)
Carla Zoltowski (Purdue University, USA)
Monica Cardella (Purdue University, USA)
William Oakes (Purdue University, USA)
Mindy Hart (Purdue University, USA)
Jean Trusedell (Purdue University, USA)

Examining and Mapping CS Teachers' Technological, Pedagogical and Content Knowledge (TPACK) in K-12 Schools
Michail Giannakos (Norwegian University of Science and Technology & Old Dominion University, Norway)
Spyros Doukakis (The American College of Greece – Pierce, Greece)
Helen Crompton (Old Dominion University, USA)
Nikos Chrissochoides (The Hellenic Ministry of Education, USA)
Nikos Adamopoulos (High School of Pyrgos, Greece)
Panagiota Giannopoulou (The Lycée Léonin Educational Institution, Greece)

Introducing Computational Thinking through Stealth Teaching
Massood Towhidnejad (Embry-Riddle Aeronautical University, USA)
Christopher Kestler (Embry-Riddle Aeronautical University, USA)
Shafagh Jafer (Embry-Riddle Aeronautcial University, USA)
Victor Nicholas (Embry-Riddle Aeronautical University, USA)

Teachers' Attitudes, Competencies, and Readiness to Adopt Mobile Learning Approaches
Jenni Rikala (University of Jyväskylä, Finland)
Leena Hiltunen (University of Jyväskylä, Finland)
Mikko Vesisenaho (University of Jyväskylä, Finland)

PW11: Challenges and Opportunities in Partnering with Industry
11:00 AM - 12:30 PM
Room: La Galeria

A Professional Project Based Learning Method in Mobile Robotics
Annemarie Kokosy (Institut Supérieur d'Electronique et du Numérique (ISEN), France)
Mihai V. Micea (Politehnica University of Timisoara, Romania)
Philippe Saey (KU Leuven, Belgium)

On Industry Academia Relations in The Arab Gulf States: Challenges and Potential Solutions
Waddah Akli (Geotechnical Engineering, USA)
Virtual placements for informatics students in open source business across Europe
Francisco J. García-Peñalvo (University of Salamanca, Spain)
Juan Cruz-Benito (University of Salamanca, Spain)
Miguel Á. Conde (University of León, Spain)
Dai Griffiths (Bolton University, United Kingdom)

The Role of University-Industry Liaisons to Enhance Engineering Curricular Development
Francisco Falcone (Universidad Pública de Navarra, Spain)
Pablo Sanchis (Universidad Pública de Navarra, Spain)
Antonio J López-Martin (Universidad Pública de Navarra, Spain)
Ana Alejos (Universidad de Vigo, Spain)

Innovative Incorporation of Industry Certifications to Enhance Recruiting and Retention in Civil Engineering
Luis Mata (Lawrence Technological University, USA)
Donald D. Carpenter (Lawrence Technological University, USA)

SBM5: Pathways into Engineering and Computer Science Education
Chair: Tom G McEwan
11:00 AM - 12:30 PM
Room: Patio 1

A Disciplinary Comparison of Trajectories of U.S.A. Engineering Students
Susan M. Lord (University of San Diego, USA)
Richard Layton (Rose-Hulman Institute of Technology, USA)
Matthew W Ohland (Purdue University, USA)

From Interest to Decision in Cooperative Education Programs
Trina Fletcher (Purdue University, USA)
Joyce B. Main (Purdue University, USA)
Nichole Ramirez (Purdue University, USA)
Matthew W Ohland (Purdue University, USA)

Student Beliefs as Barriers to Articulation
Debbie Meharg (Edinburgh Napier University, United Kingdom)
Stephanie Craighill (Edinburgh Napier University, United Kingdom)

Looking Upstream: Identifying and Describing the Entry Points into Engineering Transfer Pathways
Catherine Mobley (Clemson University, USA)
Catherine E. Brawner (Research Triangle Educational Consultants, USA)
Russell Long (Purdue University, USA)

Factors that influence confidence: Untangling the influences of gender, achievement, and hands-on activities
Marisa K. Orr (Louisiana Tech University, USA)
Christa Swafford (Louisiana Tech University, USA)
Sara Hahler (Louisiana Tech University, USA)
David Hall (Louisiana Tech University, USA)
**SS3: Building dispositions towards models and model-based reasoning in engineering education**
11:00 AM - 12:30 PM
Room: El Escorial

*Building dispositions towards models and model-based reasoning in engineering education* ................................... 2585
Alexandra E Coso (Georgia Institute of Technology, USA)
Joseph Le Doux (Georgia Institute of Technology, USA)
Wendy Newstetter (Georgia Institute of Technology, USA)
Alisha A. Waller (Georgia Institute of Technology, USA)
Milo Koretsky (Oregon State University, USA)
Audrey Champagne (University at Albany, SUNY, USA)

---

**CSE1: Learning to Program**
Chair: Juan M Montero
2:30 PM - 4:00 PM
Room: Alcalá

*Meaningful Categorisation of Novice Programmer Errors* ........................................................................ ............... 2589
Davin McCall (University of Kent, United Kingdom)
Michael Kölling (University of Kent, United Kingdom)

*Rethinking Task Types for Novice Programmers* ................................................................................... ...................... 2597
Matthias Laengrich (TU Dresden, Germany)
Joerg Schulze (University of Applied Sciences Zittau / Goerlitz, Germany)

*Replication in Ecuador of a Multinational Study on Performance of Programming Students* ...................... 2605
J. Ángel Velázquez-Iturbide (Universidad Rey Juan Carlos, Spain)
Jorge Menéndez (Escuela Politécnica Superior de Chimborazo, Ecuador)
Julio Santillán (Escuela Politécnica Superior de Chimborazo, Ecuador)
Germania Veloz-Remache (Escuela Politécnica Superior de Chimborazo, Ecuador)
Eduardo Villa-Villa (Escuela Politécnica Superior de Chimborazo, Ecuador)

*Prototyping: A Key Skill for Innovation and Life-Long Learning* ................................................................. ............. 2613
Vimal Viswanathan (Tuskegee University, USA)
Olufunmilola Atilola (Georgia Institute of Technology, USA)
Joseph Goodman (Georgia Tech Research Institute, USA)
Julie Linsey (Georgia Institute of Technology, USA)

*Failure Rates in Introductory Programming: A 2006-2012 Study at a Brazilian University* ...................... N/A
Marlos Silva (Federal Institute of Education, Science and Technology, Brazil)
Evandro Costa (Federal University of Alagoas, Brazil)
Emanuele Tuane Silva (Federal University of Alagoas, Brazil)
Paulo Barbosa (Federal University of Alagoas, Brazil)
Juliana Cavalcanti (Federal University of Alagoas, Brazil)

---

**CUR6: Mathematics and Science Curricula Design**
2:30 PM - 4:00 PM
Room: Doblon

*ROBOTRADER Competition: Educating Engineering Students in Financial Markets* ..................................... 2628
Eduardo Lopez-Gonzalo (Universidad Politécnica Madrid, Spain)

*Robotics Engineering Program and Curriculum Development* ................................................................. 2634
Rachid Manseur (State University of New York at Oswego, USA)
Design and Implementation of a New Engineering Mathematics Course .............................................................. 2639
Zohra Mansur (State University of New York at Oswego, USA)
Rachid Mansur (State University of New York at Oswego, USA)

Ann Kaiser (La Salle Academy, USA)

Modernizing Probability and Statistics Engineering Curricula ................................................................... ................ 2652
James Rowland (University of Kansas, USA)

DES1: Novel Approaches for Teaching Design
2:30 PM - 4:00 PM
Room: Patio 3

Pumpkin Carving as an Exercise in Design Process Thinking ................................................................................. 2656
William E Genereux (Kansas State University, USA)
Katrina Lewis (Kansas State University, USA)

Dealing with common problems in engineering degrees' Final Year Projects ....................................................... .... 2663
Mikel Villamañe (University of the Basque Country UPV/EHU, Spain)
Begoña Ferrero (University of the Basque Country UPV/EHU, Spain)
Ainhoa Álvarez (University of the Basque Country, UPV/EHU, Spain)
Mikel Larrañaga (University of the Basque Country, UPV/EHU, Spain)
Ana Arruarte (University of the Basque Country UPV/EHU, Spain)
Jon A. Elorriaga (University of the Basque Country UPV/EHU, Spain)

Using alien-centered design for teaching iteration in the design process in undergraduate design courses......... 2671
John Mendoza-Garcia (Purdue University / Pontificia Universidad Javeriana, USA)
Monica Cardella (Purdue University, USA)

EER9: Creating Successful Teams
Chair: Susan Nolen
2:30 PM - 4:00 PM
Room: Aranjuez

Taking Care of the Team in a First-Year Design Experience Course ................................................................. 2679
Mark Fontenot (Southern Methodist University, USA)
Katherine Canales (Southern Methodist University, USA)
Andrew Quicksall (Southern Methodist University, USA)

Productively Engaging Student Teams in Engineering: The Interplay between Doing and Thinking .................. 2684
Milo Koretsky (Oregon State University, USA)
Susan Nolen (University of Washington, USA)
Debra Gilbuena (Oregon State University, USA)
Gavin Tierney (University of Washington, USA)
Simone Volet (Murdoch University, Australia)

Evidence for the Persistent Effects of an Intervention to Mitigate Gender-Stereotypical Task Allocation Within Student Engineering Teams .......................................................... 2692
Lynn Andrea Stein (Olin College of Engineering, USA)
Deyna Aragon (Olin College of Engineering, USA)
Daniel Moreno (Olin College of Engineering, USA)
Jeremy M Goodman (Olin College of Engineering, USA)
Using Discourse Analysis to Understand "Failure Modes" of Undergraduate Engineering Teams ....................... 2701
Ryan Eggert (Franklin W. Olin College of Engineering, USA)
Aditi Joshi (Franklin W. Olin College of Engineering, USA)
Saarth Mehrotra (Franklin W. Olin College of Engineering, USA)
Yevgeniya V Zastavker (Franklin W. Olin College of Engineering, USA)
Veronica Darer (Wellesley College, USA)

ENT1: Cultural Dimensions in Entrepreneurship
Chair: Andrew O. Brightman
2:30 PM - 4:00 PM
Room: Patio 1

SEEDing Evidence-Based Educational Practices into Economic Development .................................................. 2706
Jennifer Karlin (South Dakota School of Mines and Technology, USA)
Eric James (Huron Consulting Group, USA)

Critical Learning Experiences for Korean Engineering Students to Promote Creativity and Innovation ........... 2712
Jennifer Suh (George Mason University, USA)
Nathalia Peixoto (George Mason University, USA)
Padmanabhan Seshaiyer (George Mason University, USA)
Daniel Suh (Pohang University of Science and Technology, Korea)
Kwan Hong Lee (Red Venture, USA)
Yunsuk Jung (Pohang University of Science and Technology, Korea)

Exploring Institutional Climate and Engineering Ethical Reasoning: A Cross-Institutional Study ...................... 2718
Megan Kenny Feister (Purdue University, USA)
Qin Zhu (Purdue University, USA)
Carla Zoltowski (Purdue University, USA)
Patrice Buzzanell (Purdue University, USA)
William Oakes (Purdue University, USA)
Alan Mead (Illinois Institute of Technology, USA)

Examining the Role of Culture in Assessing Individual Ethical Reasoning on Multidisciplinary Engineering Project Teams ................................................................. 2727
Qin Zhu (Purdue University, USA)
Megan Kenny Feister (Purdue University, USA)
Carla Zoltowski (Purdue University, USA)
Patrice Buzzanell (Purdue University, USA)
William Oakes (Purdue University, USA)
Alan Mead (Illinois Institute of Technology, USA)

An Ethics Transfer Case Assessment Tool for Measuring Ethical Reasoning Abilities of Engineering Students Using Reflexive Principlism Approach ........................................ 2734
Justin Hess (Purdue University, USA)
Jonathan Beever (Penn State University, USA)
Andrew Iliadis (Purdue University, USA)
Lorraine Kisselburgh (Purdue University, USA)
Carla Zoltowski (Purdue University, USA)
Matthew Krane (Purdue University, USA)
Andrew O. Brightman (Purdue University, USA)
IDP1: Interdisciplinary Learning  
2:30 PM - 4:00 PM  
Room: La Galería

Computer Science for Non-Technological Cyber Programs  
Amir Rubinstein (Tel Aviv University, Israel)  

The use of Unmanned Aerial Vehicles for an Interdisciplinary Undergraduate Education: Solving Quadrotors Limitations  
Carlos Molina-Pena (University of Puerto Rico-Mayaguez, Puerto Rico)  
Reynaldo Belfort (University of Puerto Rico-Mayaguez, Puerto Rico)  
Rafael Pol (University of Puerto Rico-Mayaguez, Puerto Rico)  
Oscar Chacon-Rosario (University of Puerto Rico-Mayaguez, Puerto Rico)  
Luís Rivera (University of Puerto Rico-Mayaguez, Puerto Rico)  
Daniel Ramos (University of Puerto Rico-Mayaguez, Puerto Rico)  
Eduardo Ortiz-Rivera (University of Puerto Rico-Mayaguez, Puerto Rico)

Engineers of the World Unite An Integrated Course on Embedded Systems and Social Movements  
Lynne Slivovsky (California Polytechnic State University, USA)  
Thomas Trice (California Polytechnic State University, USA)

Realising student potential through a truly international experience  
Ian Smith (Edinburgh Napier University, United Kingdom)  
Lise Thenault (Edinburgh Napier University, United Kingdom)  
Yuxin Zhang (Shanghai Normal University, United Kingdom)

An Educational and Research Cooperation between Brazil and Germany on Industrial Automation Topics  
Vicente F. Lucena, Jr. (Federal University of Amazonas, Brazil)  
Peter Göhner (University of Stuttgart, Germany)  
Nasser Jazdi (University of Stuttgart, Germany)

LAN2: Tools and Techniques for Learning Analytics I  
2:30 PM - 4:00 PM  
Room: La Granja

Computer Tutors Can Address Students Learning to Solve Complex Engineering Problems  
Paul Steif (Carnegie Mellon University, USA)  
Luoting Fu (Carnegie Mellon University, USA)  
Levent Kara (Carnegie Mellon University, USA)

Ensuring the integrity and interoperability of educational usage and social data through Caliper framework to support competency-assessment  
Alex Rayon (University of Deusto, Spain)  
Mariluz Guenaga (University of Deusto, Spain)  
Asier Núñez (University of Deusto, Spain)

Challenges and Perspectives in an Undergraduate Flipped Classroom Experience: Looking through the Lens of Learning Analytics  
Michail Giannakos (Norwegian University of Science and Technology & Old Dominion University, Norway)  
Nikos Chrisochoides (Old Dominion University, USA)

Using Web-Based Learning Logs to Analyze Students' Conceptual Understanding of Truss Analysis in an Engineering Statics Course  
Joel Mejia (Utah State University, USA)  
Wade Goodridge (Utah State University, USA)  
Christopher Green (Utah State University, USA)
MINI WS: Helping Students to Learn to Use Diagramming as a Problem Solving Tool
2:30 PM - 4:00 PM
Room: El Jardin

Helping Students to Learn to Use Diagramming as a Problem Solving Tool ................................................................. 2793
Alisha A. Waller (Georgia Institute of Technology, USA)
Joseph Le Doux (Georgia Institute of Technology, USA)

OER1: Evaluating Open Educational Resources
Chair: William Jobe
2:30 PM - 4:00 PM
Room: Escudo

Open Educational Resources for Enhancing the Learning of Calculus in Engineering Education .................. 2795
M. Rosa Estela (Universitat Politècnica de Catalunya, Spain)
Joana Villalonga Pons (Universitat Oberta de Catalunya, Sweden)

Exploring the Use of Student Taught Classes to Introduce New Technical Topics to Engineering Undergraduates ................................................................. 2803
Anish Simhal (University of Virginia, USA)
Venkata-Gautam Kanumuru (University of Virginia, USA)
Archie Holmes (University of Virginia, USA)
Edward Berger (University of Virginia, USA)

Recommendation of OERs shared in social media based-on Social Networks Analysis approach ............. 2811
Jorge Lopez-Vargas (Technical University of Loja, Ecuador)
Nelson Piedra (Technical University of Loja, Ecuador)
Janneth Chicaiza (Technical University of Loja, Ecuador)
Edmundo Tovar (Technical University of Madrid, Spain)

e-Yantra Lab Setup Initiative: Sustainable Knowledge Creation and Scalable Infrastructure Creation at Engineering Colleges ................................................................. 2819
Saraswathi Krithivasan (Indian Institute of Technology Bombay, India)
Krishna Lala (Indian Institute of Technology Bombay, India)
Kavi Arya (Indian Institute of Technology Bombay, India)
Saurav Shandilya (Indian Institute of Technology Bombay, India)
Shailesh Jain (Indian Institute of Technology Bombay, India)
Piyush Manavar (Indian Institute of Technology Bombay, India)
Sachin Patil (Indian Institute of Technology Bombay, India)

PRE6: Diversity in Precollege Education
2:30 PM - 4:00 PM
Room: Comendador

Increasing Awareness of Computer Science in High School Girls ................................................................. 2827
Gerald Gannod (Miami University, USA)
Janet Burge (Miami University, USA)
Victoria Mele (Miami University, USA)
Maureen Doyle (Northern Kentucky University, USA)
Karen Davis (University of Cincinnati, USA)
Robotics Education Initiative for Analyzing Learning and Child-Parent Interaction ................................................................. 2835
Francisco Cuellar (Pontificia Universidad Catolica del Peru, Peru)
Christian Penaloza (Osaka University, Japan)
Pedro Garret (Pontificia Universidad Catolica del Peru, Peru)
David Olivo (Pontificia Universidad Catolica del Peru, Peru)
Miriam Mejia (Pontificia Universidad Catolica del Peru, Peru)
Nancy Valdez (Pontificia Universidad Catolica del Peru, Peru)
Agueda Mija (Pontificia Universidad Catolica del Peru, Peru)

Across-the-ages: A Study of Robotics in Caribbean Education ................................................................................................. 2841
Tricia Gilkes (Ministry of Education, Trinidad and Tobago)
Cathy-Ann Radix (The University of the West Indies, Trinidad and Tobago)
Daniel Ringis (The University of the West Indies, Trinidad and Tobago)

Pre-College Interactions, Early Expectations, and Perceived Barriers of First Year Black and Latino Engineering Students ................................................................. 2846
Sandra Dika (University of North Carolina at Charlotte, USA)
Miguel A. Pando (University of North Carolina at Charlotte, USA)
Brett Tempest (University of North Carolina at Charlotte, USA)
Krystal Foxx (University of North Carolina at Charlotte, USA)

An approach for engineering education at an early stage .................................................................................................................. 2852
Kazuhide Sugimoto (Okinawa National College of Technology, Japan)

SER: STEM Education Outreach through IEEE's Pre-University Programs - Engaging volunteers to benefit K-12 education and local communities
2:30 PM - 4:00 PM
Room: El Escorial

STEM Education Outreach through IEEE's Pre-University Programs - Engaging volunteers to benefit K-12 education and local communities ................................................................. 2855
Sohaib Qamar Sheikh (IEEE Region 8, United Kingdom)
Efthymia Arvaniti (IEEE Region 8, Germany)

CSE2: Innovation in Computing Education
4:30 PM - 6:00 PM
Room: Alcalá

The Importance of Productive Dialog in Computer Science Students' Creative Thinking ................................................................. 2857
Deller Ferreira (Universidade Federal de Goiás, Brazil)
Anderson Gonçalves (Universidade Federal de Goiás, Brazil)
Luciana Berreta (Universidade Federal de Goiás, Brazil)

A Brave New World Developing Methodology to Investigate Individual and Collaborative Student Practice in Computer Science Education ................................................................. 2865
Daniel Knox (University of Kent, United Kingdom)

The Student Prompt: Student Feedback and Change in Teaching Practices in Postsecondary Computer Science ................................................................. 2873
Lecia Barker (University of Texas at Austin, USA)
Jane Gruning (University of Texas at Austin, USA)

Research into the Computational Thinking for the Teaching of Computer Science ................................................................. 2881
Ying Li (Beihang University, P.R. China)
Enhancing the Quality of Software Design through Multi-touch Interfaces
Mohammed Basheri (King Abdulaziz University, Saudi Arabia)
Malcolm Munro (Durham University, United Kingdom)

CUR7: Experiences in Curriculum Design
Chair: Ziming (Tom) Qi
4:30 PM - 6:00 PM
Room: Doblon

Social Context, Singular Focus
David Chesney (The University of Michigan, USA)

Towards a methodology to Inclusive Curriculum Design
An experience presented within an Accessible Virtual Learning Environment
Hector R. Amado-Salvatierra (Galileo University, Guatemala)
Rocael Hernandez-Rizzardini (Galileo University, Guatemala)

Towards Designing and Developing Curriculum for the Challenges of the Smart Grid Education
Suleyman Uludag (University of Michigan - Flint, USA)
Peter Sauer (University of Illinois at Urbana-Champaign, USA)
Klara Nahrstedt (University of Illinois at Urbana-Champaign, USA)
Timothy Yardley (University of Illinois at Urbana-Champaign, USA)

Instructional Module Development (IMOD) System: A User Study on Curriculum Design Process
Odesma Dalrymple (Arizona State University, USA)
Srividy K Bansal (Arizona State University, USA)
Ashraf Gaffar (Arizona State University, USA)
Randi Taylor (Arizona State University, USA)

Student Perception and Knowledge:
Assessment of Online Computational-Experimental (ComEx) Learning Modules
Kumar Singh (Miami University, USA)
Fazeel Khan (Miami University, USA)

A Master Degree Program Development for the Study Pathways from Bachelor of Engineering Technology
Ziming (Tom) Qi (Otago Polytechnic, New Zealand)
Caroline Terpstra (Otago Polytechnic, New Zealand)
John Findlay (Otago Polytechnic, New Zealand)

DES2: Design (and Design Learning) as a Process
4:30 PM - 6:00 PM
Room: Patio 3

Appearances matter: The perceived complexity, coherence, mystery, and legibility of Makerspace labs
Morgan Hynes (Purdue University, USA)
Wendy Hynes (Purdue University, USA)

Student Peer Feedback on Design
Farshid Marbouti (Purdue University, USA)
Monica Cardella (Purdue University, USA)
Heidi Diefes-Dux (Purdue University, USA)

Self-Regulated Learning Activities in Engineering Design Education
Oenardi Lawanto (Utah State University, USA)
Students Discovering Their Own Design Processes: Using Design Process Representations to Learn about Designing
Cynthia J. Atman (University of Washington, USA)
Janet McDonnell (University of the Arts London, United Kingdom)
Ryan C. Campbell (University of Washington, USA)
Jennifer Turns (University of Washington, USA)

How is Design Organized? A Preliminary Study of Spatiotemporal Organization in Engineering Design
Carlye Lauff (University of Colorado Boulder, USA)
Daria Kotys-Schwartz (University of Colorado Boulder, USA)
Mark Rentschler (University of Colorado Boulder, USA)
Joanna Weidler-Lewis (University of Colorado Boulder, USA)
Kevin O'Connor (University of Colorado Boulder, USA)

EDT1: Technology Enhanced Learning Experiences
4:30 PM - 6:00 PM
Room: La Galería

A Web-based Application for the Management and Evaluation of Tutoring Requests in PBL-based Massive Laboratories
Luis Fernando D’Haro (Universidad Politécnica de Madrid, Spain)
Fernando Fernández-Martínez (Universidad Carlos III de Madrid, Spain)
Ricardo Cordoba (Universidad Politécnica de Madrid, Spain)
Juan M Montero (Universidad Politécnica de Madrid, Spain)

OTILIA - An Architecture for the Recommendation of Teaching-Learning Techniques Supported by an Ontological Approach
Dulce Mota (University of Porto, Portugal)
Carlos Vaz de Carvalho (Polytechnic Institute of Porto, Portugal)
Luis Paulo Reis (University of Minho, Portugal)

Web-Enabled Formative Feedback and Learning Resources for Enhancing Student Attitude, Achievement, and Persistence
Stephen Krause (Arizona State University, USA)
Sean Maass (Arizona State University, USA)
Adam R Carberry (Arizona State University, USA)
Cindy Waters (North Carolina A & T State University, USA)
Milo Koretsky (Oregon State University, USA)
Candace Chan (Arizona State University, USA)

ENT2: Exploring the limits of Entrepreneurship
Chair: Kavi Arya
4:30 PM - 6:00 PM
Room: Patio 1

Cross-Disciplinary Collaboration in Entrepreneurship: Engineering and Business Students Really Can Work Together
Lisa Zidek (Florida Gulf Coast University, USA)
Sandra King Kauanui (Florida Gulf Coast University, USA)

Developing an Engineering and Entrepreneurship Collaborative Project
Chad Davis (University of Oklahoma, USA)
James J. Sluss, Jr. (University of Oklahoma, USA)
Ron Bolen (University of Oklahoma, USA)
Incorporating Entrepreneurship Topic into a Mobile Computing Course............................................................ 2991
Xiaoyuan Suo (Webster University, USA)
Tianye Niu (Zhejiang University School of Medicine, P.R. China)

Innovation Corps for Learning: Evidence-based Entrepreneurship™ to Improve (STEM) Education............... 2997
Rocio Chavela Guerra (American Society for Engineering Education, USA)
Karl Smith (University of Minnesota & Purdue University, USA)
Ann McKenna (Arizona State University, USA)
Chris Swan (Tufts University, USA)
Russell Korte (Colorado State University, USA)
Shawn Jordan (Arizona State University, USA)
Micah Lande (Arizona State University, USA)
Robert MacNeal (Working Company, USA)

LAN3: Tools and Techniques for Learning Analytics 2
Chair: Mariluz Guenaga
4:30 PM - 6:00 PM
Room: La Granja

Collecting and Making Sense of Video Learning Analytics................................................................. 3002
Michail Giannakos (Norwegian University of Science and Technology & Old Dominion University, Norway)
Konstantinos Chorianopoulos (Ionian University, Greece)
Nikos Chrisochoides (Old Dominion University, USA)

Visual learning analytics techniques applied in software engineering subjects........................................ 3009
Miguel Á. Conde (University of León, Spain)
Francisco J. García-Penalvo (University of Salamanca, Spain)
Diego Gómez-Aguilar (University of Salamanca, Spain)
Roberto Theron (University of Salamanca, Spain)

The use of social tagging to support the cataloguing of learning objects.............................................. 3018
Anderson Amaral (Federal University of São Carlos & Federal University of São Carlos, Brazil)
Luciana Zaina (Federal University of São Carlos, Campus Sorocaba, Brazil)
Jose Rodrigues, Jr (University of Sao Paulo & ICMC-USP, Brazil)
Renan de Aguiar (Federal University of São Carlos, Brazil)
Marcos Cavalcante Barboza (Federal University of Sao Carlos & The National University of Ireland, Galway, Ireland)

Using infographics as a tool for introductory data analytics education in 9-12............................................ 3025
Jamie L Kennedy (Drexel University, USA)
Pramod Abichandani (Drexel University, USA)
Adam Fontecchio (Drexel University, USA)

MAT1: Mathematics in Engineering and Computer Science
Chair: Duane F. Shell
4:30 PM - 6:00 PM
Room: Comendador

Improving Learning of Computational Thinking Using Computational Creativity Exercises in a College CS1 Computer Science Course for Engineers......................................................... 3029
Duane F Shell (University of Nebraska-Lincoln, USA)
Melissa Patterson Hazley (University of Nebraska - Lincoln, USA)
Lee-Kiat Soh (University of Nebraska-Lincoln, USA)
Lee Miller (University of Nebraska-Lincoln, USA)
Vlad Chiriacescu (University of Nebraska-Lincoln, USA)
Elizabeth Ingraham (University of Nebraska - Lincoln, USA)
Whole Mathematics Competences Assessment at Aerospace Engineering Sophomore .............................................. 3036
Sergio Blanes (Universitat Politècnica de València, Spain)
Francisco Minguez (Universitat Politècnica de València, Spain)
Jose Antonio Morano (Universitat Politècnica de València, Spain)
Maria Dolores Roselló (Universitat Politècnica de València, Spain)
Luis M. Sanchez Ruiz (Universitat Politècnica de València, Spain)

A new didactic approach in Engineering Education for conceptual understanding of Euler’s Formula ................. 3040
Brit-Maren Block (Leuphana University of Lueneburg, Germany)
Paolo Mercorelli (Leuphana University of Lueneburg, Germany)

A Multi-Layer Universally Designed Workspace for Tracking Students Skills and Mastery Transition in Mathematics Manipulation in Inclusive Education ............................................... 3047
Nancy Alajarmeh (New Mexico State University, USA)
Enrico Pontelli (New Mexico State University, USA)
Taylor Burgett (New Mexico State University, USA)

Mathematics for all: a Game-Based Learning Environment for Visually Impaired Students ................................. 3055
Frederico Diogo Carvalho Ferreira (Universidade Nova de Lisboa, Portugal)
Sofia Cavaco (Universidade Nova de Lisboa, Portugal)

MINI WS: Beyond Reflection: Using Discourse Analysis to Understand Your Classroom Culture 4:30 PM - 6:00 PM
Room: Aranjuez

Beyond Reflection: Using Discourse Analysis to Understand Your Classroom Culture ............................................ 3063
Yevgeniya V Zastavker (Franklin W. Olin College of Engineering, USA)
Veronica Darer (Wellesley College, USA)

MINI WS: Building Diversity by Embracing Intellectual Diversity 4:30 PM - 6:00 PM
Room: El Jardin

Building Diversity by Embracing Intellectual Diversity ......................................................................................... 3066
Stuart Kellogg (South Dakota School of Mines and Technology, USA)

MINI WS: Quality Course Development for Online Learning 4:30 PM - 6:00 PM
Room: El Escorial

Quality Course Development for Online Learning ................................................................................................. 3070
Michael DeAntonio (New Mexico State University, USA)
Sandra R Johnson (New Mexico State University, USA)

OER2: Platforms and Technologies for Open Educational Resources 4:30 PM - 6:00 PM
Room: Escudo

Facilitating the creation of interactive multi-device Learning Objects using an online authoring tool .................... 3072
Aldo Gordillo (Universidad Politécnica de Madrid, Spain)
Enrique Barra (Universidad Politécnica de Madrid, Spain)
Juan Quemada Vives (Universidad Politècnica de Madrid, Spain)
A flexible open source web platform to facilitate Learning Object evaluation
Aldo Gordillo (Universidad Politécnica de Madrid, Spain)
Enrique Barra (Universidad Politécnica de Madrid, Spain)
Juan Quemada Vives (Universidad Politécnica de Madrid, Spain)

Towards a Learning Object pedagogical quality metric based on the LORI evaluation model
Aldo Gordillo (Universidad Politécnica de Madrid, Spain)
Enrique Barra (Universidad Politécnica de Madrid, Spain)
Juan Quemada Vives (Universidad Politécnica de Madrid, Spain)

Education Quality Enhancement Through Open Education Adaptation
Jose Luis Martin (Universidad Politécnica de Madrid, Spain)
Edmundo Tovar (Universidad Politécnica de Madrid, Spain)
Jesús Sánchez López (Universidad Politécnica de Madrid, Spain)
Pilar Martínez García (Universidad Politécnica de Madrid, Spain)

Open iTunesU. A new service to manage open learning resources
Alberto Pesquera (Spanish University for Distance Education - UNED, Spain)
Esther Reula (Spanish University for Distance Education - UNED, Spain)
Elio Sancristóbal (Spanish University for Distance Education - UNED, Spain)
Manuel Castro (Spanish University for Distance Education - UNED, Spain)
Timothy Read (Spanish University for Distance Education - UNED, Spain)
Inés Gil-Jaurena (Spanish University for Distance Education - UNED, Spain)

Author Index