May 30-31
2022

Porto, Portugal

Book of Abstracts

BBC'22



isep
Instituto Superior de Engenharia do Porto

P.PORTO
ISCAP



Building Bridges in STEAM Education in the 21st Century

First International Conference

Porto Accounting and Business School
Porto School of Engineering
Polytechnic of Porto



May 30-31, 2022

PORTO – PORTUGAL

Event
BBC' 22 International Conference

Title
Book of Abstracts of the First International Conference Building Bridges in STEAM Education in the 21st Century

Editors
Filomena Soares
ISCAP – P.PORTO
Ana Paula Lopes
ISCAP – P.PORTO
Carla Pinto
ISEP – P.PORTO
Jorge Mendonça
ISEP – P.PORTO

DOI:
10.26537/20625

ISBN:
9789899785199

Participants have responsibility for the book content.

INDEX

BBC'22 Committees ---------- **5**

Invited Speakers ---------- **7**

Oral Presentations ---------- **10**

- *A game-based learning experience in math, art and science* ---------- 11
  Presented by: Paola Morando (Università degli Studi di Milano – Italy)
- *Accelerate the digital readiness of Polytechnic higher education institutions: the ACADIGIA project* ---------- 12
  Presented by: Manuel Salvador Araújo (ISCAP – Portugal)
- *Âmago Project: Intergenerational interactions using Biodesign approach for health innovation and education* ---------- 13
  Presented by: Susana Pereira (Bright Digital - Portugal)
- *An experience of synchronously writing online* ---------- 14
  Presented by: Isabel Vieira (ISCAP – Portugal)
- *Automatic Exercise Generation for Exploring Connections Between Mathematics and Music* ---------- 15
  Presented by: Irene Brito (Universidade do Minho – Portugal)
- *Bring mathematics and statistics closer to students of economics through Excel* ---------- 16
  Presented by: Srdjan Damjanovic (University of East Sarajevo – Bosnia and Herzegovina)
- *Collaborative Online International Learning Between University and Primary School Students: Creativity in Disguise in Engineering* ---------- 17
  Presented by: Patricia Munoz-Escalona (Glasgow Caledonian University – United Kingdom)
- *Design & Computation - A new inter-university, interdisciplinary, research-based Master's program* ---------- 18
  Presented by: Johannes Pointner (Berlin University of the Arts – Germany)
- *Design of teaching materials for the dissemination of Women's contribution to economic analysis: innovation, equality and new competencies* ---------- 19
  Presented by: Félix Puime-Guillén (University of A Coruña – Spain)
- *Effective Strategies and Digital Technologies for Improving Mathematics Classroom Experience* ---------- 21
  Presented by: Frederico Rato Almeida (University of Derby – United Kingdom)
- *Escape Rooms for Secondary Mathematics Education: Design and Experiments* ---------- 22
  Presented by: Jake Andrews (University of Derby - United Kingdom)
- *Future preschool and primary teachers ability to design lessons based on a STREAM integrated approach* ---------- 23
  Presented by: Cristina Florina Pop (Babes-Bolyai University – Romania)

- *Generating Engineer's Lifelong Skills Through Practical Cases in STEAM Education* -------- 24
  Presented by: Carles Serrat (Universitat Politècnica de Catalunya-BarcelonaTECH - Spain)
- *Innovative strategies in education: service-learning* ---------- 25
  Presented by: Félix Puime-Guillén (University of A Coruña – Spain)
- *Learning and teaching STEM with a water infiltration model* ---------- 27
  Presented by: Amélia Caldeira (ISEP – Portugal)
- *Manipulative activities as a bridge for STEAM Education* ---------- 28
  Presented by: Vanda Santos (Universidade de Aveiro – Portugal)
- *MATH-DIGGER – A Platform to Escape Math Problems* ---------- 29
  Presented by: Carla M.A. Pinto (ISEP – Portugal)
- *Mathematics as the keystone of STEAM education* ---------- 30
  Presented by: Thierry Dana-Picard (Jerusalem College of Technology – Israel)
- *Mobile Math Trails: an experience in teacher training with MathCityMap* ---------- 33
  Presented by: Ana Barbosa (IPVC – Portugal)
- *Narrative Didactics in Mathematics Education: Results from a University Geometry Course* 34
  Presented by: Mirela Vinerean (Karlstad University Sweden - Sweden)
- *Origami meets STEAM in "A Wheatfield on a Summer's afternoon"* ---------- 35
  Presented by: Maria Luisa Spreafico (Politecnico di Torino – Italia)
- *Peculiarities of metacognition in prospective elementary teachers* ---------- 36
  Presented by: Lavinia Șuteu (Babes-Bolyai University – Romania)
- *Pedagogical model applying Commedia dell'Arte and art workshops in higher education design studies* ---------- 37
  Presented by: Heini Haapaniemi (South-Eastern Finland University of Applied Sciences – Finland)
- *PYTHAGORAS – Erasmus+ project for STEM education* ---------- 39
  Presented by: Jorge Mendonça (ISEP – Portugal)
- *RSTUDIO in Teaching Statistics* ---------- 40
  Presented by: Alexandra Gavina (ISEP – Portugal)
- *Secondary-tertiary Transition in Mathematics for Engineering Students: Results from a Study with Focus beyond the Purely Cognitive Aspects* ---------- 41
  Presented by: Mirela Vinerean (Karlstad University Sweden - Sweden)
- *Solving problems through Engineering Design: a pathway for a connected STEAM Education* ---------- 42
  Presented by: Isabel Vale (IPVC – Portugal)
- *STEAM approach in pre-service Teacher Education: a case study* ---------- 43
  Presented by: Ana Peixoto (IPVC – Portugal)
- *Teachers' digital and metacognitive competence profiles in the virtual learning environment perspectives* ---------- 44
  Presented by: Roxana-Madalina Cristea (Babes-Bolyai University – Romania)
- *Teaching evaluation and student response rate* ---------- 45
  Presented by: Tashfeen Ahmad (The University of the West Indies – Jamaica)

- *Teaching Statistical Models in a Corporate Finance Master's Degree* ---------- 46
  Presented by: Isabel Cristina Lopes (ISCAP – Portugal)
- *The impact in students of a STEAM approach in a Calculus I Extraordinary Semester* ----- 47
  Presented by: José Manuel Dos Santos Dos Santos (Centro de Investigação e Inovação em Educação da ESE, P. Porto – Portugal)
- *The relationship of reflective thinking skills with teachers' perspective of electronic portfolio* ---------- 48
  Presented by: Cosmina Șoldea (Babeș-Bolyai University – Romania)
- *Using Digital Tools to Improve Engagement and Motivation: The Case of Accounting Education* ---------- 49
  Presented by: Paulino Silva (ISCAP – Portugal)
- *Using flipped teaching to engage Higher Education students in laboratorial activities* ----- 50
  Presented by: Marina Duarte (ISEP – Portugal)

Poster Presentations - 51

- *A pilot study on the use of Eye-tracking technology for assessing comprehension of mathematical text* ---------- 52
  Ágnes Bartalis, Iuliana-Hortensia Zsoldos-Marchis and Imre Péntek
- *Active Learning Practices in Higher Education* ---------- 53
  Maria Paula Nunes, Filomena Soares and Ana Paula Lopes
- *Bibliometric analysis of the use of gamification as a learning technique in higher education* 55
  María M. Muñoz and María-Mercedes Rojas-de-Gracia
- *Blockchain towards e-learning* ---------- 56
  Ana Afonso and Hassan Rahim
- *Bosnia and Herzegovina must accelerate the digital transformation of public administration, economy and education* ---------- 57
  Branko Krsmanovic, Srdjan Damjanovic, Predrag Katanic and Zvjezdana Krstic
- *Dancing with Physics* ---------- 58
  Abril Armenta Franco and Zsolt Lavicza
- *Exploring STEAM in Teacher Education with Poly-Universe* ---------- 59
  Piedade Vaz-Rebelo, Vanda Santos and Graça Bidarra
- *Guiding Play with Poly-Universe Material to promote STEAM education* ---------- 60
  Inês Martins, Graça Bidarra, Piedade Vaz-Rebelo and Vanda Santos
- *Integrated Curriculum Design for a Self-Paced Online Geometry Course for Engineering Students* ---------- 62
  Oksana Labanova and Elena Safiulina
- *Interactive Lessons in Statistics as Tools for Academic Success* ---------- 63
  Cristina Teles de Oliveira, Ana Maria Rodrigues, Isabel Cristina Lopes, Cristina Torres, Ana Paula Lopes and Filomena Soares

- *INVITE project: Developing Competences and Innovative Designs for International Virtual and Blended Learning Modalities* ---------- 65
  Georgios Triantafyllidis
- *"MusiMath": Creativity in Music, Math and Technology* ---------- 66
  Libby Azaryahu, Shai Cohen, Orit Broza, Sara Hershkovitz and Esther Adi-Japha
- *Poly-Universe Resources for Solving Geometric Tasks by Portuguese Basic Education Students* ---------- 67
  Vanda Santos, Alexandre Matos and Teresa Neto
- *Remarks after Implementation of Tutoring in the AGH University of Science and Technology* ---------- 68
  Katarzyna Gdowska, Marta Ciesielka, Jacek Tarasiuk and Agnieszka Chrząszcz
- *Review of learning methodologies. Teaching experience in STEM careers* ---------- 69
  Almudena Filgueira Vizoso, Félix Puime Guillén, María Jesús Rodríguez Guerreiro, Raquel Fernández-González, Begoña Álvarez-García, Lucía Boedo Vilabella and Laura Castro Santos
- *STEM studies and gender. At what point does the trend reverse?* ---------- 71
  Almudena Filgueira Vizoso, Félix Puime Guillén, Raquel Fernández-González and Laura Castro Santos
- *STEMbach: experiences in the Galician region* ---------- 73
  Laura Castro-Santos, Félix Puime-Guillén, Isabel Lamas-Galdo, Ana Isabel García-Diez, Joaquín Enríquez Díaz, Lucía Boedo Vilabella, María Dolores Lagoa Varela, Begoña Álvarez-García, Raquel Fernández-González and Almudena Filgueira-Vizoso
- *Team development in an industrial environment: the experience of the Universities of Future project* ---------- 75
  Manuel Salvador Araújo and Maria Teresa Pereira
- *The Flipped Classroom optimized through Gamification and Team-Based Learning* ------- 77
  Sérgio Lopes, Jorge Simões, Justino Lourenço and José Morais
- *The impact of some pedagogical strategies on the improvement of the individual learning process in statistics from students' point of view: A case study?* ---------- 78
  Luís M. Afonso, Gabriela Gonçalves and Jorge Mendonça
- *The Use of Role-Playing to Motivate Accounting Students* ---------- 79
  Susana Moreira Bastos and Helena Costa Oliveira
- *Towards gamification for online and hybrid mathematics education: The PYTHAGORAS approach* ---------- 80
  Georgios Triantafyllid
- *Using the Seppo platform for gamifying mathematical problem solving with focus on developing self-regulation skills* ---------- 81
  Sérgio Lopes, Jorge Simões, Justino Lourenço and José Morais

AUTHORS LIST - **82**

Secondary-tertiary Transition in Mathematics for Engineering Students: Results from a Study with Focus beyond the Purely Cognitive Aspects

Mirela Vinerean
Mathematics
Department of Mathematics and Computer Science, Karlstad University, Sweden,
Mirela.Vinerean@kau.se

Yvonne Liljekvist
Mathematics Education
Department of Mathematics and Computer Science, Karlstad University, Sweden,
Yvonne.Liljekvist@kau.se

Elif Bengu
Educational Science
Abdullah Gul University, Faculty of Educational Science, Kayseri, Turkey
Elif.Bengu@agu.edu.tr

Abstract – **High dropout rates in the first year of undergraduate studies are an expression of the secondary-tertiary transition problem and they seem to be particularly high in those degree programs where specialized mathematics courses are taught in the first year of study. Research shows that students' difficulties during the transition period cannot be reduced to purely cognitive factors. In this paper, we address the secondary-tertiary transition problem in mathematics for engineering students. Based on a questionnaire with focus beyond the purely cognitive aspects, a comparison of the transition problem at three European mid-sized universities is carried out, in order to identify common challenges and difficulties, as well as differences. The questionnaire concentrates on the four dimensions (personal, organizational, content-related, and social) and corresponding critical requirements for a successful transition described in Trautwein and Bosse [4]. A group of 306 first-year engineering students partook in the study. In the presentation, we highlight students' perceptions regarding the transition, changes and challenges they experienced under the above-mentioned four dimensions, and discuss similarities and differences between countries.**

Keywords – Dropout rates, Engineering Education, Mathematics, Secondary-tertiary transition.

ACKNOWLEDGMENT

The work is supported by SMEER (Science Mathematics Engineering Educational Research) at Karlstad University. The authors thank Johannes Przybilla for the help in the process of collecting data.

REFERENCES

[1] Cheng, M., Barnes, G., Edwards, C., Valyrakis, M. Corduneanu, R. & Koukou M. (2015). *Transition Skill Strategies: Transition Models and How Students Experience Change*. Glasgow: The Quality Assurance Agency for Higher Education.

[2] Gale, T., & Parker, S. (2014). Navigating change: a typology of student transition in higher education. *Stud High Educ*, 39(5), 734–753.

[3] Hughes, G. (2016). Transition distress: a psychological process. *University and College Counselling*, 4(3), 15–19.

[4] Trautwein, C., Bosse, E. (2017). The first year in higher education—critical requirements from the student perspective. High Educ, 73, 371–387.

[5] Troelsen, R. & Laursen, P. F. (2014). Is drop-out from university dependent on national culture and policy? The case of Denmark. *European Journal of Education, 49*(4), 484–496.

AUTHOR INFORMATION

Mirela Vinerean, Assistant Professor, Mathematics, Department of Mathematics and Computer Science, Karlstad University, Sweden.

Yvonne Liljekvist, Associate Professor, Mathematics Education, Department of Mathematics and Computer Science, Karlstad University, Sweden.

Elif Bengu, Assistant Professor, Educational Science, Faculty of Educational Science, Kayseri, Turkey.