GIREP-ICPE-EPEC Conference 2017
3rd-7th July, 2017
Dublin, Ireland

Bridging research and practice in physics teaching and learning

Organized by:
International Research Group on Physics Teaching (GIREP)
Physics Education Commission of the International Union of Pure and Applied Physics (IUPAP)
European Physical Society - Physics Education Division (EPS-PED)
Centre for the Advancement of STEM Teaching and Learning (CASTeL) at Dublin City University

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Preface

The Proceedings present selected contributions from the international conference GIREP-ICPE-EPEC 2017 conference, which was hosted in Dublin from 3rd to 7th July 2017 by the Centre for the Advancement of STEM Teaching and Learning (CASTel) at Dublin City University Ireland. This conference was organized by a collaboration between the International Research Group on Physics Teaching (GIREP); European Physical Society - Physics Education Division, and the Physics Education Commission of the International Union of Pure and Applied Physics (IUPAP).

The theme of this international conference was Bridging Research and Practice in Physics Teaching and Learning and it brought together international researchers and practitioners to share their knowledge and experiences over a week-long programme. A wide variety of topics and approaches, conducted in various contexts and settings, all adding a strong contribution to the field of physics education research were discussed. The GIREP-ICPE-EPEC 2017 conference was attended by 270 international researchers and practitioners representing 48 countries. The scientific programme offer a total of 271 contributions - including 6 invited keynote and 154 oral presentations, 40 symposia (each with four papers), 12 ICT demonstration/workshop sessions and 59 poster presentations. After the conference 95 papers were received on all seminar topics. The articles went through a rigorous process of in a double-blinded peer-review, involving members of the Editorial Board and additional referees in order to guarantee the quality of the content of this contribution. As the result two publications are issued, the book Concepts, Strategies and Models to Enhance Physics Teaching and Learning, published by Springer and GIREP-ICPE-EPEC 2017 Conference Proceedings book, presented here in ten parts.

Part I, Teaching Physics Concepts: Sharing Practice, showcases how teachers implement and evaluate the impact of teaching physics in the context of an event or an experiment; how concept inventories, mind mapping, and interviews are used in practice to track students’ conceptual development; and how teachers help students develop skills and competencies.

Part II, Primary and Secondary Physics, reports on examples of guided inquiry, active learning and flipped classroom settings; 3D-printing artefacts to aid in student understanding; how to teach experiments; and how a gender gap in spatial reasoning can be reduced.

Part III, University Physics, concerns the teaching of more advanced physics topics such as spectroscopy, chaos theory and general relativity; comparisons between and reflections on teaching methods; the development of a predictive model for student achievement; and the use of concept inventories.

Part IV focuses on Laboratory Activities in Physics Education, ranging from examples of involving students in different aspects of setting up and carrying out experiments to a survey of the goals of physics labs.

Part V, Physics Teacher Education, discusses a range of strategies and methodologies adopted to extend and deepen the professional learning of physics teachers and considers the role of physics education research and argumentation practices in pre-service teacher education programmes.

Part VI, ICT and multimedia in physics education highlights the use of interactive computational modelling and modern technologies, e.g. mobile phones, augmented reality and gaming, to enhance the teaching and learning of physics concepts in the online and laboratory environments.
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Part VII, Cross-disciplinary physics discusses interdisciplinary and transdisciplinary contexts and approaches to promote student engagement and learning and improve the connection between school, research, enterprise and territory and to promote the development of soft and transversal skills in students.

Part VIII, Physics curriculum: development and implementation, focuses on different approaches to research and innovation in physics education, ranging from conformity with nomenclature conventions to the role of conceptual metaphors.

Part IX, Assessment and evaluation of physics teaching and learning, provides examples of how to assess both conceptual knowledge and scientific skills and examines if conceptual coherence exists in a widely used Physics Inventory.

Part X, Physics education in informal and non-formal settings promotes the need for strong cooperation between formal, informal and non-formal actors in physics education to motivate and inspire young people in physics.

The organization of the conference would not have been possible without help and co-operation of many people. We sincerely thank the board members of the partnering organisations: International Research Group on Physics Teaching (GIREP); Physics Education Commission of the International Union of Pure and Applied Physics (IUPAP) and European Physical Society - Physics Education Division (EPS-PED). We are grateful for the ongoing support and contributions of the members of the Scientific Advisory and Local Organizing Committees for their dedication and commitment to this event. We are also deeply thankful to all reviewers, for their contributions both pre- and post-conference. We would also like to sincerely thank all the participants of the GIREP-ICPE-EPEC 2017 conference for submitting proposals, advance preparations for discussions and sharing their ideas with the physics education research community. We hope that these Proceedings will be of interest to physics teachers, teacher educators and physics education researchers around the world with a commitment to bridging evidence-based research and practice in Physics teaching and learning.

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