Editorial

Dear Reader

This issue of CEPS that you hold in your hand, or that you follow on the webpage, consists of two parts. The first comprises three papers about physics education research. These were developed from contributions presented at the 1st Eastern European Meeting on Physics Education, which was held in September 2012 in Ljubljana. The second part gives three contributions on different topics. As usual, a book report is also presented at the end of this issue.

Let us introduce the research field that the first part is focused on. Physics education research (PER) is a relatively new field in physics. It started to develop from the personal interests of researchers such as Karplus, who became interested in education after personal experiences in a classroom of their children. Most of the better known researchers entered physics education as a second career, after already being successful in other fields of physics. For a long time, PER was not recognized as an independent physics discipline by the physics community. It was understood that the teaching and learning of physics depended on lecturers' and students' gifts, and that physics was reserved for the most talented people. However, these perceptions have changed in recent decades, and studies of physics education and the teaching and learning of physics-related concepts have become increasingly appreciated.

In 2005, the most significant journal in physics, *Physical Review*, introduced a special issue, *Physical Review Special Topics – Physics Education Research* (*PRST*), which has two open-access issues per year and 2.132 as its five-year impact factor. As a consequence, PER was accepted as an independent discipline in physics by several departments of physics throughout the world, which finally allowed researchers to follow that academic path, occupying themselves with problems related to physics education within departments of physics.

Nevertheless, the discipline remains relatively small, only three international journals having impact factors publish papers from this field: *European Journal of Physics*, *American Journal of Physics* and *PRST*. Moreover, two journals discuss high school-oriented problems: *Physics Education* and *The Physics Teacher*. And that is practically the whole of the field. There have been some recent attempts to introduce new journals related to this discipline to the market, but the future will decide their quality and importance PER is obviously a part of a wider research discipline (i.e. science education research) and physicists are also highly active in this wider field. Researchers in physics education, educators and teachers discuss the problems related to physics education within the annually

organized conferences and seminars of GIREP (Groupe International de Recherche sur l'Enseignement de la Physique), ICPE (International Commission of Physics Education), or AAPT (American Association of Physics Teachers) meetings. The community is rather large and well organized, and new results within this field increasingly influence the teaching and learning of physics.

PER consists of several subfields; let us describe the most important ones. Within existing and new topics in curriculum development, the depth of the knowledge, the sequences and similar are discussed. As physics is an experimental science, the development of experiments, accessible to teachers and students as demonstrations and in laboratories, is an essential contribution to the field. Although experiments are mostly straightforward for teachers and their messages seem clear, the research on students' comprehension related to the experiments, how they are included in teaching interventions and at which points and why they can lead to correct or incorrect conceptions is a complementary part of the development of experiments. Studies of various approaches in teaching physics, general and tailored to the specifics of various topics, are another valuable sub-discipline. More general is the impact of studies on how conceptual understanding develops in various fields of physics, on which robust concepts is built and how these robust concepts can be transformed, if they are not correct. These studies also receive reflections outside of physics and are beneficial for science education as well as for education in general. There are several other problems scientists in this field focus on in their studies. The reader can begin to comprehend what PER is about from three contributions in the focus part in this issue of CEPS; they come from three specific areas on which this research field has focused in recent years.

The first paper focuses partly on the findings by Gojkošek, Sliško, and Planinšič regarding the role of the learning sequence on the construction of explanatory models for an experiment that is entirely new to students, called the foil test. This test asks students to explain a microscopic structure of a specific foil that is found when an LCD screen is dismounted. They are allowed to perform various experiments using a foil. The authors compare three different learning approaches, called traditional, prediction and laboratory approach, using the results of explanatory model for a foil test. They show that the prediction group seems the most successful and that the time spent on the problems has little or no effect on construction of the model. The authors discuss various possible reasons for the results obtained.

The next paper, by Hadžibegović and Sliško, discusses the role of active learning in large classes of students, which is generally believed to be impossible. The authors have chosen the topic of optics to design a module that helps

students to learn from interactive lecture experiments, guiding them to justified explanation of the phenomenon observed and predict new related phenomena, which leads to developing a conceptual understanding that is tested by writing and drawing. They report a significant increase of conceptual understanding and a substantial change from the passive to active role of students after a single active lesson.

The last contribution, by Leopold Mathelitsch, discusses competencies related to science education. The author presents three models regarding competencies in science from German-speaking countries: Germany, Switzerland and Austria. More details are given in a special program 'Competencies in Mathematics and Science Teaching', introduced in Austria. The discussion is focused on teachers' views on the idea of competencies, and those that support teachers find welcome at the introduction of the competency approach into teaching. The evaluation of the program and the role of problems and exercises is discussed in detail.

As the first part of papers was contributed by physicists working in physics education research, their papers reflect that field's standard for papers to be as short as possible for the results reported. Therefore, the part devoted to general contributions had space for three articles.

The first article of the second part, by Ceciliani and Bortolotti, discusses the physical activities of younger children, focusing on outdoor activities that are declining throughout the developed world. The authors emphasise that in our rapidly changing contemporary society, it has become apparent that children spend significantly less time playing outdoors than their parents did. Therefore, considerable attention must be paid by professionals to engage this challenge, especially within early educational contexts. The goal of their study was to first explore the continual drive of play in educational growth and, second, the ways in which children play outdoors at school, in order to reap the developmental benefits of outdoor play in a supportive context, where such fundamental activity is not only allowed, but also supported. The results of this study highlight the findings regarding children's physical play behaviour and its frequency. The authors also discuss teachers' attitudes toward outdoors activities. They suggest several options for early childhood professionals to foster children's enjoyment of outdoor play and active spontaneous play.

The next article, by Giannikas, comes from language education research. The author discusses primary language learning in the Greek region of Cyprus, specifically, the positive effects of classroom management and organisation on a student-centred approach of teaching. The focus of the article is the student-centred approach and the difficulties that teachers accustomed to

teacher-centred ways of language teaching encounter due to the lack of guidance and support when introducing the student-centred approach.

The final paper of the second part, by Stamelos and Kavasakalis, reports the results of semi-structured interviews and an analysis of the policy papers on the production of policy-oriented learning during the establishment and implementation of a specific policy program in the policy sub-system of the Greek university as well as an interpretation of the existence of policy-oriented learning. The theoretical tools were drawn mainly from the theoretical work of Sabatier and Jenkins-Smith, termed the 'advocacy coalition framework (ACF)'. The Greek university is therefore considered to be a policy subsystem in which actors form coalition networks that share policy core beliefs and values, and engage in coordinated action in order to translate these beliefs and values into public policy.

At the end a book review of the translated monograph of Warburton – The Art Question – with afterword study by Marjan Šimenc is presented.

The new issue of the CEPS journal brings a variety of papers from various education research fields, reporting and discussing several open research questions. I hope that information available in this issue will provide alternative insights into readers' research problems and foster new research ideas.

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