Editorial

Welcome to the special issue of the Science Education International. This special issue is devoted to activities and findings associated with the Ark of Inquiry project. Ark of Inquiry (http://www.arkofinquiry.eu/) is a research and development project funded by the European Commission involving 13 project partners from 12 countries. The project aims to raise pupils' awareness of Responsible Research and Innovation (RRI) by promoting an interest in science through inquiry learning.

In the Ark of Inquiry project a platform (http://arkportal.eu/) is developed through which carefully selected inquiry-based activities are made widely available across Europe. The platform brings together inquiry-based learning (IBL) activities, learners and supporters (teachers, university students, researchers, staff of museums and universities). To support teachers, the Ark of Inquiry project provides face-to-face teacher training equipping the teachers with skills of supporting and motivating their pupils in their IBL activities.

The partners of the Ark of Inquiry project have developed a project-specific pedagogical framework and related scenarios to support linking the IBL approach with RRI. The framework has been used in carefully selecting IBL activities for a repository that could be used by teachers in teaching students at ages from 7 to 18. In order to support teachers in adopting IBL, a three-phase training model has been developed and used in teaching more than 1000 teachers. Thus, we can say that teachers are at the core of the Ark of Inquiry project. However, it is often not a simple task to train teachers and to support them in using a complex IBL approach, and even more so when we aim to link it with the RRI approach. Therefore, one of the work packages of the project has been focusing on the evaluation of the project activities. This work package has been led by Emanuele Bardone, to whom I am very thankful for the good work done in coordinating all partners, but especially the core research group consisting of people in Finland, Cyprus, the Netherlands, and Estonia. On a more general level, we would like to thank the European Commission for the support given to the Ark of Inquiry project. All the studies reported in this special issue are conducted in the context of the European project "Ark of Inquiry: Inquiry Awards for Youth over Europe", funded by the European Union (EU) under the Science in Society (SiS) theme of the 7th Framework Programme (Grant Agreement 612252). The articles, however, do not represent the opinion of the EU, and the EU is not responsible for any use that might be made of their content.

In this journal issue we present six articles. All articles focus on teachers, but from different angles. In the first two articles we explain the ideas as to how we planned to change teachers' mindsets. We aim to turn teachers into designers of the learning process by inviting them to select and adapt inquiry activities and evaluation tools according to their own and their pupils' needs. This first article from Bregje de Vries, Ilona Schouwenaars and Harry Stokhof is answering the question of whether teachers make adaptations to the approach and materials of the project and if yes then how and why they do it. The authors collected lesson plans and diaries from 20 primary school teachers in the Netherlands and conducted interviews with them. Their findings demonstrate that teachers are willing and able to follow the five-phase IBL model and RRI approach used in the project as well as the formative evaluation procedure. However, the teachers still need to adapt the materials because of several practical and pedagogical reasons. Therefore, it was concluded that the "teachers as designers" approach is a fruitful one that should be supported in teacher training.

The second article is by Alyssa Filippi and Dipali Agarwal, who are not main contributors in the Ark of Inquiry project but have had an internship at UNESCO, one of the partners in the project consortium. Coming from Canada and India, respectively, some of the ideas of the Ark of Inquiry project have already been disseminated from Europe to America and Asia thanks to them. In their article they focus on factors that may be viewed as barriers to adopting the "teachers as designers" approach. The authors report findings from 14 Italian teachers and 30 Indian educators. In their conclusions, access to technology, misconceptions about women's abilities in STEM fields and the effect of poor pre-service teacher training are identified as the main barriers to adopting the "teachers as designers" approach.

The third and the fourth article discover teachers' readiness for being instructional designers. First, Marios Papaevripidou, Maria Irakleous and Zacharias C. Zacharia describe teachers' Pedagogical Design Capacity and Pedagogical Content Knowledge for IBL after completing a course developed in the context of the Ark of Inquiry project. They also shortly describe the three-phase training model (teachers as learners, teachers as thinkers, teachers as curriculum designers and reflective practitioners) used in the project. This information is important, as it provides the context for several of the following articles.

In the fourth article, Emanuele Bardone, Mirjam Burget, Katrin Saage and Maarja Taaler bring in a new dimension in teachers' adoption of new learning approaches. They offer some insight into how RRI could be implemented in science education. In an ethnographic study with seven Estonian teachers the authors conclude that RRI can be interpreted in science education as a "type of meaningful engagement in and for an inquiry during which the students are given the opportunity to make

meaningful decisions in the different inquiry phases and thus be able to take responsibility for the inquiry process".

The last two articles of the special issue focus on the findings from the implementation of the teacher trainings of the Ark of Inquiry project. First, Essi Ahokoski, Miikka Korventausta, Koen Veermans and Tomi Jaakkola report the study of 102 Finnish teachers. First, they divided teachers into three groups according to their self-efficacy. Next, they analysed several measures of these groups at the end of the training and found that the general satisfaction with the training and the utility value of the training were similarly high. In addition, the training was useful for increasing the self-efficacy of the teachers belonging to the group that had exhibited low levels of self-efficacy.

Gerli Silm, Kai Tiitsaar, Margus Pedaste, Zacharias C. Zacharia and Marios Papaevripidou are the authors of the other article on changes shown by the teachers. In this study, data collected from a majority of the project countries was used and more than 400 teachers were involved altogether. In the study, changes in teachers' sense of efficacy and attitudes towards IBL as a result of the Ark of Inquiry in-service training were analysed. The results showed a positive effect of the training on some aspects – on the student engagement subscale of the scale measuring teachers' sense of efficacy and attitudes towards IBL. However, the results also demonstrated that systemic restrictions cannot be removed by a training course.

In conclusion, the six studies show that the Ark of Inquiry pedagogical approach and three-phase teacher training have great potential but the effects should be further clarified in future studies; also, data should be collected from learners who form the main target group of the IBL activities available in the Ark of Inquiry repository.

Margus Pedaste*

University of Tartu, Estonia

Guest Editor

*Corresponding author: margus.pedaste@ut.ee

Margus Pedaste*

University of Tartu, Estonia
Guest Editor

***Corresponding Author:**
margus.pedaste@ut.ee