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Integrating technology into primary and secondary school teaching to enhance mathematics education in Hungary

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During the past decades, technology has been becoming an integral part of everyday life and slowly shaping mathematics and science teaching and learning (e.g., Heid & Blume). Although there has been enormous investment on educational technologies in many countries, technology has yet to make a sizable impact on education (e.g., Drijvers et al., 2010). On the one hand, students are becoming increasingly proficient users of technology while, on the other hand, opportunities offered by technologies have still little been utilized. Nevertheless, technologies are becoming more integrated into education providing new opportunities for pedagogical approaches and classroom organisation. For example, mathematicians stated that they use technology because in this way they can more easily treat students as mathematicians and nurture their knowledge through discovery and experimentation (Lavicza, 2010). To utilise the opportunities technology offers we developed a large-scale project, GEOMATECH (<http://geomatech.hu>), in Hungary integrating teaching traditions of the country as well as good practices from around the world.

Many Hungarian mathematicians, scientist and mathematics educators have a world-wide respect. In addition, mathematics education theorists and practitioners, George Pólya, Zoltán Dienes, Imre Lakatos, Tamás Varga among others, are often quoted as great innovators and founders of modern theories and practices in mathematics education. In the GEOMATECH

project, we are developing new approaches for technology integration into Hungarian schools utilising Hungarian teaching traditions, successful international examples, and experiences of Hungarian teachers. The research team of the project is closely working with 45 teachers (25 mathematics, 20 science) and their students (1200 mathematics, 800 science) for 8 months utilising Design Experiment and the Community of Practice frameworks (Cobb et al., 2003; Jaworski, 2006) to develop teaching materials and employing theories of inquiry-based education (Artigue & Blomhøj, 2013). The research team offers continuous feedback to the material development, teacher training and software development teams to extend this work to other Hungarian schools. The GEOMATECH project (owing to the generous 8 million Euro EU Funding, TÁMOP-3.1.12) will develop high-quality teaching and learning materials for all grades in primary and secondary schools in Hungary. These materials (1200+ Mathematics, 600+ Science) will be embedded into an on-line communication and collaboration environment that can be used as an electronic textbook, a homework system, and a virtual classroom environment. In addition to material development, we will offer 60-hour professional development courses for more than 2400 teachers in 800 schools in Hungary. Furthermore, we will organize a wide-range of teacher and student activities including competitions, mathematics and science fairs, and develop a network of schools for the long-term sustainability of the GEOMATECH project. The technology background of the project is offered by GeoGebra (<http://geogebra.org>), which an open-source, dynamic mathematics software widely used around the world.

All activities in GEOMATECH will be evaluated by the research team and questionnaires to measure students' various beliefs and conceptions will utilise the modified instruments of Andrews and Mantecón (2015). Currently, we are in the initial phase of the project starting the Design Experimental phase and preparing the project team (almost 200 people) for further tasks in the project. In our poster, we will outline the theoretical frameworks, the different stages of the project and highlighted initial results from the Design Experimental phase.

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