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***What is going on in Slovakia?
Current trends and flipped learning***

December 2016

Proceedings of the conference Flipcon Spain 2016
(Actas del II Congreso de Flipped Classroom: Comunicaciones y posters presentados)
6th – 8th May 2016, Zaragoza

<https://upjs.academia.edu/JozefHanc>

How to cite:

HANČ, J., 2016. What is going on in Slovakia? Current trends and flipped learning.
In: R. SANTIAGO CAMPIÓN (ed.), Actas del II Congreso de Flipped Classroom:
Comunicaciones y posters presentados (May 6–8, 2016, Zaragoza). Zaragoza: MT Servicios
Educativos, S.L., pp. 328–344. ISBN 978-84-617-5905-7.

II CONGRESO EUROPEO FLIPPED CLASSROOM



Libro de actas

Organizan



Flipped Learning
Simplified with Jon Bergmann



Universidad
Zaragoza

Actas del II Congreso de Flipped Classroom

Comunicaciones y posters presentados

Dr. Raúl Santiago Campión (coord.)

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El II Congreso Europeo de *Flipped Classroom* se celebró en el Palacio de la Infanta en Madrid los días 6 – 8 Mayo de 2016, con el Patrocinio del Ibercaja y con una nutrida representación de docentes, investigadores y empresas comprometidas con la educación y la transformación del modelo educativo.

Este congreso constituyó la segunda edición del Congreso Europeo de *Flipped Classroom*, y la primera vez que se celebraba en España. El éxito y la amplia participación de especialistas de todo el mundo en este encuentro -412 inscritos, 41 comunicaciones- se materializó en este libro de *Actas*, publicado por el GRUPO MT y Digital Text en 2016.

La estructura del libro constituye una réplica de la propia estructura de las comunicaciones, experiencias y posters presentadas en el congreso. En este libro de actas podrás acceder a experiencias que van desde la utilización de apps para el desarrollo del enfoque, hasta la integración de otras metodologías activas con el modelo de clase inversa. Los docentes que nos aportan su visión y puesta en práctica abarcan todos los niveles educativos: desde la Educación Infantil a la Educación Superior, incluyendo los Ciclos Formativos.

Quiero agradecer a los que habéis presentado vuestras comunicaciones, todas ellas fruto de vuestra experiencia y el trabajo día a día en las aulas: un auténtico tesoro que compartís con el resto de colegas que ven en vosotros un modelo que les puede guiar en este camino irreversible hacia la mejora del cambio educativo.

Espero que la lectura de estas actas resulte inspiradora para el lector, y que se anime a presentar su propia visión y aplicación del *Flipped Classroom* en el próximo congreso: FlipCon Spain 2017 en Madrid.

What is going on in Slovakia?

Current trends and flipped learning

Hanč J.

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Abstract

In our contribution¹, delivered during the FLIPCON Spain 2016 round table session of the invited speakers distinguished experts and simultaneously ambassadors for the flipped learning from different countries, we provide a more detailed summarization and story of the flipped learning in Slovakia. Our description of the current state is based not only on the development of flipped classroom approach during last ten years, but we present it in a broader framework of several viewpoints: the Slovak educational system and its general parameters, the well-known OECD's Programme for International Students Assessment (PISA), current global pedagogical trends, the Slovak national curricular reform (2008) and connected national and international educational projects in Slovakia from last years. As one of the main conclusions we can say that Slovakia is at the beginning of a phase, when we need to start with more systematic and focused communication in Slovak community for the flipped learning. The most important thing is to develop a stronger collaboration with other countries getting more experience how to transform whole schools or even the whole educational system on the basis of the flipped learning.

Keywords: Current state of the flipped learning, Slovak educational system, PISA, Slovak educational projects

Introduction

After last ten years, the current reports, learning initiatives around the globe and the exponential growth of publications in pedagogy and education research of the flipped learning (also known as the flipped classroom or inverted classroom) indicate that this pedagogical approach becomes one of the world's new mainstreams in education.

The increasing popularity of the flipped learning pedagogy is connected mainly with two pioneers and motivators of the flipped learning Jon Bergmann and Aron Sams (jonbergmann.com, aaronsams.com)². In the light of the current possibilities of the Internet, clouds, social networking and social media researchers and teachers in different countries create communities with the main goal to advise, share and support the application of the flipped learning model at all levels of education. As most active communities in the world we can consider the Flipped Learning Network in the US (flippedlearning.org) founded by already mentioned Jon Bergmann and Aron Sams, the Spanish-speaking world community led by Raul Santiago Campion (theflippedclassroom.es), the German community led by Jürgen Handke (invertedclassroom.wordpress.com), the French community whose leader is Héloïse D. Dufour (laclasselinversee.com) and the Italian community with Maurizio Maglioni as its leader (flipnet.it).

The flipped learning movement has also appeared in Slovakia. To understand the current state of the flipped learning in Slovakia it will be very helpful to describe it in a broader framework of several viewpoints: the Slovak educational system and its general parameters, the well-known OECD's Programme for International Students Assessment (PISA)³, current global pedagogical trends, the Slovak national curricular reform (2008) and connected national and international educational projects in Slovakia from several last years.

Therefore, in next sections we make a short introduction to Slovakia and its educational system with respect to its basic geopolitical facts. After that, we will enlighten the background and context which led to the development and application of the flipped learning in Slovakia. All information from these two parts of the article should allow understanding the current situation and the story of the flipped learning in Slovakia. Finally, we will come to general conclusions dealing with the current state of the flipped learning in our country.

Slovak educational system

In the context of the basic geopolitical facts about Slovakia (fig. 1), this school year 2015/2016 (if we ignore kindergartens), totally 820 thousand students attend primary, secondary or higher schools⁴. They are being taught by 62 thousand full-time teachers. Typically, 70% of secondary school graduates goes to colleges and universities which we have 35. Twelve universities from total 35 prepare future pre-service teachers at least in one study program.

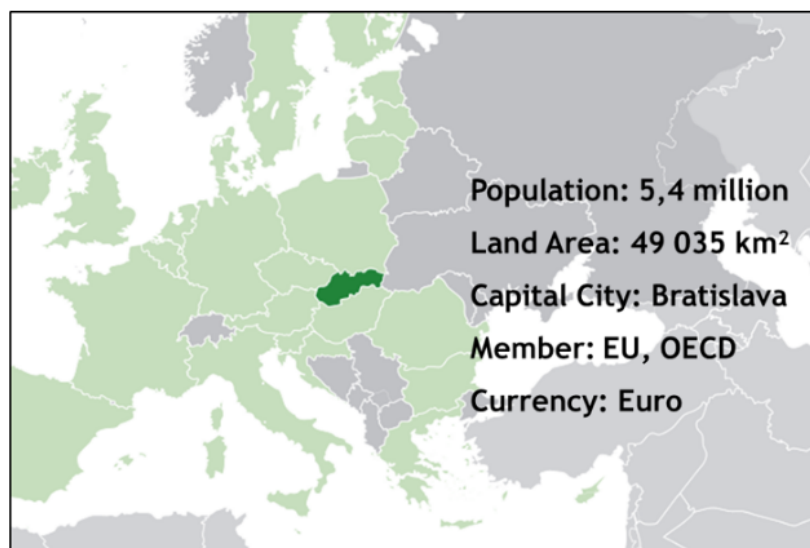


Fig. 1: Basic geopolitical facts about Slovak republic (the map adopted from NuclearVacuum, 2009; Slovak Tourist Board, 2016).

A more comprehensive visual representation of these numerical summaries is included in the following fig.2. As you can see, the overwhelming majority of students and teachers are at state schools (mark in red color), but in Slovakia you can also study at church and private schools. More details about the Slovak school system and its results can be found in publications (Claire, Johan, Deborah, & Paul, 2014; Institute of Information and Prognoses of Education, 2005).

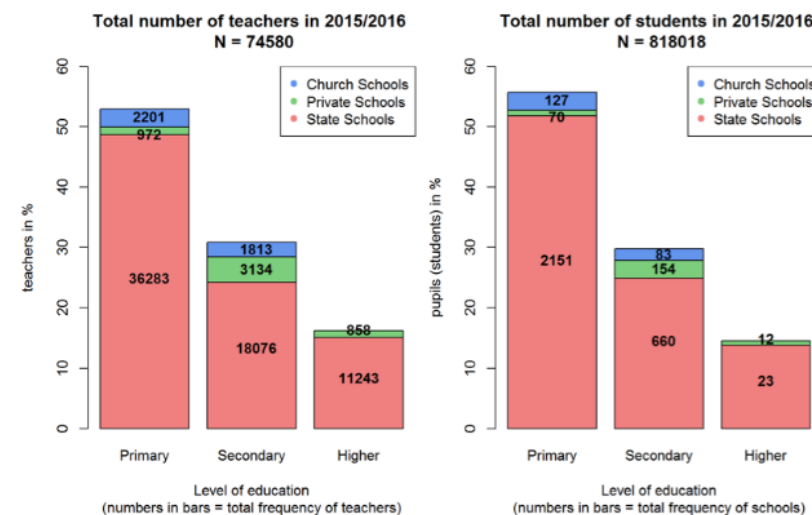


Fig. 2: A visual graphical summaries of total numbers of teachers and students at different levels of education and different types of schools in Slovakia during the last school year 2015/2016 (based on data of the Slovak Centre of Scientific and technical information, 2016).

Background and story of the flipped learning

Now let's go to the flipped learning background and story in Slovakia. In 2008, eighteen years after the velvet revolution, under the pressure of global educational trends and expectations of teachers and society a national curricular reform begun. It brought needed fundamental changes in the content, pedagogical methods and forms of all levels of education, decentralization of the school system in the form of two-level curriculum and such elements as education standards, key competencies and content areas⁵. If we are talking about quality and efficiency in school education, the national curricular reform was also an answer to unsatisfying results of Slovak students in the OECD Programme for Assessment (shortly PISA)⁶.

There are a lot of free online publications that describe the programme in more detail (e.g.

OECD, 2002, 2014). Here we mention several important features of the PISA which are connected to the flipped learning. This international measurement which aims to evaluate and compare education systems worldwide and their development over time, tests three main domains of literacy (represented by knowledge and skills needed for adult life): Reading, Math and Science.

The test tasks of PISA surveys (OECD, 2002) probe not memorization or knowing facts, but higher-order thinking processes and skills, which can be developed much more in the flipped learning than in traditional way of teaching. As for reading literacy it is probing skills as a general understanding, retrieving specific information, developing interpretation or reflecting on the content or form of the text. In mathematics it is the evaluation of skills connected to mathematical thinking, argumentation, modelling, problem posing and solving, representation or communication⁷. In the case of science PISA surveys measure the quality of literacy dealing with recognizing scientifically investigable questions, identifying evidence, drawing, evaluation and communicating conclusions, demonstrating understanding of scientific concepts.

If we talking about the performance of Slovak 15 years olds in mentioned three domains of literacy, figure 3 shows results in 2009, which are slightly below the average (less than 5 %). But what really disturb us are the graphs in fig. 4 showing countries that are getting worse in time, or in other words countries which deteriorate. Some countries are improving in their results, Slovakia is included in the group of countries with a constant negative rate of change in math performance, and negatively accelerating in science results.

Both circumstances, the national curricular reform and under average PISA results became starting points for a wider application of the flipped learning in Slovakia.



Fig. 3: Mean scores of Slovak 15-year-old boys (very similar to results of girls) in comparison with OECD average and other countries in 2009 PISA surveys (data available at OECD, 2016).

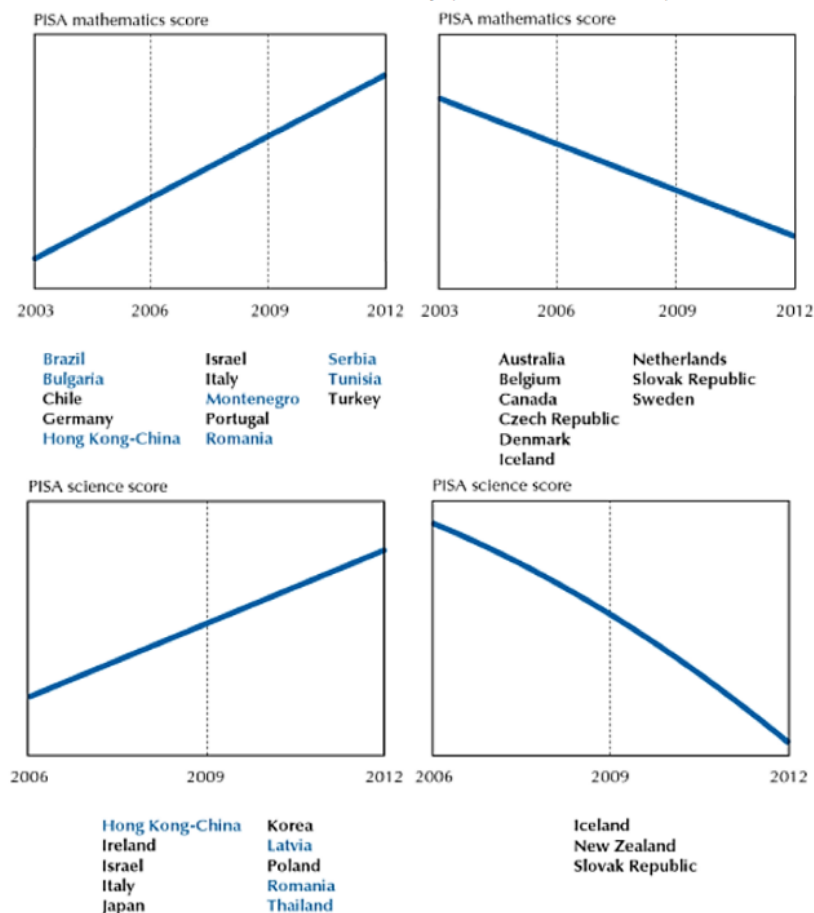


Fig. 4: Positive and negative trends in students' PISA performance in some countries including Slovakia (OECD, 2014). Unlike the math and science we did not show a trend for reading performance which in the case of Slovakia is constant in time.

After these results, in 2009 we initiated four ESF national educational projects called *Modernization of education at primary and secondary schools* (www.modernizaciavzdelavania.sk). Being a small country has sometimes big advantages and in this case we could managed four projects as a whole.

We selected 6850 in-service teachers (10% of all active teachers) from each primary and secondary school, teachers who teach at least one of the following subjects: math, physics, biology, chemistry, geography, history, Slovak language, music, arts, 1st stage of primary schools. Projects had 3 stages of teacher trainings (called modules by us):

1. basic digital literacy,
2. modern educational technology,
3. applications of technology in classroom.

The primary goal of the projects was raising awareness and capability of Slovak in-service teachers in ways how digital technologies can change classrooms into modern student-oriented environments for training, developing and enhancing required student's skills (fig.5). The more explained key ideas how the digital literacy, key competencies and what model of developing ICT skills became the cornerstones of the projects can be found in the following publications (Hanč, Kireš, & Šveda, 2010; Kireš, Hanč, Ješková, & Lukáč, 2010).

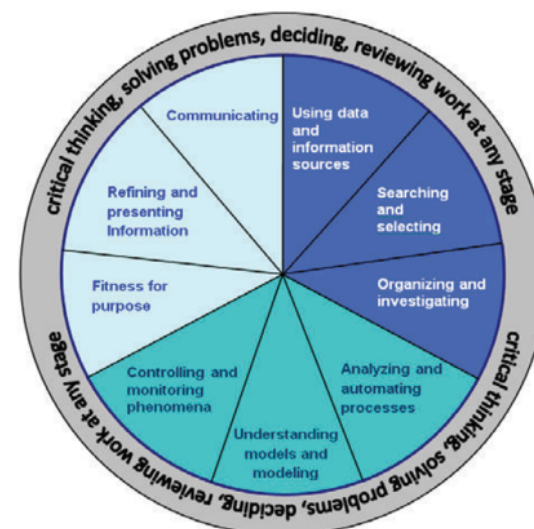


Fig. 5: The model of developing digital literacy in the projects concentrated on four areas where each area is represented by three ICT key subskills (diagrams from Hanč et al., 2010).

To get a better idea what teachers digital skills were probed and trained in our projects, we describe the graph in fig. 6. The bar graph compares input and output teachers knowledge and skills before and after training in the second stage of the projects. As it can be seen for example that skills connected to flipped learning, e.g. in work with video (producing, processing), letter G (green color) has raised from 23% to 67% and level of skills in work with classroom response systems (e-voting) has raised from 13% to 56 %.

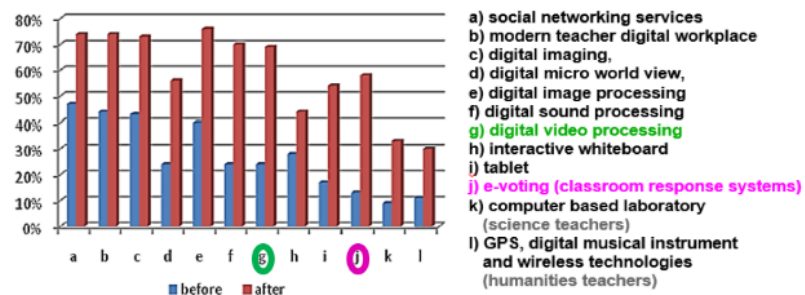
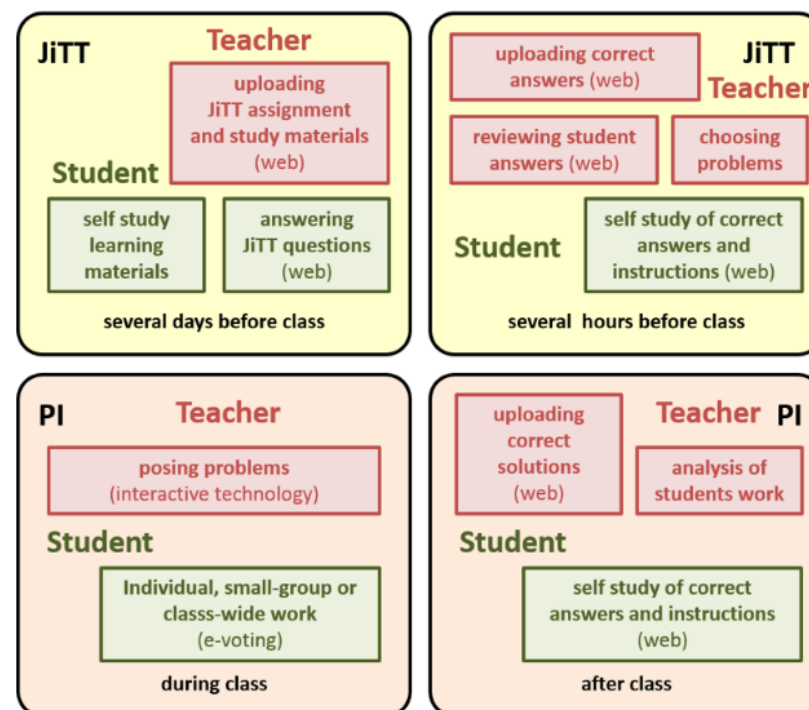


Fig. 6: Results of teachers' training in the projects (from Kireš et al., 2010).

Regarding sound pedagogy we concentrated on more effective interactive teaching methods which are "designed to promote conceptual understanding through interactive engagement of students in heads-on (always) and hands-on (usually) activities which yield immediate feedback through discussion with peers and/or instructors" (Hake, 1998). As an important example of them we introduced the flipped learning based on the just-in-time teaching method and question driven (peer instruction) method (fig.7) or the flipped learning as a combination of JiTT tutorials and the workshop method (Laws, 2004; Mazur & Watkins, 2009). Especially in math, physics and Slovak language we prepared more complex, real pre- and in-class activities.



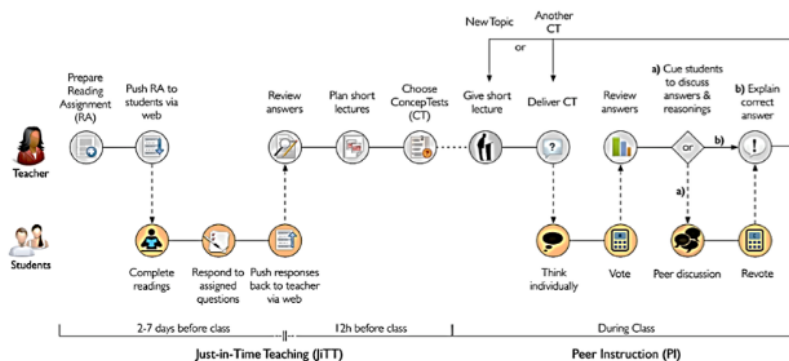


Fig. 7: The form of the flipped learning applied in our projects (figures from Ješková et al., 2010; Lukáč et al., 2010; Schell, 2012).

We used our experience in these methods from our previous project *Modern interactive methods in teaching science managed* in collaboration with world-wide distinguished experts Edwin Taylor from MIT, Jon Ogborn from Institute of physics, Eric Mazur from Harvard university and Ronald Thornton from Tufts university.

Under our supervision, the project team (more than 120 people) has written 20 textbooks 3 general about technology and pedagogy and 17 subject-oriented with real in-class and pre-class activities.



Fig. 8: Layouts of some of seventeen textbooks published in our projects

Simultaneously with these national projects four Slovak universities including us from total 12 preparing future teachers were involved in four big international 7th framework European Union projects⁸ promoting inquiry-based education (Heering, Grapi, & Bruneau, 2012) which belongs to current pedagogical trends in science education. And we know that this teaching method belongs to strong face-to-face components of the flipped learning.

And finally, we have just finished our participation in the successful nation-wide project of a nonprofit organization EDULAB sponsored by Samsung. The project entitled "school on touch" (EDULAB, 2013) trained teachers in the work with tablets together with the flipped learning as pedagogy.

Conclusions

Slovak flipped classroom and learning are after what we call phase zero. We have 10 years long flipped learning experience (5 years old with using videos as learning materials), a lot of pedagogical materials and evaluation tools for the flipped learning from the big national and international projects.

In Slovakia science flipped education is ahead of humanities flipped education. Generally Slovak science teachers are much better in using technology than teachers of humanities). We have excellent teachers applying the flipped learning (but still less than 1% of teachers, many times working in isolation). However, in Slovakia there is no school which was completely flipped. More than 10% of teachers tried or aware of our flipped learning model. More than 30% of teachers are aware of the flipped learning or trained at least with the components of the flipped learning (for example interactive methods, inquiry based science education, digital technology or

Khan Academy).

Now we are at the beginning of phase one, and we need to start with more systematic communication. We need to create more focused Slovak Community for the flipped learning, we need more special conferences. The most important thing is to start a stronger collaboration with other countries getting more experience how to transform whole schools or education system.

Summary about the author

Jozef Hanč is currently an associate professor at the Institute of Physics, Pavol Jozef Šafárik University (UPJS) in Košice, Slovakia. He has worked as a math and physics teacher at a secondary school for gifted students. He was also the head of the Department of Physics Education at the Institute.

In the last five years, he applies and manages the flipped classroom model in math and physics courses at UPJS. Simultaneously, he became one of the principal advisors for the national EU projects where the primary goal was to raise awareness and capability of more than 6800 in-service Slovak teachers in ways how digital technologies can change classrooms into modern student-oriented environments.

He gained an international reputation in the education research dealing with foundations of modern physics. As a visiting scholar, he was also involved in the study of the interactive methods namely Interactive Lecture Demonstrations, Peer Instruction, and TEAL used at Tufts, Harvard University and MIT in Boston, MA.

Jozef Hanč is a reviewer in recognized physics and science education journals (American Journal of Physics, Physics Education, Scientia educatione). He was also an expert adviser for modern physics to the second edition of British textbooks for the nationwide Advancing Physics curriculum at British secondary schools. He is a co-author of a scientific monograph and physics textbook for secondary schools. He has authored over 85 publications with more than 100 citations (including more than 50 citations in SCI and SCOPUS databases). As a translator he is the author and coauthor of Slovak translation of four scientific books.

Acknowledgments

This work was supported by the Slovak Research and Development Agency under the contract No. APVV-0715-12. The work also represents a continuation and dissemination of results of the

project SCIENCENET, financially covered by the grant LPP-0134-09 of the Slovak research and development agency (APVV) in the program for Human Potential Support in R&D and Science Popularization.

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Notes

1. The corresponding Google presentation delivered by the author at the FLIPCON Spain 2016 is available at goo.gl/upggdF.
2. They are also authors of several methodological publications for teachers dealing with this model of learning (Bergmann & Sams, 2012, 2014, 2015a, 2015b, 2015c, 2015d, 2016).
3. The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental economic organisation of 35 member countries, founded in 1961, whose basic mission is to promote policies that will improve the economic and social well-being of people around the world (www.oecd.org).
4. The data was taken from the statistical yearbook (Slovak Centre of Scientific and technical information, 2016).
5. As it was showed later the reform did not go without problems (Porubský, Trnka, Poliach, & Cachovanová, 2015). According to Kascak, Pupala, & Mbugua, 2015 some problems with this reform which are not resolved up-to-date can be understood as a result of using the so-called educational borrowing model frequently adopted in many post-communist countries implementing education reforms (Silova, 2009).
6. The first PISA survey which tests the skills and knowledge of 15-year-old students was conducted in 2000. It is repeated every three years and the last published results come from 2012 (www.oecd.org/pisa/; OECD, 2014).
7. We recommend a very accessible and instructive publication for a general reader about the mathematical literacy and thinking written by J. Boaler from Stanford University who also works in PISA team (Boaler, 2015).
8. PRIMAS (2010-2013, www.primas-project.eu), ESTABLISH (2010-2014, www.establish-fp7.eu), SAILS (2012-2015 sails-project.eu), or CHAIN REACTION (2010-2016, <http://www.chreact.eu/>).

EQUIPO EDITORIAL

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ISBN: 978-84-617590-5-7

