IEVADS ANGĻU VALODĀ

INTRODUCTION

Today welfare of countries greatly depends on human resources, opportunities to obtain competitive knowledge and skills, which can be successfully applied in people's lives. The education system should be of a good quality, ensure a possibility to acquire the necessary proficiency and strengthen young people's motivation and ability to continue education after leaving the school. All stakeholders – parents, students, teachers, education managers, education policy-makers, as well as the general public – should be informed about how well the respective education system can prepare young people for life. European Union's (EU) Strategic Framework of Education and Training (ET 2020) has defined improving the quality and efficiency of education as one of the four strategic objectives for education development by 2020 (*http://ec.europa.eu/education/policy/strategic-framework/index_en.htm*). One of the Republic of Latvia key education development policy documents is "Education Development Guidelines 2014–2020", and its main goal is "high-quality and inclusive education for personal development, human welfare, and sustainable national growth" (*http://polsis.mk.gov.lv/view.do?id=4781*).

Thus, education quality issues are among the most important in the development of national education systems. Fundamentally, the quality of education and its evaluation is not a simple concept, it is constantly in academic, practical and political focus of attention (see chapter 1.1.). There is an issue that emerges quite regularly in political debates concerning education in Latvia, that, firstly, an agreement is needed on what is denoted by the concept 'quality of education', what methods should be used to assess it, and only subsequently the respective steps in education policy and practice should be taken.

Most often, the countries do not content themselves with using only their own national quality assessment. Usually, internationally recognized criteria, methods and assessments are taken into account, and Latvia is not an exception. Ever since Latvia regained its independence in 1991, our country has introduced

and applied an education quality assessment method that has been developed and gained vast popularity all over the world for more than 55 years, ensuring a direct comparative assessment of what students in different countries know and can do in various areas. International organizations – OECD (Organisation for Economic Cooperation and Development, *www.oecd.org*), IEA (International Association for Evaluation of Educational Achievement, *www.iea.nl*), EU – perform extensive organizational and research work: they develop scientifically justified education assessment programmes that conform to high standards and methodologies. Based on the assessment results, these institutions elaborate recommendations for education policy to assist governments in addressing the issues in the sphere of education quality and enhancement of education system. In the modern globalized world, the results of regular international assessment programmes (OECD PISA (Programme for International Student Assessment, *www.pisa.oecd.org*), IEA TIMSS (Trends in International Mathematics and Science Study), IEA PIRLS (Progress in International Reading Literacy Study, *www.iea.nl/current_studies.html*), etc.) – involving about 80 countries, which and including all the industrially developed countries, always cause an extensive response in the world; these results are being analysed and used by EU, OECD, UNESCO (United Nations Educational, Scientific and Cultural Organization), the World Bank and other institutions, as well as the participating countries.

Each of the countries participating in research programmes attach a great importance to the performance level of its students in comparison to their peers all over the world, and, furthermore, benefits from additional internationally evaluated comparative information, thereby enhancing its education system and undertaking required reforms. For example, structural reforms of education system are a very important aspect of policy in Latvia, the need of which has been widely discussed in recent years. A certain downsizing of school system is also intended thereof, as well as optimization of school network due to significant decrease in number of students (approximately by half) caused both by demographic reasons and migration of population to other countries. Reforms of school networks should be linked to education quality provided by schools; many other indicators are required that can be found in international education studies. Indeed, as early as 15 years ago, based on the results of international comparative assessment of education, researchers have suggested school network reforms in Latvia (see, e. g., A. Kangro (2000), A. Kangro (2002), A. Geske, A. Kangro (2004)), which only now (i. e., in 2014) are included in "Declaration of the Intended Activities of the Cabinet of Ministers Headed by Laimdota Straujuma" (*http://www.pkc.gov.lv/images/LS_MK_deklaracija.pdf*) and subject to vigorous political discussions.

Ultimately, it comes to evidence-based education policy decision making, which today to a great extent is founded on internationally obtained data and analysis.

All the developed countries work toward improvement of their education systems and participate in international comparative assessments dedicated to education, obtaining and accumulating internationally recognized and significant data characterising the quality of their education system and many of its contextual attributes, and regularly receive international expertise regarding various aspects. Of course, application of the research results in education policy directly depends on the countries participating in the research, the same goes for appropriate detailed national analysis (i. e., secondary analysis of international research data).

All monographs of the series "Educational Research in Latvia", like many other publications of monograph authors, are devoted to analysis of Latvian results in international comparative evaluation and assessment of education.

The 7th monograph of the series – "Quality of Education: International Comparison. Latvia in OECD Programme for International Student Assessment" – is aimed at the analysis of the most recent education quality indicators in Latvia and their contextual characteristics in the international comparison, the secondary analysis performed in order to address the current education development issues in Latvia. The publication predominantly draws on the most recent data (OECD PISA 2012), however, researchers exercise one of the major advantages characteristic to this cyclical research – the opportunity (and, simultaneously, the necessity) to compare the changes over time that have affected any particular quality indicator or the factors affecting it. Consequently, many parameters have to be analysed in comparison with the data provided by PISA 2000, 2003, 2006, 2009. Thus, various trends are examined in the light of the entire OECD PISA data collection obtained within the previous cycles, as well as the data from IEA TIMSS and PIRLS cycles. The monograph is intended for researchers and practitioners in education, educational policy-makers and education managers, teachers, graduate students, whose interests lie in the respective sphere.

Chapter 1 of the current monograph focuses on the education quality assessment and general characterisation of OECD PISA. At the beginning of the chapter a whole set of quality assessment activities is highlighted – assessment of students, appraisal of teachers and school principals, evaluation of schools and education system in various countries in order to improve learning and to achieve the planned results thereof. The important role of student assessment is discussed by showing international comparative student performance assessment origin and its place in quality assessment activities as a whole. A brief description of IEA (since 1958) and OECD (since 1998) activity is provided, both in the context of developing regular international comparative assessment in the countries of the world, as well as the advancement of this research direction in Latvia since 1991. The problem of research result implementation in the education policy is studied particularly. The chapter provides a description of OECD PISA cycles and their main features.

Chapter 2 reflects the international comparative educational research methodology, describing the research sample selection and the research implementation process, performance scale and building proficiency levels, as well as formation of the context indices by using the survey data. Several of abovementioned issues have not yet been described in Latvian language, therefore this chapter could contribute to improved understanding of the rather complicated methodological issues.

Chapters 3, 4 and 5 address mathematics, science and reading performance of 15-year-old students based on the data and results of the latest completed cycle (PISA 2012) of OECD PISA assessment, as well as those of the previous cycles. First of all, each chapter provides a definition of the respective proficiency and its six levels, aspects of proficiency assessment and types of test items with examples of particular items. Subsequently, PISA measurement results are presented, including the average student performance in the participating countries, the distribution of students according to the achieved level of proficiency in the test, changes in results over time, etc. The analysis is mainly focussed on the performance of Latvian students in comparison to OECD and EU countries. These chapters outline the main PISA results and their evaluation with regard to Latvia in order to select the directions for secondary analyses of Latvia's results in the following chapters of the monograph.

Chapter 6.1 examines the changes in trends of Latvian student average performance in mathematics, reading and science over a rather long period of time. OECD PISA cycles enable the comparison of quality levels since year 2000, using the assessment results obtained every three years. Results achieved by Latvian students in mathematics, science and reading in OECD programme overall have improved. IEA TIMSS initiated in 90s of the 20th century and subsequently also IEA PIRLS cycles and their continuation simultaneously with PISA cycles in the next decade provide an opportunity to assess the trends of education quality level in 49 countries around the world from 1995 to 2009. Publications cited in chapter 6.1 demonstrate that the average annual increase of education quality in Latvia is the highest among all 49 countries, taking into account the results of Latvia not only in OECD PISA, but also in IEA research. Results of Latvia in IEA TIMSS and PIRLS until 2009 (after that Latvia temporarily ceased to participate in IEA research, remaining only in OECD PISA) were significantly above the average level of the participating countries and with an upward trend. Thus, essentially, in a long-term perspective – throughout the entire period after Latvia regained its independence in 1991 – our education system has ensured an increase of education quality level.

Undoubtedly, this raises the question as to the currently attained level of education quality in Latvia in comparison to other countries. Chapter 6.1 provides an answer to this question by using the results, which combine the data from PISA 2012 and TIMSS 2011 – Latvia is the 24th out of 76 countries. The analysis of Latvia's

relative position in each OECD PISA cycle is performed, taking into account the total number of countries participating in the research. It is evident that Latvia takes a stable position on the average level among OECD countries or is close to it, but the performance of students in the new participating countries, whose number is growing, almost always is lower. Thus, the relative rank of Latvia among all the participating countries significantly improves.

Chapters 3, 4, 5 and 6.1 of the monograph mainly provide analysis of the Latvia's students' performance in the international context – OECD PISA tests, in the particular content area, respectively, mathematics, reading and science, but the continuation of chapter 6 is devoted to performance of Latvia's students in relation to various contextual factors (e. g., socio-economic status of the family (SES), location of the school and the type of the school, school network, truancy, etc.), which, in essence, similarly affect student performance in any content area. Naturally, the most recent data is usually used for the purposes of illustration (i. e., PISA 2012 main content area – mathematics), although the analysis often deals also with other content areas and the previous PISA cycles.

Chapter 6.2 examines the generally known student performance relation with student SES in the context of Latvia. It is shown that the relation of student performance and family's material well-being, educational and cultural resources available at home, education and profession of parents (i. e., family SES) in Latvia in recent years has become somewhat more pronounced, as our country from being in a higher position, according to international comparison, has reached the average level of OECD countries in the field of equal opportunities in education. Thus, it is necessary to monitor the situation and look for the ways to help students from families with a lower SES and especially schools attended by a greater number of these students, to achieve a higher study performance.

To characterise the situation more precisely, the chapter 6.2 continues by giving analysis of the average level of school SES, as well as the average school performance in Latvia within international comparison. The level of school's SES is a particular factor that significantly influences student performance, comparing various schools in Latvia and also on the average in OECD countries. In this respect, the greatest attention should be directed toward the groups of schools with low SES and low performance, and average SES and low performance. There are 9.0% and 11.5% of students, respectively, that study in these schools in Latvia. The schools with low SES in Latvia are often located in areas with a less developed socio-economic level, therefore, in this case, the quality improvement is definitely also a matter of regional development. By contrast, in case of schools with low performance and average SES, the decisive improvement factor should be the analysis and advancement of educational work. This topic is further addressed in chapters 6.4 and 6.5 and other chapters of the monograph by linking the previously

described school performance and SES group with urbanization, type of school and other factors.

Chapter 6.3 provides a performance analysis of the students who have a very high family SES (10% of students with the highest level of SES) comparing the situation in nine countries of the Baltic Sea region: Finland, Estonia, Latvia, Lithuania, Russia, Poland, Germany, Denmark and Sweden. Analysing the relation between performance in mathematics and reading, and the SES group, certain differences between the countries can be observed, especially in the lowest group of SES – Latvia, Lithuania and Germany have a pronounced sharp decline in performance. The analysis shows that the increase in performance of students with a high SES is positively related to support provided to students by teachers, discipline and student interest in the study subject.

Chapter 6.4 commences with the analysis of Latvia's student variation of performance distribution, which in Latvia has always been substantially below the average in OECD countries. Also, one of the components thereof – the variance between schools – in Latvia is approximately two times smaller than the average in OECD. Thus, it can be concluded that the education system in Latvia overall provides an improved equity in education quality and students with different performance levels are studying in the same school more often than on the average in OECD countries. This analysis also shows that the relative number of students in Latvia in lowest and highest proficiency levels, which are defined according to OECD countries' average distribution, will be below the average in OECD, since the average student performance in Latvia is close to the OECD average, but the variation of performance distribution is smaller.

Following the general review of variation of performance distribution, chapter 6.4 proceeds with an analysis of relationship between Latvia's student performance and the location of the school, type of school and study programme, as well as students' gender. A particular attention is dedicated to the relatively large differences between rural and urban school performance, exposing one of the causes – significantly lower SES of rural students. A major difference between student SES in different types of schools in Latvia is revealed – from the highest level of SES in national gymnasiums to the lowest level in basic schools. Similar tendencies in differences can be observed with regard to the performance of students – the highest performance in gymnasiums, followed by secondary schools and the lowest performance in basic schools.

Chapter 6.5 examines the relation between the student performance and factors like the autonomy level of Latvia's school management, the number of students at school and in classroom, the high competition among schools, and a particularly important issue in our country – the optimization of school network. For example, the number of fifteen year old students in Latvia has decreased by half in 10 years,

the number of students in general education day schools in Latvia since 1998 has decreased by 42%, while the number of teachers and schools has decreased only by 25%.

It is a situation where, on average, a higher student performance in Latvia can be observed in schools and classes with a greater number of students, however, it should be noted that this is also related to urbanization, SES of schools and students, and student selection procedures in schools. The relatively free choice of schools in Latvia foster the impact of parent SES on the choice of school, the relative number of schools that are chosen by socio-economically most favourable families is rapidly decreasing (since 2006, the relative number of schools in Latvia chosen by families with very high SES has decreased from 75–77 % to 55%).

Optimization of school network is considered as an issue of state administrative territorial division and state's regional development, because it is not solely a matter of educational policy. The authors recommend that during the school network optimization process, which includes merging, closure and transformation of schools, to take into account also the quality of education provided therein, and choose appropriate methods for comparing the education quality level of individual schools – centralized examinations, international comparative studies of education, particular quality monitoring activities in order to determine the level of student performance and, possibly, its growth, etc., trying reform implementers take into account also student SES and overall SES of the school. With regard to research and application of research results to the policy, it is interesting to look at the publications by the authors of this monograph, released 15 years ago. Therein, based on TIMSS of 1990s and other international assessment programmes carried out in Latvia, it is proposed to implement the school network optimization reforms that are currently included in the government declaration on the measures to be taken and are subject to vigorous political discussion. Thus, international comparative research of education quality for at least 20 years has signalled the need to devote particular attention to the school network and opportunities to obtain education of equity in Latvia.

Chapter 6.6 investigates the impact of truancy on student performance in OECD PISA 2012. Truancy is a problem faced by most education systems in the world. Researchers admit that truancy significantly influences student performance and the future life of each student, as well as causes damage to the society as a whole. One of the reasons for instigating such analysis is the fact that student survey results in Latvia indicated a relatively high frequency of truancy in comparison to other countries. Impacts of different types of truancy on student performance were analysed (skipped day, arriving late for school, skipped classes). A possible link between student SES, type of school and study programme, urbanization and gender of students was also explored.

Based on the analysis, chapter 6.6 provides recommendations of various levels, commencing with the necessity of overall change in attitude towards truancy, which in Latvia usually is not regarded as something extraordinary, and continuing with more specific recommendations concerning schools and families. These results to some extent echo the opinion of Latvian public, that the most pressing problem in our schools is the lack of discipline among the students. It was the view expressed by 57 to 62% of respondents for three successive years in the sociological survey "DNB Barometer of Latvia" (*https://www.dnb.lv/sites/default/files/dnb_latvian_barometer/documents/2015/dnb-latvijas-barometrs-petijums_nr82.pdf*). Certainly, the DNB survey does not reveal the details – how, according to the residents of Latvia, the lack of discipline among the students is mainly manifested, what should be achieved improving this discipline, and what could be the involvement of the school and other parties, for example, parents. Because, obviously, the family also could have a major role in preventing skipped days and arriving late for school.

Chapter 7 is mostly dedicated to performance of Latvia's students and analysis of its correlation with other factors, student skills and activities to ensure future career. Additional career module was included in student surveys in three PISA cycles, however, unfortunately, it was not possible to perform a trend analysis as the questions included in the module were different in each cycle. In PISA 2012 cycle the answers of Latvian students to the questions about the performed activities that would assist in the choice of their further education and career, signal a relatively low student participation in different activities (for example, consulting with career counsellors, shadow days, school and workplace visits, etc.). The exception is activities like information search over the Internet about secondary school or university study programmes, general career opportunities and filling in a survey in order to define one's interests and skills. This was done by 70–80% of students. These students, who apparently want to purposefully build their future education and career, had a higher performance in mathematics. On the other hand, it is alarming that only 14% of these are students from rural basic schools. Is not surprising, that, according to the opinion of the majority of students themselves, the skills required for online search of career-related information they have mastered outside school. At school they have dedicated more time to learn to write a summary of their qualifications and to prepare for a job interview. However, in this aspect the result of analysis is particularly important, showing that students from families with lower SES mostly have mastered all skills related to future careers at school rather than outside it, purposefully thinking about their future career.

Chapter 8 analyses the link of student performance with use of information and communication technologies (ICT) detected in OECD PISA. Including ICT question group in OECD PISA survey of students and schools provides the opportunity to explore a variety of factors related to the use of ICT in education, to investigate,

how they affect student performance, as well as to develop medium and long-term forecasts and recommendations regarding different aspects related to the integration and use of ICT.

OECD PISA data also show that students are increasingly provided with computers at home, and Latvia has rapidly reached the average rate of OECD countries – 92%. Access to Internet and working with it, educational software, printers and other devices at home are positively associated with a higher student performance, although, to some extent, it also reflects the influence of student's family SES.

On the other hand, the analysis of OECD PISA participant progress in relation to the use of ICT in lessons in Latvia and other countries showed the opposite correlation – the use of ICT in lessons did not in any way contribute to higher performance, on the contrary, the correlation between the student performance in PISA test and use of computer time during lessons is negative. Consequently, PISA 2012 results again touch upon the problem that has to be tackled urgently. ICT is developing rapidly and enters all spheres of life, therefore it is a popular belief that teachers should use technologies more actively during lessons, although, as it turns out, at our current teaching methodology development level it is not scientifically justified, since student performance is thereby being reduced.

Chapter 9 considers Latvia's students with a high performance, who have reached the proficiency levels 5 and 6 in reading, mathematics or science in OECD PISA tests. The beginning of chapter is dedicated to the differences between students with a high performance and gifted students. The issue addressed in this chapter arises from the results of PISA cycles – the proportion of students in Latvia who demonstrate high performance is lower than the average in OECD countries, although the overall student performance in Latvia coincides or is close to the average performance of students from OECD countries.

However, the fact that the proportion of students with low and high performance is smaller, in Latvia is also determined by smaller variation of performance distribution – there is less diversity in the quality of provided education (see chapter 6.4), nevertheless, it is very important to look for factors associated with higher performance of our students, which could potentially increase performance of students and the proportion of students with high performance in Latvia.

Chapter 9 provides analysis using binomial logistic regression method, to explore the factors (indices) that would allow students of Latvia with performance from 500 to 600 points in reading, mathematics and science to join the group with performance exceeding 600 points. The result allowed to obtain both general factors, such as a higher education level of parents, and a number of factors specific to each content area, such as more frequent solving of formal mathematics tasks, overcoming excessive anxiety and insecurity in this subject, more frequent reading for pleasure, a more correct learning strategy in order to comprehend and remember texts or

write a text summary. High performance in science could be promoted by a number of specific factors, such as students being well-informed on environmental issues, confidence and satisfaction with their study results in science, a positive attitude about science's role in people's lives and development of society, and the possibility of choosing their careers in spheres requiring science. The chapter also looks at the experience of countries with a large number of students in the highest performance levels. The results allow to offer a number of recommendations to education policy makers, school principals, teachers, parents and students.

Chapter 10 is dedicated to relationships between the results of PISA, student assessment results and content of curriculum in Latvia. Data used in the analysis include student performance in mathematics within PISA 2003, PISA 2009 and PISA 2012, results of Latvia's students in the mathematics examination, and the 9th year students' final marks in mathematics in 2012, and the results of centralized examination in mathematics of the 12th year students in 2012 and 2015.

First of all, the results of Latvia's students in mathematics link items in PISA 2003 and PISA 2012 cycles are compared in order to detect possible changes in student performance in this or that content area of mathematics. The following part of analysis is devoted to a detailed comparison of results shown by Latvia's students with the average performance in OECD countries in item groups classified according to different aspects – content area of mathematics, item type, item context and proficiency required for solving the item. Analysis of Latvian curriculum content and its teaching methodology in the context of PISA is concluded by PISA 2012 mathematics results' analysis, the analysis of optimal comparative frequency of using applied mathematics items (items related to real life) and those of simple formal mathematics. The results of Latvia's students also confirm the overall conclusion of PISA 2012 that a balanced approach is required, and it is not recommended to become too carried away only with the items of applied mathematics or only the formal items.

The further analysis deals with the student assessment in mathematics at the final grade of basic schools in Latvia – grade 9, and at the conclusion of secondary school – grade 12, comparing these results with the results of OECD PISA test. Students of grade 9 take a final examination in mathematics, its content is the same for all and developed centrally by the National Centre for Education (NCE), but it is marked at the school. Students of grade 12 take the mandatory centralized examination in mathematics, its content is developed and the results marked in a centralised manner. For the purpose of analysis, the same students are chosen – students of grade 9 who have participated in PISA 2012 test and have taken the final exam in mathematics in basic school (grade 9), or students who in 2009, while in grade 9, participated in PISA 2012 test, and have taken the centralized examination in mathematics in 2012, while in grade 12, or the students who in 2012 participated in PISA 2012 test and took the centralized examination in mathematics graduating the grade 12 in 2015.

The method of analysis is calculation of correlation and comparison of achievement distributions. High correlations have been obtained in all cases, however, it must be noted that students, whose performance in OECD PISA is low – below proficiency level 2, in grade 9 exam assessment have mostly received 6, 5, 4 points and also an assessment below 4 (17%). Latvian schools use a 10-point scale, where a score below 4 is unsatisfactory.

Chapter 11 provides a study of 15-year-old students' financial proficiency in the context of school, family and student-related factors in Latvia, based on the data of OECD PISA 2012 financial literacy module. Financial module within OECD PISA was developed for the first time and offered to the countries participating in the research as an optional module. In the sphere of financial literacy, OECD PISA 2012 is the first large-scale international study dedicated to the students at the age, when they graduate of the end of the basic school. 18 PISA 2012 countries chose to participate, and the first results were announced later than the results of the key content areas – on July 9, 2014. The obtained results showed that Latvia's students in financial module have achieved very similar results to those in science, mathematics and reading, within the spheres like the average performance and its relation with the student SES index, variation in performance distribution and the relative number of students with low and high performance.

Analysing other contextual factors, the financial education area reveals significant differences in comparison to such "classical" fields as mathematics, reading and science. For example, one of the results shows that student performance in the participating countries does not depend on the volume of the financial education in the curriculum estimated by school principals. In Latvia, the highest performance in tests was achieved by the student group who claimed that they had not mastered these topics either at school, or in any organized manner outside it. However, these students had demonstrated a good achievement in mathematics and reading, and they had a relatively high SES.

Consequently, perhaps, financial education is one of the interdisciplinary spheres, where the nature of teaching and learning has changed most pronouncedly in the modern world – students can learn a lot by themselves, outside school, if they have acquired the key proficiencies and the adequate conditions have been created for them (which are likely to be better in families with a higher SES). Thus, it in no way diminishes the role of the school, but rather requires to introduce some changes in it, in this case, strengthening of interdisciplinary links, quality mastering of key proficiencies by all students, while the most efficient method, most likely, will not be introducing a new subject – financial education.

The monograph reflects the result of shared, purposeful work of the authors, obtained in joint research and various seminars, particularly during drafting of the monograph. Professor, *Dr. phys*. Andris Kangro has written the introduction, chapters

1, 6.2, 6.4, 6.5 and the summary, professor, *Dr. oec*. Andrejs Geske – chapters 2, 4, 5, 6.1 (together with A. Grīnfelds) and chapter 6.3, assistant professor, *Dr. admin.* Rita Kiseļova – chapters 3, 7, 10; professor, *Dr. phys.* Andris Grīnfelds – chapter 6.1 (together with A. Geske), chapter 6.6 and chapter 8, PhD student Linda Mihno – chapters 9 and 11. The monograph has been developed under scientific editorship of A. Kangro.

The study of OECD PISA 2012 in Latvia was supervised by the Republic of Latvia Ministry of Education and Science (MoES), its implementation and pre-financing was commenced by the University of Latvia (UL), and since 2011 it was implemented by State Education Development Agency (SEDA) in close cooperation with researchers of the University of Latvia, Faculty of Education, Psychology and Art, Institute of Educational Research (director, prof. Dr. oec. A. Geske) in the framework of the project "Support to Education Studies" funded by European Social Fund, Agreement No. 2011/0011/1DP/1.2.2.3.2/11/IPIA/VIAA/001, UL reg. No. ESS2011/123. The established Advisory Council for supervision of the project delivery was chaired by the director of SEDA Dita Traidās. PISA National project manager in Latvia is prof. Dr. phys. Andris Kangro, the leading researchers (group managers): assist. professor, Dr. admin. Rita Kiseļova, prof. Dr. phys. Andris Grīnfelds, prof. Dr. oec. Andrejs Geske, PhD student Linda Mihno. Latvian representatives on the OECD PISA 2012 Governing Board are Dita Traidās, director of SEDA European Union Lifelong Learning Programme Department Ennata Kivriņa and Andris Kangro. The abovementioned ESF project also supports the implementation of PISA 2012 secondary analysis and publication of the results. Practically all the chapters in the monograph concerning the research data analysis and discussion thereof, also contain the elements of secondary analysis, while three main secondary studies advanced within the project are reflected in chapters 6, 8, 9 and 10. Since 2014 Latvia is in accession process to OECD organization, therefore, currently there is a particularly pronounced interest in our country concerning participation in OECD programmes.

The results published in monograph have been widely disseminated and discussed with the key stakeholders – education policy makers and implementers, directors of education authorities, school principals, teachers, education researchers, representatives of parent organizations and journalists, postgraduate students of respective study directions – including several conferences with a large representation of the involved parties. Thus, for example, the conference "Quality, Teaching and Learning in International Comparison. Latvia in OECD PISA and OECD TALIS programmes" held on 17.06.2015 in the Aula Magna of the University of Latvia brought together about 150 participants.

The forum of general and vocational education establishment directors and municipal education specialists "Education in Crossroads: Opportunities and Choices"

held on 19.08.2015 with approximately one thousand participants, included discussion of the report "Equity in Education of Latvia: International Comparison", considering the international comparative research results and recommendations for Latvian education policy making. There have been other conferences where the results of the latest OECD PISA and other international studies are presented and discussed, press conferences, seminars at the School Boards and schools, regular meetings of project Advisory Council, special consultations with heads of MoES and with OECD representatives during Latvia's accession negotiations. Mass media have shown a great interest with regard to the results of OECD PISA data analysis, for example, information about the equity issues and quality of education in Latvia, rural schools, necessity to optimise the network of education institutions, and other matters. The main daily news programme at Latvian National Television Channel 1 "Panorāma" dedicated 12 exclusively prepared news stories "School as an opportunity" (I. Springe), broadcasted during September 2015, organised the TV discussion "Direct speech", and National Radio of Latvia, Programme 1 aired a radio broadcast "Family Studio" to the issues addressed in research. Many publications appeared in newspapers and magazines of national and local level.

The results of secondary analysis have been regularly reported in international scientific conferences, for example, the annual European Conference on Educational Research, organized by European Educational Research Association (EERA), as well as in International Research Conference (IEA IRC) organized by International Association for Evaluation of Educational Achievement (IEA).

All the comprehensive databases on the international comparative educational research are available to researchers and interested parties globally (*http://www.oecd.org/pisa/pisaproducts/*, *http://www.iea.nl/data.html*). New instruments for more convenient use of the databases are being constantly developed and are freely accesibble (*http://www.iea.nl/fileadmin/user_upload/IEA_Software/Installing_the_IDB_Analyzer__Version_3_0_.pdf*). A further joint database has been created (Cross – Time, Cross – System – XTXS), containing both IEA and OECD organized international comparative research data as well as other UNESCO, World Bank, United Nations Development Programme (UNDP), Statistics Canada databases, etc., encompassing 232 education systems (*http://www.iea.nl/data.html*). Currently within the framework of the implemented OECD PISA 2015 cycle student testing in most countries, including Latvia, the process is already fully computerised, thus marking a new level in student assessment development.

The authors express their gratitude to the tens of thousands of Latvia's students, hundreds of teachers and school principals for participation in research cycles, hoping that the achieved results in comparison with the most advanced countries of the world will yield a certain satisfaction and strengthen their self-confidence, while bestowing new energy and ideas for future education development path.

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SUMMARY

A whole set of education quality evaluation tools are being developed and used globally to improve student learning and teaching and to achieve the planned results. They include student, teacher, school principal, school and education system assessment and evaluation. Student assessment, which is also implemented in international comparison globally since 1958 and in Latvia – since 1991, is one of the major education quality assessment instruments.

All the developed countries, including Latvia, invest a great effort in improvement and development of their education systems. Therefore, consistent and effective participation of Latvia in the global education quality evaluation and advancement processes, maintaining and developing the research potential at an international level in our country, and involvement in relevant OECD, EU and IEA research and education development programmes is crucial. Thus, a comprehensive, reliable and internationally comparable information and new knowledge is obtained about Latvian education system and its development trends. It can significantly contribute to elaboration and adopting evidence-based decisions in education management and policy.

"Quality of Education: International Comparison. Latvia in OECD Programme for International Student Assessment", the 7th monograph in the series "Educational Research in Latvia", is dedicated to the analysis of the latest Latvian education quality indicators and their contextual characteristics in international comparison on the basis of OECD PISA data, in the secondary analysis addressing relevant Latvian educational development issues.

The summary presents the main results obtained by the analysis of Latvia's student performance in mathematics, sciences, reading and financial literacy within international comparison, the relation of our students' performance to the students' socio-economic status, education process at school (absences, use of ICT, student assessment results in school examinations, etc.), the potential to increase the relative

number of students with high performance in Latvia. The problem of increasing the opportunities to obtain education of equally high quality throughout Latvia is contemplated in various aspects by analysing the quality of education in urban and rural areas, different types of schools, depending on the gender of students, in small schools and classes, showing the necessity of the school network optimization.

Student Performance in Mathematics, Reading and Science

OECD PISA defines the mathematics literacy as

- individual's capacity to formulate, employ, and interpret mathematical problems in a variety of contexts;
- individual's ability to detect causal links mathematically, use mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena;
- individual's ability to recognize the role that mathematics plays in the world and to take well-founded judgments and decisions needed by constructive, engaged and reflective citizens.

This definition emphasizes the role of mathematics as a subject taught at school, where the processes related to problem-solving in real-life context, by using mathematical analysis, applying appropriate mathematical literacy and evaluating the solution in the context of the problem are particularly emphasized. Items of mathematics are composed depending on the knowledge and skills required to solve them, observing the particular context and content. Mathematical literacy, as well as science and reading proficiency is expressed in points or in six proficiency levels.

For OECD countries in PISA 2012, the average student score in mathematics is 494 points with a standard deviation of 92 points. The highest average performers are the students of Shanghai (China) (613 points), followed by Singapore (573 points), Hong Kong (China) (561 points), Taiwan (China) (560 points) and Korea (554 points). Among the European countries the highest performers are the students of Liechtenstein (535 points), Switzerland (531 points) and the Netherlands (523 points).

The mean score of Latvia's students – 491 points – is not statistically significantly different from the OECD average, it is seen as a very good achievement of our education system. Latvia's student performance is on the same level as the average student performance in France, Great Britain, Iceland, Luxembourg, Norway, Portugal, Italy and Spain.

In comparison with the PISA 2003, PISA 2012 showed a decrease of the number of students in Latvia who did not reach the second proficiency level in mathematics, which is considered a basic level, where the students begin to demonstrate sufficient mathematical proficiency that allows to successfully apply mathematical knowledge and skills to achieve any objective and in the future to integrate into the society and compete in the labour market. This decrease is statistically significant, and is the fifth largest among the European Union countries. By contrast, the percentage of Latvian students who are able to solve items of the highest difficulty level in 2012 has remained at the level of 2003, and is one of the lowest among European Union countries (overall, 8% in proficiency level 5 and 6). Among the countries of European Union, invariably the highest performers are the students of Finland and the Netherlands, the lowest – Greek, Bulgarian and Romanian students. Latvia's student performance in 2012 has improved in comparison with the previous studies, reaching the average level of EU – the mean score of 492, surpassing countries like Sweden, Portugal, Luxembourg, Italy and Hungary.

Scientific literacy is defined as an individual's scientific knowledge and its use to identify questions, acquire new knowledge, explain scientific phenomena, and draw evidence-based conclusions about science-related issues. Scientific literacy includes both scientific knowledge and knowledge about science as such. The science items are versatile, they include a variety of real-life and scientific aspects. Five different real-life situations related to health, natural resources, environmental quality, hazards, scientific and technological performance in personal, social and global settings are used in these items. The science content is divided into four categories of knowledge: Physical Systems, Living Systems, Earth and Space Systems and Technology Systems. To solve the items in science, students must be able to identify scientific issues, explain phenomena scientifically, as well as use scientific evidence.

PISA 2012 average student performance in science in various countries ranges from 580 to 373 points. The performance of Shanghai (China) students (580 points) is statistically significantly higher than that of students from all other participating countries. With a relatively high performance difference follows Hong Kong (China) (555 points), Singapore (551 points) and Japan (547 points). The highest performance from European countries is demonstrated by the students from Finland (545 points), Estonia (541 points) and Poland (526 points). Statistically significantly above the OECD average (501 points) is the performance of the students from Liechtenstein (525 points), Germany (524 points), the Netherlands (522 points), Ireland (522 points), Switzerland (515 points), Slovenia (514 points), Great Britain (514 points), the Czech Republic (508 points) and Belgium (505 points). Latvia (502 points) together with Austria (506 points), France (499 points), Denmark (498 points) and the USA (497 points) belongs to the group of five countries where the average performance does not statistically

significantly differ from the OECD average student performance. Students of Peru, Indonesia, Qatar, Tunisia and Albania show a very low performance in science. The lowest performance among the European countries is achieved by the students from Albania and Montenegro. The students of Cyprus, Romania, Serbia and Bulgaria performed slightly better.

The average performance of Latvian students in science does not statistically significantly differ from the OECD average, and that is a very good achievement of our education system. However, the comparison of proficiency groups shows that there are too few students in Latvia, whose literacy corresponds to the highest performance level (overall, 4.3% in the 5th and 6th level of proficiency), consequently, in this aspect our education system needs major improvements.

The greatest increase in science literacy since 2006 PISA cycle is observed in Turkey, Qatar, Romania and Thailand, however, these countries still have a long way to go to reach the level of medium and high performance. Among the countries with relatively high performance a significant improvement has been noted in Poland (28 points), Italy (18 points), Korea (16 points), Japan (15 points) and also Latvia (13 points). A decline of performance is observed in European countries with a relatively high level of education – in Finland (-18 points), Hungary (-10 points), Sweden (-19 points), Slovakia (-17 points) and Iceland (-13 points). In 2006, the performance of Latvia's students in science was lower than that of Swedish students, in 2009 – of the same level, whereas in 2012 – statistically significantly higher.

While looking at the average performance of students from European Union in science in 2006, 2009 and 2012, invariably the highest performance is shown by the students from Finland and Estonia, the lowest – by Greek, Bulgarian and Romanian students. The performance of Latvia's students shows a rising trend, in 2012 it is already slightly (though statistically insignificantly) above the EU average. Latvia has ascended in the ratings by three places and now outperforms France, Denmark, Hungary and Sweden, but not Austria.

PISA defines reading literacy as the capacity to understand, use, reflect on and engage with written texts in order to achieve one's goals, develop one's knowledge and potential, and participate in the life of the society. Reading literacy includes reading of diverse types of coherent text (for example, description, narration, exposition, argumentation, transaction) and variously structured documents (for instance, forms, advertisements, announcements, tables, diagrams).

PISA reading literacy assessment items are developed, observing three main elements: the text (medium, environment, format, type), the aspect (to obtain the information, to interpret what has been read, link the information to one's past experience) and the situation (related to private sphere, public sphere, education, work). There are several different types of reading items in the test – items requiring open-constructed, short-constructed, multiple-choice and complex multiple-choice responses.

In PISA 2012, the highest reading literacy performance is demonstrated by the students of East Asian countries – Shanghai (China) (570 points), Hong Kong (China) (545 points), Singapore (542 points), Japan (538 points), Korea (536 points) and Taiwan (China) (523 points). The highest performance in the European countries was shown by the students of Finland (524 points), Ireland (523 points), Poland (518 points) and Estonia (516 points). The average performance of Latvia's students in reading (489 points) is slightly below the OECD average (496 points), however, this difference is statistically significant. The performance of our students statistically significantly does not differ from those of the Czech Republic (493 points), Italy (490 points), Austria (490 points), Hungary (488 points), Spain (488 points), Luxembourg (488 points), Portugal (488 points), Israel (486 points), Croatia (485 points) and Sweden (483 points). The performance of our students is higher than that of our neighbours – Lithuania (477 points) and Russia (475 points). The lowest performance in Europe was shown by the students of Bulgaria, Romania and Montenegro.

Similarly to mathematics and science, in 2012 the ratio of Latvia's students at the highest – sixth level of reading proficiency was very small (0.3%). By comparison, one can look at the following example: if in a big school there are 1000 students, only three of them will demonstrate the performance of the highest level. If one class group (for example, all the 9th grades) in Latvia comprises 20 000 students, only 60 of them will perform at the highest level. This is by no means enough to provide the country with excellent doctors, scientists, politicians and entrepreneurs. However, it should be noted that the fifth level of proficiency also corresponds to the top level performers' group of OECD PISA, which in Latvia within PISA 2012 has been reached by 3.9% of the students in reading. Hence, in Latvia there are altogether 4.2% of the students representing the 5th and 6th proficiency level. The greatest increase in reading performance since 2000, except the countries with very low performance, was in Poland (39 points), Israel (34 points), Liechtenstein (33 points) and Latvia (31 points). In case of Israel and Latvia, the relatively low performance in 2000 should be noted. The decline was most conspicuous in the countries of Northern Europe – Sweden (-33 points), Iceland (-24 points) and the European leader in education – Finland (-22 points). Since 2009, the biggest performance increase was noted in Taiwan (China), Ireland, Macao (China), Thailand, Japan and Poland. The most significant performance decrease was in Iceland, Slovakia, Sweden and Finland. The international community comparatively early noted a decrease in Swedish students' average performance revealed by international comparative studies (not only PISA), at the same time, insufficient attention as yet has been paid to the fall in Finland's performance.

Overall, from 2006 to 2012 the average performance of the European Union students in reading has increased. The average performance of Latvian students

has also been rising steadily, yet in 2009 and 2012 only by two points (statistically insignificantly), falling behind the average performance of EU students (486 and 491 points, respectively). Over the past three years, Latvia has moved up one place in the rating, surpassing Hungary, Portugal and Sweden, where the student performance has declined. By contrast, Czech and Austrian students who in 2009 were behind Latvian students, in 2012 overtook them.

Latvian Student Performance in Relation to Different Contextual Factors

In the long-term perspective – throughout the whole period since regaining of independence in 1991 – the Latvian educational system has ensured a gradual increase in the quality of education, furthermore, the average quality increase is among the highest in comparison with other countries worldwide. The level of education quality attained by our students places Latvia among the 15–25% of the countries globally with the highest quality of education.

The above conclusions are proved by the fact that we can assess the average education quality level in Latvia and its changes in international comparison over quite a long period of time, because Latvia has been actively involved in international comparative education studies from the time of regaining its independence. International analysis shows that, as per Latvian results, not only in the OECD PISA since its first cycle – PISA 2000, but also in the cycles of TIMSS and PIRLS of IEA that were started earlier, the annual average increase of Latvian education quality in mathematics, science and reading is the greatest among 49 countries in the period from 1995 to 2009. We are followed by countries like Germany, Poland, Lithuania, Finland, Denmark, Hungary, USA, Russia, Austria, etc., while the most notable decrease in the level of quality is observed in Sweden, followed by the Czech Republic, Norway, etc.

According to PISA 2012 and TIMSS 2011 data, the education quality level attained in Latvia corresponds to the 24th position among 76 countries. According to the OECD PISA cycle results, the education quality level in Latvia corresponds or is close to the average performance of OECD and EU countries (except the considerably lower results obtained in PISA 2000). Nevertheless, the results of Latvia according to IEA TIMSS and PIRLS data until 2007 (since subsequently Latvia temporarily ceased to participate in IEA studies, remaining only in OECD PISA) were significantly above the average level of the participating countries of the studies and with a growing trend. The relative position of Latvia in countries' ranking in

each of the OECD PISA cycles, taking into account the total number of participating countries, also has an overall tendency to rise. More and more countries become involved in the research, yet their education systems usually show a lower level of education quality than the OECD average, and thus also lower than the level of Latvia. Envisaging the continuation of this process and notionally composing a ranking chart containing the results demonstrated by students representing almost all the countries of the world, and the expected results in international comparative studies, we see Latvia among the 15–25% of countries with the highest performance. Of course, all the countries of the world do not participate in international comparative assessment of education quality, therefore, we can have only an approximate idea of their possible quality of education.

Educational reforms have also been summarised and analysed internationally – implementation of student and school assessment and evaluation (centralized examinations, international comparative studies, accreditation, licensing, etc.), arrangement of the fundamental organizational and financial issues related to the education system (development of school management and financing mechanisms, and to a certain extent – their decentralization, etc.), systematising the pedagogical foundations of the education system (curriculum reforms, education standards and study programmes, textbooks, etc.), that have formed the basis of increasing the quality of education in Latvia and other countries (for example, in Poland, Lithuania, Hong Kong (China) and Singapore), in certain periods of national education system development in these countries generally achieving a good level of education quality according to internationally established criteria.

According to PISA 2012, Latvia has one of the smallest student performance variations in mathematics in comparison with the OECD countries, practically, it is the same only in Estonia and still smaller in Mexico, even Finland shows a greater performance variation than Latvia. Latvia has demonstrated a relatively small student performance variation also in other PISA cycles and other content areas. Furthermore, there has been an increase in performance, and simultaneously a reduction of its performance variation, indicating that the quality of education in Latvia has increased while the disparity in equity of education quality has decreased. One component of performance variation – the between-school variance – in Latvia is twice as small as the average in OECD.

Overall, it certainly positively characterizes the education system of Latvia, since it indicates that the high proficiency level of Latvia's students does not have as great a difference from the low proficiency level in comparison with the average difference in OECD countries – consequently, the education system provides a relatively greater equity of education quality throughout the education system of the country. This also means that the relative number of students in Latvia in the lowest and highest proficiency levels, which are defined according to OECD countries' average

distribution, will be below the average in OECD, as the average student performance in Latvia is close to the average score of OECD, but performance variation is smaller.

Although the performance variation in Latvia is relatively smaller than in many OECD countries, it still exists, and depends upon a number of factors – regional, school, family, and an individual student's level. Analysis of PISA 2012 results shows that the degree, to which the performance of Latvia's fifteen-year old students in tests depend on the material welfare of the family, educational and cultural resources available at home, parental education and occupation (i. e., student SES), generally is consistent with the average level in OECD countries. However, in the last years the dependence of student performance on student SES in Latvia has slightly increased as previously it was lower than the average in OECD countries. Consequently, the situation in the field of education equity in Latvia has somewhat deteriorated.

The average level of a school's SES significantly influences student performance, when comparing various schools in Latvia and on the average in OECD countries. A more detailed analysis of school SES and average school performance shows that 21.3% of Latvia's students attain a high level of performance studying in schools with a high level of SES. These are joined by additional 3.8% of the students who attend schools with a high performance but average level of SES. On the other hand, 9% of Latvian students study in schools with a low school SES and a low performance level. Increasing the student performance in these schools is certainly not just a matter of education system, but mainly a topic of regional development, when the schools are located in the area where SES generally is low, and perhaps it is partly a matter of student selection in these schools. 11.5% of students attend schools with a low performance level, but an average level of SES. In such schools improvement of education should be the key factor in increasing learning outcomes. The international comparison of schools in respect to school performance levels and school SES is favourable to Latvia – in OECD countries, on the average, 18% of students learn in schools with low SES and low performance level, and 20% attend schools with a high SES and high performance levels. In Latvia, the relative number of such students is 9.0% and 21.3%, respectively. Thus, the number of students from schools with a low performance level and a low SES in Latvia is relatively small in comparison to the OECD average. The smallest number of students from schools with a low SES and a low level of performance is in Finland – only 4%. Finland is followed by Norway (4.1%), Iceland (7.1%), Estonia (7.8%), Sweden (8.1%), Latvia (9.0%), Canada (9.5%) and Denmark (10.1%).

The average performance of fifteen-year olds in mathematics, science and reading in the rural schools of Latvia still lags behind the performance level of the students of similar age group in the schools of Riga and other Latvian cities and towns. Difference in performance levels depending on urbanization does not significantly change over the period of time, it has been present in all studies, in all content areas and levels of

education. The analysis shows that the difference in performance is not determined solely by objectively lower student SES in rural areas, but also by other factors.

Student SES in rural schools of Latvia is significantly lower than in Riga, the relative differences being much more pronounced than on the average in OECD countries, and these are considerably increasing. The relative number of rural students in Latvia is twice as large as on the average in OECD countries. Therefore, the role of regional development policy in providing support to rural development is very significant. Without development of the rural regions, the education system alone will not have sufficient capacity to ensure equally qualitative education opportunities in the entire territory of the country.

At the same time, as the difference of performance levels in Riga and rural schools remains unchanged in a situation, when the relative differences of family SES between Riga and rural areas are visibly increasing, it is not a bad indicator regarding the rural schools. Besides, the achieved science literacy level in Latvia's rural schools within PISA 2012 is close to the average level of students in Sweden and Russia (the entire countries), in reading – approaching Cyprus' level, and in mathematics – close to the level of Israel and Greece.

The PISA 2012 in Latvia shows that the performance level of girls is higher than the performance level of boys in all content areas. In reading and science this difference is statistically significant, but in mathematics it is statistically insignificant. In reading, the superiority of girls in Latvia in all PISA cycles since 2000 has been invariably high (it has been so also on the primary school education level, as shown by IEA PIRLS results in grade 4). The girls also show a higher performance in science in all cycles, although the performance difference in scores varies, and within the last cycles it has a tendency to increase. Until recently, the performance difference in mathematics between boys and girls in Latvia has been statistically insignificant.

The average performance of Latvia's students in all content areas and all PISA cycles does not significantly differ in the schools that teach in the Latvian language and schools where minority education programmes are delivered in Russian language.

The average performance of Latvia's students differ in case of students who study in different types of education establishments. Gymnasium students have the highest performance, followed by secondary school students and then – by basic school students. An identical dependence of Latvia's student performance on the type of an education establishment has been observed in all PISA cycles since 2000 and in other international studies.

For example, PISA 2012 results show that the performance of students from Riga gymnasiums in mathematics almost reaches 570 points, just behind the average achievements of Shanghai (China) and Singapore, thus relatively ranking the 3rd in international performance. The average performance in mathematics of students

from all the other PISA 2012 participating countries is lower. However, it should be understood that we are comparing only the single best, but relatively small education segment of Latvia to the average indicators of other countries (although it should be noted that Shanghai also is just one of China's cities).

It is well-known that there is a student selection, often using entrance examinations, in gymnasiums, students do prepare beforehand (with private tutors and through enhanced lessons in extracurricular groups, etc.), in order to study in gymnasiums. The gymnasiums have a quite high student SES, the atmosphere strongly promotes focusing on excellent results, etc. At the same time, it clearly demonstrates that very high results like these are quite achievable in Latvia. However, in Latvian basic schools the student performance level is much lower, for example, in mathematics PISA 2012 showed scores between 480 and 455 points (depending on the location of the school), which was below the OECD average. Then again, it is the same range of average performance level in mathematics as achieved by the students in the USA, Lithuania, Sweden, Hungary and Greece.

To contribute to the equity of education quality, one should pay attention also to the lower performance levels of Latvian students in basic schools in comparison with secondary schools, besides, this phenomenon is most pronounced in Riga, slightly less in other cities and rural areas of the country, but it is almost absent in the towns. Possibly, it is influenced by a certain selection of students, which, in turn, is related, among other factors, also to SES.

Comparing the performance levels in different types of schools, the data characterising student SES in different types of schools in Latvia should definitely be taken into account. Gymnasiums, particularly the state gymnasiums, have a very high level of SES. They are followed by secondary schools and basic schools, where this index is the lowest. Consequently, the variations in performance levels in different types of schools to a certain extent can be explained also by the different SES, which, in turn, depends on the location of the school, the student selection process, as well as other factors.

The survey of school principals in Latvia reflects that their resource management activities (responsibility of planning and spending the school budget, selection and recruitment of teachers, setting the initial salaries and bonuses for teachers) are significantly more autonomous than in OECD countries on the average. On the other hand, regarding curriculum and assessment management (choice of textbooks, study subjects and their content, choice of student assessment methods) the level of autonomy in Latvia is lower than on the average in OECD countries. The relative level of school autonomy in Latvia has a tendency to grow.

The principals of Riga schools see less autonomy in their activities with regard to resource and curriculum and assessment management in comparison to their colleagues in other Latvian schools. On the other hand, student – teacher relationship,

discipline, provision with study materials and teachers, extracurricular activities are evaluated by school principals as equally good both in the city schools and rural schools of Latvia. The rural schools usually are smaller, they have less students per teacher and there are less students in the classrooms.

Competitiveness among schools with regard to attracting students from the same area is higher in Latvia than on the average in OECD countries, and it has definitely increased due to the reduced number of students. 74% of school principals think that the school is competing with two or more schools in attracting the students, 19.5% – with one school and only 6.5% state that they do not have a competition with other schools. Besides, only 20.5% of school principals think that living in the school area "Always" equals to admission of the student, 79.5% of the school principals have replied "Sometimes" or "Never". The relatively free choice of schools in Latvia foster the impact of family SES on the choice of school, the relative number of schools that are chosen by the most socio-economically favourable families is rapidly decreasing (since 2006, the relative number of schools in Latvia that are being chosen by families with very high SES has decreased from 75–77 % to 55%).

There is a pronounced correlation in Latvia that higher performance in international studies is demonstrated by schools and classes with a bigger number of students. However, it should be noted that correlation between two variables does not signify a direct causal link. The situation is considerably influenced by other factors, for example, student SES, location of the school, student selection procedures (if such exist), striving for improved learning performance at school and in classroom, etc. As a result, the possible pedagogical advantages of small schools and classes in Latvia to be gained because of small number of students still cannot compensate for negative factors, and student performance there, on the average, is lower (also after accounting for student SES).

The dramatic decrease of student numbers in Latvia calls for an optimization of the school network. The number of 15-year-old students in Latvia's education establishments in the period from 2003 to 2012 has dropped by 50.5%. This is the greatest decline among PISA participating countries. The number of students from general education day schools in Latvia has decreased by 42% since 1998, and the number of teachers and schools – by 25%. The relation between the numbers of students and teachers within this period has decreased from 11.7 to 8.9. The authors do not consider that the reduction in numbers of schools and teachers has to be relatively as big as the decrease in student number, however, a large disproportion is bound to cause problems.

The greater school management autonomy in smaller municipalities could be a hindering factor for school optimization there. School principals and individual teachers quite often also are elected officials in these municipalities and they can possibly have a crucial vote in municipal decisions with regard to the field of

education in the interests of their schools. As a result, school principals fight for retaining their own schools at any cost, and the local municipalities support them.

Undoubtedly, the issue of school network reform is closely linked to the state administrative and territorial division, possible changes thereof (continuation of the reform) and the state policy of regional development. It is very complicated to ensure efficient education in regions that are not being developed. Likewise, the regions cannot properly develop without schools. Thus, this is a matter of intersectoral policy and it can be solved more efficiently, if the municipalities are willing to cooperate.

If there is a clarity on state administrative territorial division and regional development, then it is possible to systematically implement the goal set in the current government's declaration for 2014: "We shall establish a strategic development model of school network, which will ensure a quality education for students of the first six grades as close as possible to students' homes, while preserving the rural schools of Latvia as important local community centres. Secondary education will be concentrated in schools with well-developed pedagogical resources, as well as material and technical facilities." The declaration exactly corresponds to the recommendations the researchers have been publishing since 2000, based on the data of international comparative education studies implemented in Latvia in the 1990s and later. Thus, essentially, one of the proposals arising from the results of all the current international comparative studies is the necessity to optimize school network in Latvia and to ensure the equity of education quality throughout the state.

Student performance is increased both by their positive interaction with the teacher (student feels the teacher's interest in each student's performance, the teacher provides additional assistance when necessary, and explains the topic until the students have understood it, teacher gives students an opportunity to express their opinion) and the discipline in the classroom (lack of noise and disorder, students listen to the teacher, they are not late arriving to school or do not skip the entire school days), as well as student interest in the respective study subject (i. e., mathematics). This was confirmed by analysing the performance of students with high SES in relation with various contextual factors in nine Baltic Sea Region states, using PISA 2012 data.

Overall, the analysis of truancy and disciplinary problems in classroom, on the basis of PISA 2012 student survey data, showed that our students have a relatively high truancy level. Skipped days in schools of Latvia are related to essential weakening of performance level, a less pronounced correlation was established between the decrease in performance and arriving late for school. However, skipped classes in case of Latvia's students in comparison to the OECD average, as well as Baltic Sea Region states, was related to a small decrease in performance level, thus raising concerns about importance of that particular lesson and its added value. The truancy

trends of Latvia's students were not statistically significantly different in schools with various study languages, urban and rural schools, basic schools, secondary schools and gymnasiums. Both girls and boys have similar truancy habits. The schools with a better disciplinary climate index have a lower intensity of truancy. Latvia's students from the families with a higher SES on the whole are less prone to truancy than the students from families with a low SES.

Undoubtedly, the role of ICT is very important in all the areas of the contemporary life. However, the obtained results here in a way counter our expectations and hopes. OECD PISA participant performance analysis demonstrated that the highest average performance in all content areas was shown by the group of students, who indicated that in the respective study subject the computers were not used at all during the lessons within a week at school. Furthermore, as the time dedicated to computer use increased, the average performance of students in all content areas deteriorated. Not to deny the growing role of ICT in study process, the obtained research results signal that meaningful ICT use in Latvia's general education schools should be viewed as insufficient, as it is still impossible to identify the added value obtained through the use of ICT in the study process.

Students with a higher performance more often use the Internet to search for the information about further career options, upper secondary school, college and university study programmes, as well as try to establish their interests and skills. Unfortunately, among these there are rather few rural basic school students (14%). Students' interest in their future career can serve as a motivating factor for higher study performance, therefore career education has a particular role at schools. PISA data analysis demonstrates that students from families with a lower SES have mastered most skills related to future careers more at school than outside it. Consequently, schools have the means as well as obligation to motivate students from less well-off families to choose to continue their education and think purposefully about their future career.

The above results of analysis have contributed to the following recommendations:

- to continue increasing the overall quality of education in Latvia (student proficiency in mathematics, science and reading), enhancing the work with gifted students and simultaneously focusing on the less advanced ones. It will result in raising the average performance level, the relative number of top performing students will increase and the number of students showing a low performance will decrease;
- to ascertain the situation and look for ways to help students from families with lower SES to achieve higher performance, and particularly to assist schools with a relatively great number of these students. In this respect, a particular attention should be paid to the group of schools with low overall SES and low performance (approximately one tenth of 15-year-old students study in

this group of schools), although this is the matter of regional development as much as that of education;

- to optimize the school network and develop the regions in Latvia, ensuring the high equity of education quality throughout the country (in cities and rural areas, basic schools and secondary schools). In this process, the students from the first six grades must recive the education of a good quality as close as possible to their homes, concentrating the secondary education in schools with teachers of a high professional level and well-developed infrastructure by improving the school network, schools should be merged or closed, secondary schools should be transformed into basic schools, basic schools – into primary schools, etc. The education quality factor should definitely be taken into account during optimization, not basing the decisions only, for example, on infrastructure costs. When the optimization of infrastructure brings the economy of resources, the funds must be directed towards improvement of education process and professional growth of teachers. Appropriate methods must be chosen for comparing the education quality levels of individual schools – centralized exams, international comparative studies of education, specialised quality monitoring activities – in order to determine both the level of student performance and, as much as possible, its growth, while taking into account also SES of student families and overall SES of the school;
- to reduce disparity between genders in reading literacy:
  - to use as many diverse study methodologies during study process as possible to ensure that different student groups would benefit from the study process to the greatest extent, and to meet the interests and needs of different students;
  - to provide speech therapist free of charge to all the students at pre-school and basic school levels;
  - to create a school environment where students would not abuse each other neither verbally, nor physically;
  - to preserve the mandatory pre-school education and to ensure the required number of places in pre-schools for all age groups;
  - to change the attitude toward truancy, which in Latvia is not usually considered as something out of the ordinary. On the state and municipal levels to meticulously comply with all the requirements established by the legislation with regard to absence recording, monitoring and reporting, to revise the registration system of truancy cases, to set a procedure of cooperation between schools and parents with regard to absences, to improve the definition of actions to be implemented in case of truancy, depending on its type and scale;

- to carry out extensive scientific and methodological work to study the opportunities for ICT use during lessons at school to achieve a positive impact of ICT integration on student performance. It is required that ICT industry supports this work;
- to focus the work of teachers on creating a positive cooperation with students, a good disciplinary climate, to provide strong support for students during their learning. All stakeholders – parents, teachers, intellectuals, mass media – should try to increase the students' motivation to learn.

Latvian Students with a High Level of Performance

The proportion of top-performing students in mathematics, science and reading in Latvia in all PISA cycles is lower than on the average in OECD countries. PISA 2012 results show a very small tendency to increase in comparison with PISA 2009, however, the relative number of such students in Latvia has not statistically significantly changed in any cycle and content area. In comparison to the neighbouring countries, we are behind Estonia, whereas in Lithuania and Russia the proportion of such students is similar to our country. The number of girls in the top-performing group in Latvia is higher, particularly in reading, in the last PISA cycles this difference is increasing. In mathematics, in the last cycles the number of boys in the top-performing group is slightly bigger than that of girls. On the other hand, in the area of science the number of boys and girls in the top-performing group is nearly the same. A particular attention should be devoted to rural schools, especially basic schools, since they show the poorest results with regard to achieving top-performance.

The strategic development and education policy documents of Latvia envisage an increase in the number of students achieving high performance and that undoubtedly is crucial for the progress of our country, therefore the secondary analysis using the data of PISA cycles aims to define the factors that could contribute to increasing the number of such students in Latvia. It resulted in identification of general factors, like higher parental education level, which is positively related to a higher student performance in all the content areas, as well as a number of factors specific to each content area.

Accordingly, by constantly increasing the level of education among the public and particularly young families in Latvia, we can expect a rise in student performance. In this respect, our country has good prospects, as the relative number of inhabitants who have obtained higher education in Latvia is rapidly increasing, for example, our country belongs to those EU countries that have already exceeded

the EU indicator for 2020 – 40% of young people in the age group from 30 to 34 have obtained a higher education. The forecast provided in OECD *Education at a Glance* (2014) testifies that almost 85% of young people in Latvia will start studies in tertiary education during their lifetime, and this is the second greatest indicator value after Australia (the average indicator of OECD countries is close to 60%).

A high student performance in mathematics is positively influenced, if the students experience adequate anxiety when responsibly solving mathematical tasks, at the same time overcoming the excessive anxiety and insecurity in this subject. The performance is positively influenced also if the students often solve the so-called formal mathematics tasks. Thereby, they learn how to act upon instructions and develop algorithmic thinking, which, in turn, also helps to achieve a higher performance in other areas, for example, reading. The frequent use of computers does not improve students' results in mathematics, while a positive student opinion regarding the use of computer and Internet information for the purposes of learning and solving school exercises is related to a higher performance in mathematics.

To improve student reading literacy, a positive attitude towards reading must be promoted, students should be encouraged to read for their own pleasure, not only the mandatory literature at school, including electronic texts. Particular attention should be paid to literature intended for boys in all age groups. A more correct learning strategy should be shaped for the students in order to understand and remember texts or write text summary.

High achievements in science are promoted by a number of specific factors, such as students being well-informed about environmental issues, confidence and satisfaction with their performance in science, positive attitude towards the role of science in people's lives and in development of society, and the possibility of developing their careers in the field of science.

PISA data analysis and study of foreign experience allows to offer a number of recommendations to education policy makers, school principals, teachers, parents and students.

Recommendations to education policy makers:

- create precise and detailed education policy with respect to gifted students;
- devote more attention to education of teachers, their qualification and work quality;
- improve public opinion regarding education by creating respectable, intelligent and positive image of the teacher. If the teachers will be the best of the best and if they will respect their own work, then the others will also respect them;
- ensure a higher state financial support to implementation of education process both in general education and higher education, as well as further

education – teacher salaries, state-funded study places, grants and scholarships;
- devote more attention to higher education and lifelong learning, since the learning process should not stop, it must continue throughout the lifetime;
- create a student assessment procedure, which, in parallel to assessment with a mark, would provide a descriptive evaluation of student's progress as well as assessment of behaviour.

Recommendations to school principals:
- recruit only the best candidates as teachers;
- give teachers the maximum allowed autonomy in developing the study programme;
- ensure student-friendly environment at school;
- organize interviews related to student development with participation of student's parents. The aim of the interviews: to promote student's development instead of reprimand;
- organize various events related to environmental issues and involve the school thereof;
- build a closer cooperation with libraries, participate in their events, as well as proactively organise different activities related to reading, paying a special attention to youth attendees.

Recommendations to teachers:
- develop your own study programmes according to education standard and based on the needs and skills of the particular class and students;
- encourage student motivation to learn, read and educate themselves;
- regularly involve students in self-evaluation;
- raise your qualifications, attend courses, seminars or increase the level of education by enrolling into higher study levels at the university.

Recommendations to parents:
- choose a school that is close to home and adapted to child's physical, intellectual and emotional needs;
- set an example that education matters, that education does not end with obtaining a diploma and continues throughout one's lifetime, and that the main benefit from the education is knowledge and competencies;
- never speak bad about a teacher in the presence of a student, even when parents disagree with teacher's opinion. It will help to maintain the status of the teacher and student's respect for him or her. Never let students speak bad

about the teacher, instead teach them how to defend one's opinion by maintaining a calm and respectful attitude;
- become actively involved in events organized by the school, thus demonstrating to children that school and the things happening in it do matter to parents. Support teachers to help your child to achieve a better performance, show the interest about events at the school – not only in problem situations but also in everyday life;
- devote a particular attention to reading in family, by reading yourself and encouraging children to read, by choosing relevant and interesting literature together with children. Concentrate particularly on the boys' reading habits;
- do not punish children for failure, rather support and help to overcome errors;
- control the time the children spend with computer, tablet or smart phone, using Internet for leisure, playing games or watching films. Make sure that children go to bed early and have done their homework;
- together as a family participate in different events related to environment protection – sorting waste, taking care of environment, reducing water and electricity consumption by participating in "Earth Hour", etc.

Recommendations to students:
- as much as possible participate in the events organised by the school. Try to do your best, giving the maximum of your capacity to complete the task as well as possible;
- in case of failure don't give up, rather study more efficiently, ask help from teachers, parents and fellow students who are more advanced in the subject;
- try to understand your own interests and choose appropriate literature by visiting school and municipal libraries. Each day read at least a page of a book which is not a textbook;
- limit the use of computer for leisure, first of all complete your homework and then think about the entertainment, not forgetting the sleep;
- together with family and school actively participate in environment protection events;
- try to understand the real meaning of education, – the main benefit is knowledge and competencies and not the assessment or mark. Knowledge and competencies is the only thing that nobody can take away and which we can supplement throughout our lifetime both in formal and informal ways.

Analyses of Latvia`s Mathematics Curriculum and Student Assessment in Comparison with PISA results

Commencing a new PISA cycle, all the participating countries evaluate suitability of the new items to the students of the respective country, taking into account the content and context of each item. In Latvia, the skills and knowledge required for solving PISA mathematics items correspond to Regulations on the State Standard in Basic Education and on Basic Education Study Subjects' Standards.

Comparing student performance in mathematic link items in both PISA study cycles with mathematics as the main content area – PISA 2003 and PISA 2012, it was established that the results differ only in some items. Overall, Latvia's students in PISA 2012 were better at solving the items involving numbers and measurements, but less successful concerning the items involving shapes and spatial reasoning. The items concerning space and shape (geometry) have traditionally been the field in which Latvia's students have shown the highest performance, however, the decreasing performance in mathematic link items may indicate negative trends in teaching geometry at school.

In comparison with the OECD countries, Latvia's students have been statistically significantly better at solving 12, but less successful – at solving 27 out of 109 mathematics items included in PISA 2012. Other items were solved according to OECD average level. Students in Latvia have a greater difficulty with open-constructed response items requiring logical justification of the judgments and making conclusions. Items, where students must be able to use mathematical knowledge correctly to find the right solution in equal number of items (11 items), are both among the best and worst-solved. Most of the items showing poorer results in PISA 2012 in comparison with PISA 2003 are also the open-constructed response items, where students must transform formulas or apply the respective formulas to a specific situation. Among the best-solved items there are less open-constructed response items, and these items do not require transformation of formulas. As to the content areas in comparison with the students from OECD countries, Latvia's students faced the greatest difficulties with the items involving probability and statistics. Although both themes are included in the Regulations on the State Standard in Basic Education and on Basic Education Study Subjects' Standards, interpreting data tables and diagram content still proves to be complicated for our students. Latvian students faced problems also with items involving numbers and measurements. Although students can use calculators for solving PISA items, numerical calculations, proportions and percentages still present difficulties.

When compiling programmes for the subject of mathematics, the question arises, as to what extent mathematics associated with real-life issues should be included in school mathematics curricula. PISA 2012 data analysis showed that the correlation between student performance and frequency of solving applied mathematics tasks is not linear. If such tasks are solved on separate occasions only, student performance is increasing, but a frequent solving of such tasks does not guarantee a higher performance by students. On the other hand, a frequent simple formal mathematical task solving during the lessons, in addition to knowledge, as well as understanding of mathematical concepts, can be associated with a higher student performance. In OECD countries, the increase of index value by a single unit, which characterises the frequency of solving simple formal mathematical tasks items in lessons, the performance would increase by 50 points, and the performance of Latvia's students would increase by 62 points. In East Asian countries (Shanghai (China), Singapore, Hong Kong (China), Taiwan (China), Korea, Macao (China), and Japan), where students demonstrate a high performance level, students have indicated that simple formal mathematic tasks are solved during the lessons more often than in other participating countries. PISA results indicate the need for a balance among the different kinds of tasks. High performance in PISA is not related only to providing students with frequent opportunities to solve simple formal mathematics items – it is necessary, but not sufficient. The learning opportunities of applied mathematics are also related to high performance, although only to a certain limit.

In Latvia, the basic education study results are evaluated both according to a student's final assessment (the average mark calculated from the results throughout the final year) upon graduating from the 9th grade and the results of final examination graduating the 9th grade. The examination in mathematics at the end of the 9th grade mainly tests students' knowledge and skills, as applied to standard tasks in mathematics. Tasks, where mathematical knowledge and skills should be used in real-life situations make up 20–29% from the total number of examination tasks. By contrast, the main goal of OECD PISA is to examine the proficiency of students to apply their mathematical knowledge and skills to real-life situations. Between the 9th grade student achievement in mathematics examination and PISA 2012 score there is a statistically significant correlation 0.656.

The distribution of student achievement in mathematics at the end of the 9th school year, in the final examination at the end of the 9th school year and PISA 2012 differs – only PISA 2012 performance distribution is close to standard. At the end of the 9th grade, the most commonly received score is 4 points, in the examination – 5 and 6 points (according 10-point grading scheme for students` assessment in Latvia). Comparing the performance distribution according to school types, it can be concluded that PISA 2012 performance distribution is close to normal in basic and secondary schools, gymnasiums and state gymnasiums. Thus, it can be affirmed

that the items of PISA mathematics test were suitable for Latvia's students, regardless of the school which they attended. The 9th grade examination assessment distribution is close to standard in case of secondary school and gymnasium students. Examination tasks were easy for state gymnasium students, but more difficult for basic school students. Distribution of performance in examination and at the end of the school year raises some doubts about the objectivity of assessment.

Upon comparing PISA 2012 and the examination performance distribution, it is evident that among the students who have received a relatively low score in the examination (4, 5 and 6 points), there are students who reached both high and low results in PISA. By contrast, virtually in all PISA mathematics proficiency levels there are students who have received the highest score in the examination. Students with high results in examination and simultaneously low performance in PISA have mastered the school programme well, but lack the capacity to apply that knowledge in real-life situations.

OECD PISA student knowledge and skills are considered to be sufficient for successful continuation of education, if a student's performance corresponds to at least the second proficiency level. Only 17% of the students whose performance in PISA 2012 is lower than the proficiency level 2, have obtained unsatisfactory score (lower than 4 points) in examination, all the other students who have showed a low performance in PISA test, scored a sufficiently the examination – most often they received 4 (almost satisfactory), 5 (satisfactory)and 6 points (almost good).

Student achievement both in the examination and PISA has a statistically significant correlation with student SES. In comparison, SES influence on the examination results is less pronounced. Student achievement in examination and in PISA 2012 is most closely related to the occupation of student's parents. The more prestigious is the profession of student's parents, the higher achievement is shown by the student both in examination and PISA 2012. A higher performance in PISA 2012 is demonstrated by those students, who have more household items, as well as education and culture-related items at home. Examination score is less influenced by these factors.

In order to analyse the further achievement of PISA participants, upon graduating from the upper secondary school the students, who participated in PISA 2009 and in 2012 took centralized examination in mathematics – a total of 1410 students or 31% of PISA 2009 participants – were selected. Between the performance of these students in mathematics in PISA 2009 and in the centralized examination in 2012 there is a statistically significant correlation of 0.561. Both students with a high performance in PISA 2009 and those with a very low performance – from 240 to 725 points continued their studies at upper secondary school. Students with top-level performance in mathematics in PISA 2009 obtained a high assessment score also in the centralized examination (90% of these students achieved A, B and C level).

The correlation between the performance of all PISA 2009 participants in mathematics and their family SES is 0.355, which is statistically significant. For those PISA 2009 participants who in 2012 took the centralized examination in mathematics, this correlation is weaker – the correlation coefficient is 0.109, although it is statistically significant. SES impact on the level of secondary education is weaker because secondary school and gymnasium students have a higher SES and it is less diverse. Those PISA 2009 basic school students, who continued to study in upper secondary school, had the average SES of 0.014, while all PISA 2009 participants who attended basic school, had the average SES of -0.429. Hence, the education in upper secondary schools or gymnasiums is continued by those students of basic schools (and basic schools mainly are rural schools), whose family's socio-economic status is higher.

Student performance in both PISA 2009 and centralized mathematics examination in 2012 is closely related to students' further education plans after graduating from basic school. Students who responded in PISA 2009 that they are planning to obtain a higher professional education or a bachelor's or master's degree, showed a higher performance.

On the level of school, a statistically significant correlation was observed between the student performance in mathematics in PISA 2009 and in centralized examination in 2012 (correlation coefficient 0.502), as well as between the student performance in mathematics in PISA 2012 and the centralized examination in 2015 (correlation coefficient 0.528). Thus, in secondary schools and gymnasiums, where students achieve high results in PISA tests, high results could be expected also in centralized examinations.

The following recommendations have been developed as a result of the analysis.

- Education policy-makers should introduce centralized assessment and marking of the 9th grade mathematics examination, which would ensure a more objective comparison of education quality provided by different schools. It is necessary to prepare an adequate analysis and reviews to be submitted to the local municipality leaders about the 12th grade compulsory centralized examination results, that would provide municipalities with a better understanding of the education quality achieved by schools (comparable indicators, relative quality level of each secondary school in relation to other schools and its changes over the years, the number of students, etc.).
- Mathematics teachers should concentrate their efforts on providing the tasks related to probability, statistics and geometry spheres, interpretation of data tables and content of diagrams, formula transformations, proportion and percentage calculations.

- Providers of further education for teachers and methodological associations of mathematics teachers should incorporate in their operational programmes the topics proposed to in the recommendation above.

Student Performance in Financial Literacy

The fifteen-year-old Latvia's students' financial literacy in OECD PISA 2012 (501 score points) fully corresponds to the average level of students from OECD countries. The performance of Latvia's students does not statistically significantly differ from Polish (510 points) and USA student performance (492 points). Estonian student performance (529 points) is higher than the average score of OECD countries, Russia's (486 points) – lower. The relationship of Latvia's student performance and SES index, as it changes by a unit, is lower than the OECD average, and performance standard deviation in case of Latvia is the smallest among all the 18 countries participating in PISA financial literacy module. The smallest performance variation in Latvia suggests a greater equity in education quality in our country, and, at the same time, it influences the relative number of students with low and high performance, in comparison to the average values of OECD countries – Latvia has relatively less students with a low performance and, unfortunately, that also is the case with the high achievements.

Of course, a significant specifics of the financial sector also emerges in the analysis of various contextual factors. The volume and place of financial education in the basic school curriculum in Latvia is not sufficiently expressed and defined, an important role in performance of students in the field of finance is played by the knowledge and skills obtained informally, for example, using a bank account and a debit card, in conversations with parents about money issues, family budget, joint planning of family recreational travel expenses, saving and spending habits of their own.

The framework and respective items included in OECD PISA 2012 financial literacy module framework are also incorporated in the curriculum of other countries participating in the research, although in a less regular and consistent manner than, for example, in mathematics. This is demonstrated by the surveys of school principals, as well as students. To the question regarding availability of financial education in basic schools a negative response was given by 84% of school principals in Spain, while the answer "financial education is not available" was provided least often in Slovakia (16%). Even in the countries with a high student performance there is a great relative number of school principals who believe that the financial education

in basic schools is not available – Estonia 78%, Shanghai (China) 51%, whereas in Latvia, this opinion is expressed by 28% of school principals.

Less than 40–50% of the students confirm that they have learned to manage money at school, or in various events and projects outside. There are even less affirmative answers to the question, whether students have learned it in a special school subject or classes dedicated to management of their own finances. 19% of Latvia's students claim that they have not learned how to manage money in any of the ways listed above. It is surprising that these are exactly the students who demonstrate high performance in the financial test (573 points), second only to the average performance of students from Shanghai (China). However, it should be noted that these students have good performance in mathematics (518 points), reading (513 points) and they have a relatively high SES.

Consequently, we can conclude that the overall student performance in the finance test has no relation to the amount and scope of financial education at school. In our opinion, these facts attest to the fact that finance is integrated field in the school curriculum as a cross-subject topic. In the financial sphere the knowledge and skills obtained informally are also of a great importance. Perhaps these results reflect the change in the teaching and learning in the modern world – in many cases, specific knowledge and skills can be acquired outside school, through information and communication technologies, informally. However, that requires a high level of key competencies, for example, in mathematics, reading comprehension, critical thinking, etc.

Therefore, we recommend to develop the key competencies of students, to analyse and improve curriculum and teaching and learning methods, integrate financial themes in a variety of school subjects (social studies, mathematics, home economics, etc.), to develop appropriate training materials, to organize teachers' methodological seminars, to include the respective topics to a greater extent in teacher training and professional development, to involve experts from financial institutions and NGO's in the educational process.