Глобальные треки стратегического развития мировых лидеров в области школьного образования в преддверии исследования PISA-2022

Проблема и цель. Страны и территории мира, лидирующие в системе школьного образования, формируют стратегические треки развития, направленные на разработку и внедрение образовательных проектов, ориентированных на развитие интеллектуального и творческого потенциала личности и ее социализацию в условиях глобальной цифровизации. Цель исследования – изучить глобальные треки стратегического развития мировых лидеров в области школьного образования в преддверии исследования PISA-2022.

Материалы и методы исследования. Эмпирическое исследование опирается на ретроспективный и перспективный анализ. Материалами исследования послужили суммарные показатели по читательской, математической и естественнонаучной грамотности из отчетов PISA 2012, 2015, 2018 стран блока ОЭСР и их партнеров в агрегированном виде, которые сопоставлялись с качественными и количественными характеристиками систем школьного образования выбранных стран и территорий. Отчетные показатели использовались для составления гибридного рейтинга, межстранового сравнения и оценки динамики (прироста) за три периода опросов PISA. В работе проводится кейс-анализ систем школьного образования стран и территорий мировых лидеров для выявления особенных и общих показателей глобальных треков стратегического развития. Измерение коэффициента сравнения позволяет проверить применимость универсальных и/или уникальных индикаторов стратегий.

Результаты исследования. Показатели гибридного рейтинга по данным PISA 2012, 2015, 2018 демонстрируют положительный прирост в Макао (Китай) и Москве (Россия) в диапазоне 2–4%; почти нулевой прирост в Сингапуре и Эстонии; отрицательный прирост к 2018 г. у Китая (Пекин – Шанхай – Цзянсу – Гуандун), Гон-Конга (Китай), Японии, Кореи, Китайского Тайбея в диапазоне 4–5%. Выделены индикаторы стратегических треков развития: профессиональный стандарт педагога, система учительского роста, сертификация педагогических работников, оценка качества работы учителя (аттестация), компетентностный подход, HR-служба, цифровизация образовательного процесса (цифровые компетенции), направленные на реализацию основных задач PISA.

Заключение. Система школьного образования любой страны или территории может внедрять и реализовывать в своей системе индикаторы глобального универсального трека стратегического развития, но также может разрабатывать уникальные образовательные проекты и программы для повышения качества образования.

Ключевые слова: PISA, система школьного образования, глобальные треки стратегического развития, мировые лидеры в сфере образования, глобальные тренды системы образования, глобальная цифровизация, цифровая трансформация

Global tracks for the strategic development of world leaders in school education on the eve of the PISA-2022 study

Problem and goal. The countries and territories of the world that are leaders in the system of school education form strategic development tracks aimed at the implementation of educational projects focused on the development of the intellectual and creative potential of the individual and its socialization in the context of global digitalization. The aim of the article is to study the global tracks of the strategic development of world leaders in the field of school education in anticipation of the PISA-2022 study.

Materials and methods. Empirical research is based on retrospective and prospective analysis. The materials of the study included the summary indicators for reading, mathematical and science literacy from the PISA 2012, 2015, 2018 reports of the OECD countries and their partners in aggregate form, which were compared with the qualitative and quantitative characteristics of the school education systems of the selected countries and territories. Reported indicators were used to compile a hybrid ranking, cross-country comparison and assess the dynamics (growth) for the three periods of PISA surveys. The paper provides a case analysis of the school education systems of countries and territories of world leaders to identify special and general indicators of global tracks of strategic development. Measuring the comparison ratio allows to check the applicability of universal and/or unique indicators of strategic tracks.

Results. The hybrid rating indicators according to PISA 2012, 2015, 2018 show positive growth in Macau (China) and Moscow (Russia) in the range of 2–4%; near-zero growth in Singapore and Estonia; negative growth by 2018 in China (Beijing – Shanghai – Jiangsu – Guangdong), Hong Kong (China), Japan, Korea, Chinese Taipei in the range of 4–5%. Indicators of strategic development tracks have been identified: the professional standard of the teacher, the system of teacher growth, the certification of teachers, the assessment of the quality of the teacher’s work (attestation), the competence-based approach, the HR service, the digitalization of the educational process (digital competencies), aimed at implementing the main tasks of PISA.

Conclusion. The school education system of any country or territory can introduce and implement indicators of the global universal track of strategic development in its system, but it can also develop unique educational projects and programs to improve the quality of education.

Keywords: PISA, school education system, global tracks of strategic development, world leaders in education, global trends in the education system, global digitalization, digital transformation

For Reference:
Introduction

World leaders of school education form strategic tracks aimed at the development and implementation of educational projects focused on the growth of the intellectual and creative potential of the individual and their socialization in the context of global digitalization, pandemic threats and challenges.

The international program PISA (Programme for International Student Assessment) is a unique program aimed at identifying, on the one hand, the level and quality of education in different countries and territories, and, on the other hand, it makes it possible to identify global and strategic tracks for the development of national school education systems.

The PISA program differs from other school quality assessment programs in that it covers a large number of countries and territories of the world; motivated to get education in the near future; systematic and planned, as the participating countries have the opportunity to monitor the dynamics of the success of their achievements in the education.

It is important to note that each time PISA adds an additional research topic to the assessment of the three key types of literacy (reading, mathematics, science). For example, in 2012, financial literacy was also assessed, in 2015 – the ability to solve problems, in 2018 – global competencies, and in 2022 it is planned to study creative thinking and non-standard creative approach schoolchildren in all areas of activity.

Based on the results of the latest study, more precisely the PISA-2018 program, which covered 78 countries and territories, researchers have the opportunity to create new tools for measuring the quality of education in countries around the world, as well as highlight universal and unique strategic tracks for the development of school education in countries.

It should be noted that in assessing trends in school education, one should rely not only on a retrospective analysis, referring to the PISA 2018, 2015 and further early years reports, but it is also important to see the planning horizons of educational systems, which requires an assessment perspective. That is why we think it important to include the intended goals and objectives of PISA-2022 in the analysis.

The 2022 International Study of the Quality of Education is focused on the modern fifteen-year-old teenager and on identifying their well-read, erudition and ability to apply own knowledge in everyday life. Firstly, the upcoming PISA program is designed to identify trends in improving the reading, mathematical and science literacy of modern children from different countries, and, secondly, what a teenagers can do and how he can apply their knowledge gained at school in the financial sector, what their degree of integration into society and the ability to overcome various obstacles in life. The PISA 2022 program tries to reflect not only global trends, trends and new technologies, but also the unique features of a rapidly changing world, highlighting math literacy and math reasoning ability as fundamental literacy. The emergence of new modern technologies is possible with the actively developing mathematical, logical and digital thinking, which are elements of mathematical literacy. Focusing on this, from 2022 PISA will study mathematical reasoning, understood as the ability to reason logically and find objective and persuasive arguments. Here, mathematics is not just a science of abstractions, but also as a science that is applicable in various contexts of real life [1]. In 2022, as part of the international PISA study, a targeted assessment of the frequent use of mathematics in the most important aspects of life: in society, profession and personal life will be carried out.
It should be noted that the importance of the international PISA program is high due to the fact that the countries and territories that participate in the study in the future have the opportunity to study and analyze the results of assessing the quality of school education systems, identify the level, merits and weak elements of their education system, and also to develop an optimal track for the strategic development of the national school system, taking into account both their research results and the identified global trends and trends. Schoolchildren from about 88 countries and territories will show their skills and abilities in the PISA-2022 analysis,

Thus, for more than 20 years, the PISA program has not only become an important global event in the field of education, but more importantly, a kind of beacon for the development of school education in different countries of the world.

The aim of the article is to study the global tracks of the strategic development of world leaders in the school education in anticipation of the PISA-2022 study.

For our study, we will work out the Rankings of countries and territories of world leaders according to PISA 2018, which will allow to closely identify and analyze the global tracks of the strategic development of school education in high-ranking countries and territories, to reveal the universal and distinctive features of education systems, taking into account new trends and tendencies in the context of global digitalization.

Materials and methods

Scientific research is empirical in nature and is based on general and particular scientific methods. A variety of research approaches is associated with the analysis of the international PISA program, which is aimed at assessing the quality of school education in different countries and territories. The research methodology is represented by a set of methods, such as systematization, comparison, generalization, interpretation and analysis of the results of the PISA study.

Empirical research is based on retrospective and prospective analysis. The materials of the study were the summary indicators for reading, mathematical and science literacy from the reports PISA-2012, 2015, 2018 of the OECD countries and their partners in aggregate form, which were compared with the qualitative and quantitative characteristics of the school education systems of the selected countries and territories. Reported indicators were used to compose a hybrid ranking, cross-country comparison and assess the dynamics (growth) for the three periods of PISA surveys. The article provides a case analysis of the school education systems of world leaders to identify special and general indicators of global tracks of strategic development. Measuring the comparison ratio allows you to check the applicability of universal and/or unique strategy indicators. The empirical part of the article consists of four steps.

At the first stage, we choose descriptive quantitative data of the Report PISA-2018 and make TOP-10 hybrid rating of all participating countries and territories.

At the second stage, we studied the dynamics of the indicators of high-ranking countries and territories in the PISA 2012, 2015, 2018 studies, which made it possible to identify the direction of the trends: negative, stable and positive.

At the third stage, indicators of the strategic development tracks of school education in high-ranking countries and territories were identified in accordance with the hybrid rating allocated according to PISA reports. Taking into account the peculiarities of the functioning
of each system of school education universal and special indicators were recorded that affect the results of a high assessment of the quality of school education.

At the fourth stage a special case analysis of school education assessment is presented, covering a comparison of key indicators in accordance with PISA for Moscow and Russia as a whole. On the basis of this, the competitive advantages of Moscow in the strategic development of its concept of the school education system are identified by a set of indicators.

An empirical scientific study makes it possible to identify global tracks of the strategic development of world leaders in the field of school education in accordance with the PISA concept, to identify universal and unique directions in the development of school education in the leading countries of the world among the selected tracks for the formation of a predictive model.

Literature review

The international program for assessing educational achievements among students PISA has established itself as a serious tool for analyzing the quality of the school education system in various countries of the world. The significance of the international PISA program is high, especially among the countries and territories that participate in the study: 2000 – 32 countries, 2003 – 43 countries, 2006 – 57 countries, 2009 – 74 countries, 2012 – 65 countries, 2015 – 70 countries, 2018 – 78 countries, 2022 – 88 countries planned. Project participants can study and analyze not only their results of assessing the quality of school education systems, i.e., identify their levels, advantages and disadvantages, but also develop strategic development directions for themselves. Developing for more than 20 years the PISA program contributes to a critical analysis of the country of its school education system. Acting as a "bifurcation point" They can indicate new trends and based on the results of the study reach a higher level of a national school system. PISA research is an important world event in the school education. Rissom H. W. believes that the initiative of the Organization for Economic Cooperation and Development which in collaboration with scientific organizations and national centers conducts PISA research deserves not only encouragement, but also full support from the state authorities of the countries participating in the international program [2].

Rowley K. J., McNeill S. M., Dufur M. J., Edmunds Ch., Jarvis J. A. analyze how countries are trying to improve their Program for International Student Assessment (PISA) rankings and scores based on PISA 2006, 2009 and 2012 data. As a result, the authors found that few countries significantly increased their PISA scores. At the same time, improvements in PISA scores are observed in those whose rating was significantly lower in the previous study period, and who adapted the national school system in the context of PISA objectives [3].

Scientists Haw J. Y., King R. B., Trinidad J. E. R. studying the school education in many countries draw attention to the fact that the experience of world leaders in school education has a positive effect and improves the education quality in other countries [4]. Kaplan D., Jude N. studied how countries used global trend analysis to inform national education policy. The authors emphasize the importance of predictive models based on international large-scale PISA estimates [5].

Mazurek J., Garcia C. F., Rico C. P. argue that student achievement increases the potential of human capital and competitiveness, leading to a balance in solving the problem of gender inequality [6].
The international PISA program affects the improvement of school education quality systems in different countries of the world and thus motivates both teachers and students to develop not only in three types of literacy. Research indirectly forms the image of a successful and effective person who can easily cope with any life problems that occur in society or on a personal and professional level. Of course, Gamasa A., Martinez-Abad F. argue that the PISA reports contain a colossal array of data and in order to be easy to use and quickly obtain the necessary information, for example, based on the results of one’s own or another country for the development and formation new development strategy, it is necessary to create a database using intellectual analysis [7]. You can also use the results of PISA reports, both to evaluate special and unique moments in school systems [8], and to assess the quality of education in different countries of the world [9]. A database with intelligent functions for analyzing and evaluating PISA results can better influence the development of school education around the world as well as find more understanding in the scientific literature.

The study by Lavonen J. et al. on the evaluation of a funded and implemented teacher training project in Finland should be highlighted. Such qualities as purposefulness, active learning, cooperation, contextualization and reflection, according to the authors, are significant in the educational process for both students and teachers [10].

Scientists believe that education is endowed with the value of motivation, the value of the desire to receive another education in the future, and the value of employment [11]. PISA research motivates students and educators to continuously improve their education and qualifications. Hori R. & Fujii M. are based on the idea that PISA studies even more actualize the importance of achieving one of the goals of sustainable development about the quality of education, which cannot be imagined in the era of global digitalization and digital transformation without free possession of IT technologies. Digital literacy provides an opportunity to be more confident, efficient, successful [12]. Kyzym M., Balian A. et al. once again confirm the idea in their work that the competent use of new digital technologies, on the one hand, affects the increase in human, social and financial capital, and, on the other hand, can lead to digital inequality [13]. Only global digitalization and high-quality digital transformation will provide a digital educational environment that will motivate, stimulate and increase the desire for conscious study of educational content [14].

In the context of the promising task of our study, it is necessary to point out the work of Marouli S., which convincingly proves the need for an education system for sustainable development (ESD). The author points to the improvement of the education system, taking into account the current socio-economic and cultural context. Education not just for society, but rather for eco-communities, suited to the challenges of the 21st century [15].

On the eve of the PISA-2022 study, the participating countries are studying not only global trends and trends in the school education system of world leaders, but also forming their own strategic development track. The modern world is changing rapidly, new conditions and trends are emerging. So, it is necessary to constantly adapt the education in general and school education in particular to achieve high-quality results in solving problems in the world and society, at the personal and professional levels.

Results

As part of a scientific study, the results of PISA-2018 on assessing the quality of school education were studied and rankings of world leaders of countries and territories in the
field of school education were compiled, united in three groups: 1) OECD countries, 2) OECD partner countries and territories, and 3) all countries and territories participating in this program in 2018.

The ratings are arranged in descending order of indicators, which are based on the sum of points for three types of literacy: reading, mathematical and sciences. In this empirical study, when forming the rankings of world leaders in the school education system, we focused not only on the countries of the Organization for Economic Cooperation and Development (hereinafter referred to as the OECD) and the countries of the OECD partners according to PISA-2018, but also on the territories of the OECD countries and OECD partner countries that are represented in the PISA surveys (see Table 1). It was important for us to identify and study the global tracks of the strategic development of world leaders in the field of school education in order to comprehend the high results of assessing the quality of education in these countries and territories. It is necessary to reveal the universal and unique features of strategic development tracks, scenarios for successful strategies for the development of school education from world leaders in this field.

Table 1

<table>
<thead>
<tr>
<th>Rank</th>
<th>OECD partners</th>
<th>OECD countries</th>
<th>Hybrid group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Country /territory</td>
<td>Total scores</td>
<td>Country</td>
</tr>
<tr>
<td>1</td>
<td>China (Beijing - Shanghai - Jiangsu - Guangdong)</td>
<td>1736</td>
<td>Estonia</td>
</tr>
<tr>
<td>2</td>
<td>Singapore</td>
<td>1669</td>
<td>Japan</td>
</tr>
<tr>
<td>3</td>
<td>Macau (China)</td>
<td>1627</td>
<td>Korea</td>
</tr>
<tr>
<td>4</td>
<td>Moscow, Russia</td>
<td>1596</td>
<td>Canada</td>
</tr>
<tr>
<td>5</td>
<td>Hong Kong (China)</td>
<td>1592</td>
<td>Finland</td>
</tr>
<tr>
<td>6</td>
<td>Chinese Taipei</td>
<td>1550</td>
<td>Poland</td>
</tr>
<tr>
<td>7</td>
<td>Croatia</td>
<td>1415</td>
<td>Ireland</td>
</tr>
<tr>
<td>8</td>
<td>Russia</td>
<td>1445</td>
<td>Great Britain</td>
</tr>
<tr>
<td>9</td>
<td>Belarus</td>
<td>1417</td>
<td>New Zealand</td>
</tr>
<tr>
<td>10</td>
<td>Ukraine</td>
<td>1388</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

In Table 1, three ratings are arranged in parallel in descending order of indicators, taking into account Total scores in reading, mathematics and science literacy: TOP-10 Ranking of countries and territories of the OECD partners, TOP-10 Ranking of OECD countries and TOP-10 Hybrid ranking of countries and territories according to PISA-2018.

In the TOP-10 of the Ranking of countries and territories of the OECD partners, four positions were taken by China with the territories: Beijing – Shanghai – Jiangsu – Guangdong, Macau, Hong Kong, Chinese Taipei and Russia is presented in two forms (the country as a whole and a separate territory – Moscow). Moscow demonstrates higher quality education and higher results in the PISA-2018 survey than the results for Russia as a whole.

The TOP-10 of the OECD Country Rating included 6 European countries, and the first place in this rating was taken by Estonia, which scored 1576 points. It is important to note that Russia is not among the countries of the Organization for Economic Cooperation and Development.
(OECD), therefore Moscow (Russia), as the leading territory in terms of the quality of school education, demonstrated high results in the quality of education, scored a total of 1596 points in reading, mathematics and science literacy, but was not included in the OECD Country Rating and failed to take first place in the TOP-10 OECD Country and Territory Rating.

The TOP 10 of the PISA-2018 Hybrid Ranking is built on the basis of two ratings: the TOP 10 Ranking of Countries and Territories of the OECD Partners and the TOP 10 Ranking of the OECD Countries. The Hybrid Ranking includes ten high-ranking countries and territories of the world with the best school education systems, among them four positions in the ranking were occupied by China with the following territories: Beijing – Shanghai – Jiangsu – Guangdong, Macau, Hong Kong, Chinese Taipei. In the TOP-10 of the hybrid rating, Moscow, as a territory of Russia, took 4th place, losing ground to two Chinese territories (Beijing – Shanghai – Jiangsu – Guangdong, Macau) and Singapore.

The international PISA program and the results of the 2018 study, on the eve of a new study in 2022, have become the main tool for measuring the quality of education in the countries of the world and forming universal and unique strategic tracks for the development of school education in different countries and territories.

When identifying the global tracks of the strategic development of school education in world leaders, it is important to analyze the dynamics of the indicators of countries and territories according to PISA in the studies of 2012, 2015, 2018, which demonstrates a negative, stable or positive dynamic of the indicators of countries and territories in the field of education (see. Fig. 1–3) [16; 17; 18].

![Graph showing the dynamics of indicators in the Ranking of countries and territories of the OECD partners, PISA 2012, 2015, 2018](image)

**Figure 1** Dynamics of indicators in the Ranking of countries and territories of the OECD partners, PISA 2012, 2015, 2018
The dynamics of indicators in the Ranking (see Figure 1) clearly demonstrates the following trends: negative dynamics – China (Beijing – Shanghai – Jiangsu – Guangdong), Hong Kong (China), Chinese Taipei, Croatia; stable dynamics – Singapore and Russia (in general); positive dynamics – Macau (China), Moscow (Russia). It is important to note that in 2018 Belarus and Ukraine took part in the PISA surveys for the first time and, according to the results of the assessment of the quality of school education, they entered the TOP-10 of the Ranking of countries and territories of the OECD partners, where they took the ninth and tenth places, respectively.

The dynamics of indicators in the Ranking of OECD countries (PISA 2012, 2015, 2018) in Figure 2 reflects the following dynamics: negative – Japan, Canada, Finland, Poland, Ireland, New Zealand; stable – Estonia, Korea; positive dynamics – Great Britain, Switzerland. The first place in the OECD Country Rankings (PISA-2018) is occupied by Estonia with a total score of 1576 points in three types of literacy with its unique school system. On the histogram, we indicated the territory – Moscow, taking into account its dynamics of indicators, how the OECD Countries and Territories Rating could look like if Russia was a member of the Organization for Economic Cooperation and Development. As part of the PISA-2018 study, Moscow scored 1596 points and showed the best results in assessing the quality of school education.
In the hybrid rating, ten high-ranking countries and territories of the world with the best school education systems of PISA-2018 were selected, those that maximally reveal the trends and tendencies of the education system in the context of global digitalization were identified. The dynamics of indicators in the Hybrid ranking (PISA 2012, 2015, 2018) in Figure 3 indicates the following development of school education in countries and territories: positive growth in Macao (China) and Moscow (Russia) in the range of 2–4%; near-zero growth in Singapore and Estonia; negative growth by 2018 in China (Beijing – Shanghai – Jiangsu – Guangdong), Hong Kong (China), Japan, Korea, Chinese Taipei in the range of 4–5%. The first place by a wide margin in the Hybrid ranking of countries and territories (PISA-2018) is occupied by China (Beijing – Shanghai – Jiangsu – Guangdong) with a total score in three types of literacy – 1736 points with its unique school education system.

By studying the global strategic development tracks of highly ranked countries and territories that are in the TOP-20 of the PISA-2018 Hybrid Ranking, using a geographical approach, one can analyze the location of countries, their unique or universal policies in the field of school education.
Table 2

Dynamics of indicators in the Hybrid ranking in the PISA study 2012, 2015, 2018: geographical approach

<table>
<thead>
<tr>
<th>Country / territory</th>
<th>Total scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2012</td>
</tr>
<tr>
<td><strong>Asia-Pacific group</strong></td>
<td></td>
</tr>
<tr>
<td>China (Beijing - Shanghai - Jiangsu - Guangdong)</td>
<td>1763</td>
</tr>
<tr>
<td>Singapore</td>
<td>1666</td>
</tr>
<tr>
<td>Macau (China)</td>
<td>1568</td>
</tr>
<tr>
<td>Hong Kong (China)</td>
<td>1661</td>
</tr>
<tr>
<td>Japan</td>
<td>1621</td>
</tr>
<tr>
<td>Korea</td>
<td>1628</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>1606</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1528</td>
</tr>
<tr>
<td><strong>Europe</strong></td>
<td></td>
</tr>
<tr>
<td>Moscow (Russia)</td>
<td>-</td>
</tr>
<tr>
<td>Estonia</td>
<td>1578</td>
</tr>
<tr>
<td>Finland</td>
<td>1588</td>
</tr>
<tr>
<td>Poland</td>
<td>1562</td>
</tr>
<tr>
<td>Ireland</td>
<td>1546</td>
</tr>
<tr>
<td>Great Britain</td>
<td>1507</td>
</tr>
<tr>
<td>Sweden</td>
<td>1446</td>
</tr>
<tr>
<td>Croatia</td>
<td>1447</td>
</tr>
<tr>
<td>Belarus</td>
<td>-</td>
</tr>
<tr>
<td>Ukraine</td>
<td>-</td>
</tr>
<tr>
<td><strong>North America</strong></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>1566</td>
</tr>
<tr>
<td><strong>Europe and Asia</strong></td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>1443</td>
</tr>
</tbody>
</table>

In Table 2, the countries and territories that are in the TOP-20 of the Hybrid Rating are located in terms of geographical approach: Asia-Pacific group – 5 countries and 3 territories, Europe – 9 countries and a territory, North America – a country, Europe-Asia – a country. Based on the geographic view we can conclude that the countries and territories of Europe and the Asia-Pacific group are constantly improving the school education system, carrying out school reforms, forming a new development strategy, developing and implementing educational projects focused on the development of the intellectual and creative potential of the individual and its socialization in the context of digital transformation, pandemic threats and challenges.

According to the PISA-2018, we have revealed universal indicators of strategic development tracks in the school education system of the world leaders: the professional standard of the teacher, the system of teacher growth, the certification of teachers, the assessment of the quality of the teacher’s work (attestation), the competence-based approach, the HR service, the digitalization of the educational process (digital competencies), and many others.
Figure 4 Architecture of the model of school education based on the Hybrid ranking of countries and territories PISA-2018

Studying the global tracks of the strategic development of school education in world leaders in anticipation of the PISA-2022 study we developed the architecture of the school education model based on the PISA-2018 Hybrid Ranking, based on our two studies: the first study is devoted to global trends in the education system of high-ranking countries according to PISA-2018; the second study (described in this article) on the global strategic development tracks of school education of world leaders in the run-up to the PISA-2022 study (see Fig. 4). The model of school education based on the Hybrid Rating of Countries and Territories PISA-2018 includes not only global trends in school education, but also universal and unique indicators that make up the global tracks of the strategic development of school education by world leaders according to the PISA-2018 study.

Let us single out a number of universal indicators of global tracks of the strategic development of school education by world leaders according to the PISA-2018 Hybrid Ranking, and briefly describe these indicators:

- the professional standard of a teacher is a fundamental document that includes the personal and professional competencies of a teacher. Based on the professional standard of a teacher, attestation can be carried out and a qualification category can be assigned;
- the system of teacher growth, on the one hand, is a form of development of teaching staff under the condition of self-regulation, and, on the other hand, a mechanism for professional growth throughout the entire career;
• certification is a procedure by which a teacher confirms his level of competence and qualifications according to the relevant requirements, depending on the position and qualifications;
• assessment of the quality of a teacher's work is a system of performance criteria, which is aimed at identifying the quality of the results of a teacher's professional activity;
• attestation is a process of confirming qualifications, the level of knowledge and skills of a teacher;
• a competence-based approach for teachers and students is a system that creates conditions for mastering a set of competencies that contribute both to the formation of a personality and the ability to adapt to various modern conditions;
• HR service is a service that selects new employees, works with personnel. The HR service does not just hire people to the company, but also involves, motivates, and develops new employees in the workflow;
• digitalization of the educational process is the transformation of familiar processes, for example, from offline to online mode, as well as the development and implementation of new programs, systems, databases, services to optimize the process without losing the quality of the result.

School education of countries and territories can fully include all universal indicators in the track of their strategic development and demonstrate the high quality of school education, while unique indicators may be fully present / absent in the school education development strategy, but the quality of education may be higher than in other countries and territories participating in the research of the international PISA program. Any even universal indicators of the tracks of the strategic development of school education in a particular country can be developed and implemented taking into account unique features, approaches and peculiarities.

Exploring the strategic tracks for the development of school education in countries and territories that are in the TOP-10 of the Hybrid Rating according to the results of the PISA-2018 study. The unique indicators of the track of the strategic development of school education are fully or partially implemented with a slight deviation from the model in all countries and territories of the TOP-10 of the Hybrid Rating according to the PISA-2018 concept.

To describe the characteristics of the school education model based on the PISA-2018 Hybrid Rating of Countries and Territories, which is based on global education trends in accordance with the PISA concept, it is useful to refer to the example of Moscow in comparison with the indicators for Russia as a whole (see Table 3).

<table>
<thead>
<tr>
<th>Comparison criteria</th>
<th>Moscow</th>
<th>Russia</th>
<th>Comparison ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects of the Russian Federation</td>
<td>1</td>
<td>43</td>
<td>x</td>
</tr>
<tr>
<td>Number of schools (sample)</td>
<td>151</td>
<td>265</td>
<td>x</td>
</tr>
<tr>
<td>Number of students</td>
<td>7289</td>
<td>7608</td>
<td>x</td>
</tr>
<tr>
<td>Total score</td>
<td>1596</td>
<td>1445</td>
<td>1.104</td>
</tr>
</tbody>
</table>

Table 3
Comparative characteristics of Moscow and Russia by indicators PISA [19; 20; 21]
The track for the strategic development of school education in Moscow is built not only on universal, but also on unique indicators. They include the school of steps, pre-profile education along verticals, tutoring, the Olympiad movement, support for talented youth, the personnel reserve program, new formats for improving the qualifications of teachers etc. It should be noted that the Moscow school education system is constantly in a dynamic state, in search for new answers to internal and external challenges. For example, this is being implemented in new educational programs and projects that correspond not only to the conditions of global digitalization, pandemic threats, global trends and trends in education, but also to other modern challenges.

Let's take a few examples to illustrate. Moscow in its school education strategy is developing new programs and projects that are aimed at improving the entire school education system and have a positive effect on improving the quality of education. For example, Moscow schools are updating infrastructure, introducing a digital environment into educational and extracurricular processes. They are also equipped with high-speed Internet access using Wi-Fi and platforms for teaching modern information technologies. The Moscow Electronic School project provided students with the content necessary to prepare for lessons (about 39.000 curricula, 1.500 textbooks and teaching aids, 82.000 interactive educational applications) [22]. Digital today is a tool that allows you to make the educational process as transparent as possible. The digital project "Moscow Electronic School" is, on the one hand, an internal analytics system, and, on the other hand, a crowd technology that allows professionally developing a teacher in the context of digital transformation and pandemic threats. In the 21st century a modern teacher is required to possess digital skills and constantly develop their digital competencies in order to organize better educational and extracurricular processes. The individual path of the teacher's professional development can be built using digital technologies by evaluating the results of the student and analyzing the work of the teacher.

Studying the unique indicators of the track of the strategic development of the Moscow school system, one cannot ignore the concept of the school of growing up. It is organized in accordance with the psychological characteristics, needs and prospects of each age period, and is maximally focused on training to the practice-oriented application of the acquired knowledge and is carried out in different complexes according to the age characteristics of the students. Such an organization of school education confirms the effectiveness of the chosen development strategy and the accents placed in the
system of Moscow education. The School of Growth develops pre-vocational education in high school in nine areas: engineering, IT, academic, entrepreneurial, media, creative industries, cadet and sports. At the moment, more than 50% of high school students are studying in classes with a pre-professional practice-oriented bias using project activities. The School of Growing up is a unique indicator of the track of the strategic development of the Moscow school education system as a practice-oriented collaboration of basic and additional education, pre-professional development of a student that influences his professional choice in the future.

Table 4
Checkpoints of the school education system in accordance with the concept PISA [23; 24; 25]

<table>
<thead>
<tr>
<th>Criteria</th>
<th>PISA research</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2012</td>
</tr>
<tr>
<td>General purpose</td>
<td></td>
</tr>
<tr>
<td>To study whether 15-year-old students who have received compulsory general education have the knowledge and skills necessary for full-fledged functioning in modern society, that is, for solving a wide range of tasks in various areas of human activity, communication and social relations. The program allows you to identify and compare the changes taking place in the education systems of different countries and evaluate the effectiveness of strategic decisions in the field of education.</td>
<td></td>
</tr>
<tr>
<td>Key areas of study</td>
<td></td>
</tr>
<tr>
<td>Reading literacy</td>
<td></td>
</tr>
<tr>
<td>Mathematical literacy</td>
<td></td>
</tr>
<tr>
<td>Science literacy</td>
<td></td>
</tr>
<tr>
<td>Main line of research</td>
<td>Mathematical Literacy</td>
</tr>
<tr>
<td>Additional Research Topic</td>
<td>Financial literacy</td>
</tr>
<tr>
<td>Innovation purpose</td>
<td>Identification of trends in the development of mathematical education in the world in recent years</td>
</tr>
<tr>
<td>- Assessment of reading electronic texts, solving interactive problems during computer testing, assessment of the formation of educational strategies.</td>
<td>- Measuring computer-based literacy using a new type of interactive science literacy task.</td>
</tr>
</tbody>
</table>
As a result of the study, we fix the fact that in the process of forming, creating, adjusting, adapting the strategy for the development of the school education system in a particular country or territory, it is necessary to take into account not only the results of assessing the quality of education from previous studies of the international PISA program, but also the control points described in this program in the following form: the general goal of the PISA program, key areas of research, main direction of research, additional research topic, innovative goals (for more details, see Table 4). The PISA program develops new test items each time and for each year of the study selects one of the three literacies in the form of functional (core, main) literacy and a unique additional research topic, which allow you to study and objectively assess the quality of school education in countries and territories from a new perspective, participating in the program. In connection with this approach, the results of assessing the quality of school education in countries around the world may change. The PISA program from a certain position in the last ten years has become an international program that motivates countries to modify their tracks for the strategic development of school education to introduce and develop universal and unique indicators.

Discussion

Our study, aimed at studying the global tracks of the strategic development of world leaders in the field of school education in anticipation of the PISA program in 2022, was based on a retrospective and prospective analysis of reports. Using this approach, we support the ideas and results of the study by Kaplan D., Jude N., who pointed out the importance of predictive models for national education systems, which are based on international large-scale assessments [5].

Any strategy for the development of education in general and school education in particular should take into account a favorable, emotional climate among teachers, teachers and students, teachers and parents, etc. A favorable climate is an important factor in cognitive, psychological and social well-being for all participants in the educational and extracurricular processes, but also the entire educational space [26]. We agree with the position of Eryilmaz N., Sandoval-Hernández A., that the strategy for the development of school education should include a direction that is focused on the sustainability of the modern educational space, the formation of a social climate and the development of emotional intelligence. All this once again confirms our ideas that global trends and trends in the school education system form an effective, successful educational practice [27].

The conclusions of our study are consistent with the approach and results of the study by Rowley K. J. et al., who provide a comparative analysis of countries according to PISA in a retrospective analysis [3].

Based on the perspective of the PISA study planned for 2022 and highlighting the key milestones that are announced in this project, we consider it appropriate to suggest that the organizers of the study include tasks that also aim to test legal, financial and media literacy. These types of literacy play a practical role, demonstrating the ability of students to safely, to some extent independently behave in practical situations in the current conditions of global digitalization and digital innovations. Here we support the idea of Marouli S. about the need to build an education system for sustainable development (ESD) [15].

As a result of the study, we note that the identification of universal and unique indicators applicable for the strategic development of the school educational system...
of world leaders according to the PISA-2018 Hybrid Rating of Countries and Territories, where the presence of indicators is an important attribute of the development of the modern educational world space.

**Conclusion**

The upcoming international PISA research in 2022, aimed at studying the quality of school education in about 88 countries and territories of the world, the fundamental focus of the control points is the assessment of mathematical literacy, mathematical reasoning, creative thinking and non-standard creative approach. The new results of the PISA survey provide monitoring of the country’s ranking, the strengths and weaknesses of school education in the participating countries. This, in turn, helps to identify new global trends and trends in the school education system in high-ranking participating countries. This study continues our study "Global Trends in the Education System of High-ranking Countries According to PISA-2018" in the journal Science and Education Perspectives (Issue 1, 2022), where we identified global trends and trends in school education according to PISA-2018. As a result of a new study, we found that, by analyzing the quality of school education systems, countries around the world are not only trying to introduce and begin to implement new trends and trends in the field of education, but also to form, adapt tracks of their strategic development in the field of school education to new modern conditions.

The strategic tracks for the development of school education in world leaders are focused not only on the professional standard of the teacher, the system of teacher growth, but also on the development and implementation of educational projects aimed at developing the intellectual, creative potential of the individual, its socialization in modern conditions of digital transformation and pandemic threats.

According to the PISA-2018 version we have revealed universal indicators of strategic development tracks in the school education system of the world leaders: the professional standard of the teacher, the system of teacher growth, the certification of teachers, the assessment of the quality of the teacher’s work (attestation), the competence-based approach, the HR service, the digitalization of the educational process (digital competencies). The world leaders in the school education system according to PISA-2018, on the one hand, use the universal track of strategic development to achieve the quality of education, and, on the other hand, using the example of Moscow, we have identified unique educational projects aimed at developing intellectual, creative potential of the individual in modern conditions of global digitalization, digital transformation, pandemic threats and challenges.

The school education system of any country or territory can introduce and implement indicators of the global universal track of strategic development in its system, but it can also develop unique educational projects and programs to improve the quality of education.

Thus, it is necessary to emphasize that universal and / or unique indicators are used to form and implement the strategic development of the school educational system in the countries of the world and are an important attribute of the development of the modern educational world space.


Информация об авторах

Томюк Ольга Николаевна
(Россия, г. Екатеринбург)
Кандидат философских наук, старший научный сотрудник, старший преподаватель кафедры теории государства и права
Уральский государственный юридический университет имени В. Ф. Яковлева
E-mail: helgago@yandex.ru
ORCID ID: 0000-0001-9524-8364
Scopus ID: 57211983935

Дьячкова Анна Викторовна
(Россия, Екатеринбург)
Кандидат экономических наук, доцент кафедры экономической теории и экономической политики Уральский федеральный университет имени первого Президента России Б. Н. Ельцина
E-mail: a.v.diachkova@urfu.ru
Scopus ID: 57211156711
ORCID ID: 0000-0003-4970-1820

Киселева Наталия Александровна
(Россия, Москва)
Заместитель руководителя Департамент образования и науки города Москвы
E-mail: KiselevaNA@mos.ru
ORCID ID: 0000-0001-7139-0665

Камка Светлана Васильевна
(Россия, Москва)
Кандидат педагогических наук, заместитель директора
Корпоративный университет московского образования
E-mail: KamkaSV@mioo.ru
ORCID ID: 0000-0001-7575-0875

Николенко Ольга Игоревна
(Россия, Москва)
Заместитель начальника Управления оценки и сертификации
Корпоративный университет московского образования
E-mail: NikolenkoOI@mioo.ru
ORCID ID: 0000-0002-4503-1711

Information about the authors

Olga N. Tomyuk
(Russia, Ekaterinburg)
PhD in Philosophy, Senior Researcher, Senior Lecturer, Department of Theory of State and Law
Ural State Law University named after V. F. Yakovlev
E-mail: helgago@yandex.ru
ORCID ID: 0000-0001-9524-8364
Scopus ID: 57211983935

Anna V. Diachkova
(Russia, Ekaterinburg)
Associate Professor, PhD in Economics, Associate Professor of the Department of Economic Theory and Economic Policy
Ural Federal University named after the first President of Russia B. N. Yeltsin
E-mail: a.v.diachkova@urfu.ru
Scopus ID: 57211156711
ORCID ID: 0000-0003-4970-1820

Natalia A. Kiseleva
(Russia, Moscow)
Deputy Head
Moscow Department of Education and Science
E-mail: KiselevaNA@mos.ru
ORCID: 0000-0001-7139-0665

Svetlana V. Kamka
(Russia, Moscow)
PhD in Pedagogic sciences, Deputy Director
Corporative University of Moscow Education
E-mail: KamkaSV@mioo.ru
ORCID ID: 0000-0001-7575-0875

Olga I. Nikolenko
(Russia, Moscow)
Deputy Head of the Evaluation and Certification office
Corporate University of Moscow Education
E-mail: NikolenkoOI@mioo.ru
ORCID ID: 0000-0002-4503-1711