

Education in Ukraine: Quality Assessment and Development Prospects Based on PISA-2018

[V. Novikov](#), [Ye. Makarova](#)

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Valery Novikov

Doctor of Sciences in Economics, Professor, Leading Researcher, Department for Human Development Studies, Ptoukha Institute for Demography and Social Studies, National Academy of Sciences of Ukraine.

Email: valery.economy@ukr.net

Yelena Makarova

Correspondent Member of the National Academy of Sciences of Ukraine, Doctor of Sciences in Economics, Senior Researcher, Deputy Director for Research, Ptoukha Institute for Demography and Social Studies, National Academy of Sciences of Ukraine.

Email: makarova_h@ukr.net

Address: 60 Tarasa Shevchenko Blvd, 01032 Kiev, Ukraine.

Abstract. In 2018, Ukraine joined the Programme for International Student Assessment (PISA). The results of PISA-2018 showed that Ukraine performed below the OECD average in all areas of literacy: reading, mathematics, and science. This outcome did not meet the public expectations. The expert society has not yet fully realized the critical potential of the obtained PISA results or started a broad discussion to evaluate them and outline the avenues for education reforms.

The article analyzes the PISA-2018 performance of Ukrainian students in reading, mathematics, and science literacy, as well as gender inequality, socio-economic context, academic resilience and achievement.

Comparison of Ukraine's educational practices with those of EU countries, benchmark countries, and Russia is used to identify the common features of national education system development at the present-day stage and determine the specific aspects of institutional evolution in Ukrainian education. Public investment in education is analyzed and possible ways of improving its effectiveness are demonstrated. National education policy could be enhanced by updating the learning standards and competencies, raising teacher pay, extending professional development opportunities for teachers, increasing teacher motivation, developing the infrastructure, improving the inter-budgetary relations, and achieving better education statistics.

Keywords: educational quality, competence, literacy, inequality, equity, education policy, PISA-2018, Ukraine.

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In the modern era of technology renewal, as financial, economic, and political institutions are advancing in the context of economic globalization and the growing geopolitical competition, educational quality

is becoming crucial for the development of national economies. International economic integration is increasing, providing a bi- and multilateral framework to ensure mobility of capital and, more importantly, workforce. As a result, international and domestic migration rates are growing, Ukraine and Russia being no exception. Over the course of three years (2016–2018), Russia accepted on average 155,300 migrants from Ukraine annually. This flow amounts to 26.3% of total migration from Ukraine, which makes Russia the second most popular destination for Ukrainian migrants after Poland [Libanova 2018:14]. Ukraine ranks second in terms of remittance flows from Russia to migrant workers' home countries [Chubar, Malishko 2019:63]. Along with labor migration, student migration constitutes an essential part of the migration flow from Ukraine to Russia, Russian universities being quite popular among Ukrainian high school graduates.

Modern educational researchers express their concerns about the global massification of higher education [Chou, Wang 2012; Ka Ho Mok, Jin Jiang 2016; Altbach, Reisberg, de Wit 2017]. As one of its consequences, education is degrading and, as result, losing its value. Commercialization of higher education has significantly eased the admission requirements, which inevitably affected the quality of school education.

Therefore, education policies are becoming a national priority for most of the countries in the 21st century. Globalization has added a distinctive feature to design of such policies: a tremendous influence of international organizations, such as UN, UNESCO, EU, OECD, and World Bank, which establish requirements for national education strategies. Mechanisms that are widely applied to meet those requirements include harmonization and standardization of national education policies to adapt the education systems to the current trends of socioeconomic development. This implies a transition from industrial technology to information technology and scientific computing, which are largely based on a high level of educational potential. Obviously—to Ukraine as well—reforms in education cannot be successful if they are implemented as a series of continuing local changes, often controversial and not connected by a common conceptual approach.¹ That is why it is important, using the results of PISA-2018, to give an objective assessment of educational quality in Ukraine and possible ways of improving it.

¹ National Academy of Educational Sciences (2016) *Natsional'ny doklad o sostoyanii i perspektivakh razvitiya obrazovaniya v Ukraine* [National Report on the State and Prospects of Education Development in Ukraine], Kiev: National Academy of Educational Sciences, pp. 11–13. Available at: <http://naps.gov.ua/ua/press/releases/1001/>

1. Analysis of PISA-2018 Results

In 2018, Ukraine joined the Programme for International Student Assessment (PISA). The PISA methodology has become engrained in sociological practice as a technique for educational quality assessment. It represents a cumulative effect of a number of factors: age, gender, and family characteristics of students; type of education program; type, location, and resources of educational institutions. It is extremely difficult to measure the influence that each factor in isolation has on the quality of school education. In PISA, educational quality is assessed by measuring performance gains in the domains covered by the project. Because it was the first round for Ukraine, its results only reflect educational quality as of the end of 2018 and serve the basis for comparison with the OECD and benchmark countries. The latter include Belarus, Georgia, Estonia, Moldova, Poland, and Slovakia.²

PISA covers 87% of 15-year-olds in Ukraine (coverage index), compared to the OECD average of 88%. In Ukraine, unlike in many other countries, the PISA test was taken not only by school students but also by students of vocational schools and institutions of vocational higher education. The test measuring functional literacy of 15-year-old students was administered in 250 educational institutions in every region of the country (except localities adjacent to the conflict and buffer zones), secondary schools accounting for 79.2%, institutions of vocational higher education for 12%, and vocational schools for 8.8%.

The results of PISA-2018 showed that Ukraine performed below the OECD average in all areas of literacy: reading, mathematics, and science. This outcome did not meet the public expectations and even caused the so-called “PISA shock” in the educational community. A similar performance had been demonstrated by Russian school students in 2000, sparking a wide discussion on PISA results and ways to improve educational quality [National Research University Higher School of Economics 2004].

In PISA, educational quality is measured as the level of reading, mathematics, and science literacy. Each of the three domains has a baseline level of literacy (Level 2), at which students are required to demonstrate a minimum level of proficiency in reading, mathematics, and science, as well as independent thinking skills.

The PISA scale of proficiency was reviewed in 2018,³ which should be taken into account when analyzing the levels of student literacy. This modification increases the probability of Ukraine performing below the OECD average and lower than the benchmark countries in each PISA domain. The gap is nearly equivalent to one year of schooling, which indicates that Ukraine is seriously falling behind in educational quality. The OECD equates 30 score points to one year of upper secondary schooling. Ukrainian students scored on average 465.95 in

² Benchmark countries were selected based on whether they had socio-economic similarities or shared some culture/history with Ukraine.

³ Level 1 in reading and science was broken into two sub-levels: 1a and 1b.

reading, 453.12 in mathematics, and 468.99 in science, which is 23, 39, and 22 score points below the OECD average, respectively. Ukraine also performed lower than such benchmark countries as Estonia, Poland, Hungary, and Belarus, whose results approached the OECD average. The lowest performance was observed in mathematics, unlike in most benchmark countries.

Ukraine's best-performing students scored way below their counterparts in other countries. Level 3 and higher levels of literacy were achieved by only 46.4% in reading, 37.9% in mathematics, and 43.6% in science. Level 3 is the most common level of proficiency among 15-year-olds in the OECD countries. In Ukraine, the percentage of students performing at Level 3 or above is below the OECD average.

1.1. Reading Literacy PISA results, in particular the percentage of students attaining Level 1a—just below the baseline,—indicate a lack of basic reading skills among Ukrainian students. For 16.7% of Ukrainian 15-year-olds, 1a is the highest level of proficiency they can achieve. Furthermore, there are those who perform at the bottom level of 1b, which includes very simple tasks for reading comprehension, such as finding the parts in a text where the explicit answers lie. The percentage of students scoring at Level 1b of reading literacy is 7.2% in Ukraine.

Students below Level 1b account for 2% in the Ukrainian sample, which is above the OECD average of 1.4%. Such students may understand the meaning of sentences or text passages, but they are unable to retrieve and synthesize information from the text, process long texts, or make simple inferences. International experts believe that adolescents scoring below Level 1b find it rather difficult to work with texts and thus have limited opportunities for obtaining a comprehensive education in the future.

1.2. Mathematics Literacy Literacy in mathematics implies ability to apply the mathematical knowledge acquired in school in various contexts that require reasoning, intuition, and thinking out of the box. Students performing at Level 1 on the PISA scale can follow simple procedures, such as arithmetic operations to find obvious solutions. This level of proficiency in mathematics is observed in 20.3% of Ukrainian 15-year-olds. However, 15.6% do not achieve even this level, being unable to solve a problem that gives all the necessary information, asks a clearly formulated question, and only requires following a standard procedure in a familiar context according to explicit instructions. The baseline level (Level 2) of mathematics literacy is not achieved by 36.0% of students in Ukraine. This percentage is way above the OECD average as well as the percentages in Estonia, Poland, Slovakia, and Belarus, yet somewhat lower than in Georgia and Moldova.

1.3. Science Literacy Similar to the other two domains, test items measuring science literacy require that students be able to synthesize information and make

inferences based on the changes in everyday life and environment induced by scientific and technology development. The lowest levels of science literacy are Levels 1a and 1b (and below Level 1b). At Level 1a, students can choose the best scientific explanation of obtained data in familiar contexts. Students scoring at Level 1b are able to use the most basic subject knowledge to identify specific aspects of simple scientific phenomena. In Ukraine, only 19.2% of students reached Level 1a, and 7.3% scored lower. Level 1b was the highest achievable level for 6.3% of 15-year-olds in Ukraine, and 1% scored even lower, as compared to the OECD averages of 5.2 and 0.7%, respectively.

1.4. Gender Inequality

Ensuring gender equality of opportunity and outcome in education is a pressing issue for a lot of countries, and many of them tackle it effectively. Ukraine demonstrates essential gender disparities, particularly in reading, where boys perform considerably lower (450.1) than girls (483.6). Ukraine's gender gap of 33.5 score points in reading literacy is above the OECD average of 30.1 and wider than in the benchmark countries (except Georgia and Moldova with their gaps of 38 and 40 score points, respectively).

Boys score higher than girls in mathematics. The gender gap in this domain is 7 score points, as compared to the OECD average of 4.8. However, this difference is not statistically significant. Similar gender gaps are observed in Belarus and Estonia.

No gender disparities in scientific performance were revealed in most PISA-participating countries. In Ukraine, boys outperform girls by 1.7 score points. In the OECD countries, meanwhile, girls have an average advantage of 2.8 points over boys, similar to the rates in Estonia, Poland, Belarus, Hungary, and Slovakia. A slightly wider performance gap in science (in favor of girls) is observed in Moldova and Georgia.

1.5. Socioeconomic Context

PISA looks for correlations between students' performance and a number of factors describing their socioeconomic status (SES). Socioeconomic disparities in education are assessed using three indicators that reflect the relationship between learning outcomes and SES: the average level, the average rate of change, and the strength of correlation. The average level shows whether students in a specific country or education system perform better or worse than their peers from similar socioeconomic backgrounds in other countries. The average rate of change shows to what extent students in better socioeconomic contexts perform better than those from less advantaged backgrounds and lower-income families. The strength of correlation shows the chances for low-SES students to perform as high as their high-SES counterparts.

Table 1 compares the socioeconomic disparities in education between Ukraine and other countries. The average level of reading literacy among 15-year-olds in Ukraine (475.3) is significantly lower than among students with similar SES in the OECD countries (488.4).

Table 1. The key indicators of socioeconomic inequality in education

	Average level		Average rate of change		Strength of correlation*	
	Mean	S.E.	Score gap	S.E.	%	S.E.
Belarus	480.5	1.89	51.3	2.15	20	0.01
Georgia	391.7	2.33	27.9	1.8	9	0.01
Estonia	521.7	1.77	28.7	2.11	6	0.01
Moldova	449.0	2.59	41.7	2.01	17	0.02
Poland	518.3	2.41	39.0	2.56	12	0.01
OECD	488.4	0.38	36.7	0.3	6	0.01
Slovakia	467.7	1.92	45.6	2.06	18	0.02
Hungary	482.0	2.13	45.9	2.22	19	0.02
Ukraine	475.3	2.7	45.2	2.48	14	0.01

Note: The strength of correlation is the percentage of variation in reading performance explained by SES.

Source: Ukrainian Center for Educational Quality Assessment (2019) *Natsional'ny otchet po rezul'tatam issledovaniya kachestva obrazovaniya. PISA-2018* [Ukraine's National PISA-2018 Report], Kiev: Ukrainian Center for Educational Quality Assessment, pp. 66–67.

The average rate of change (difference in reading scores corresponding to a one-point increase in SES) is much higher in Ukraine (45.2) than in the OECD countries (36.7). In Georgia and Estonia, the rate is essentially lower (27.9 and 28.7, respectively), which indicates more educational equity in terms of SES in these countries and a high degree of social stratification in Ukraine.

SES explains 14% of variation in reading performance in Ukraine, which is close to such OECD countries as Hungary and Slovakia, lower than in Moldova and Belarus, and higher than in the other benchmark countries.

Performance of Ukrainian students from low-SES backgrounds is comparable to that of Belarusian 15-year-olds sharing the same status, yet the SES-related rate of change in the test scores is lower in Ukraine than in Belarus. There is a considerable performance gap between high- and low-SES students. However, the probability of scoring high for low-SES students is about the same as in the OECD countries and in most of the benchmark countries (except Estonia, Poland, and Georgia).

Students with a medium SES in Ukraine are 2.5 times more likely to achieve the baseline level of proficiency in reading than their low-SES peers (2.3 times more likely in mathematics and 2.1 times more likely in science). High-SES students' chances of scoring above the base-

Table 2. **Resilient students in Ukraine vs. the OECD average, %**

	International (relative) resilience			National resilience		
	Reading	Mathematics	Science	Reading	Mathematics	Science
Ukraine	4.6	17.8	23.8	11.7	12	12.8
OECD average	3.8	24	23	11.4	10.9	11.4

Source: Ukrainian Center for Educational Quality Assessment (2019) *Natsionalny otchet po rezul'tatam issledovaniya kachestva obrazovaniya. PISA-2018* [Ukraine's National PISA-2018 Report], Kiev: Ukrainian Center for Educational Quality Assessment, pp. 74.

line in all domains are 2.6 times higher than those of medium-SES students and almost 6 times higher than those of low-SES students.

1.6. Academic Resilience and Achievement

PISA had adopted a step-by-step approach to the problem of access to quality education, which suggests ensuring academic resilience prior to making education universally accessible.

Resilience is key to achieving equity in education. PISA defines resilient students as those who come from disadvantaged backgrounds, e. g. from low-SES families or with negative social experiences, but still exhibit high levels of success by being assiduous and interested in getting an education.

Resilience in PISA is examined using international, national, and “core-skills” perspectives. Core-skills resilience is the ability of disadvantaged students to achieve good levels of performance in all three core PISA domains. The threshold used in the core-skills definition is absolute in the sense that disadvantaged students need to perform at a certain given threshold that is the same for all students. The cut-off point to reach proficiency Level 3 in each subject does not vary across countries.

When the performance level is assessed with reference to a specific country, the threshold is relative (Table 2). Percentages of internationally and nationally resilient students in Ukraine are comparable to those of OECD countries (except international resilience in mathematics). Expansion of this category of students will help increase the overall literacy rates and reduce the socioeconomic achievement gaps.

PISA examines the influence of specific learning environment and school characteristics on student achievement. Such characteristics include residential segregation, segregation based on income or on cultural or ethnic background, the structure of the upper secondary education system, education programs, and system-level education policies, e. g. differences in school autonomy.

To measure the impact of specific factors on academic achievement, it is important to analyze the variation in variables that directly affect the quality of education in the core PISA domains, since levels of

literacy vary between schools as well as within them. Between-school variation in PISA scores accounts for 30% of total variation in Ukraine, which is higher than in Belarus, Moldova, Georgia, Estonia, and Poland. It means that school segregation in Ukraine is higher than in these benchmark countries.

To some extent, variation in educational quality reflects differences in the quality of teaching between urban and rural schools as well as between different types of schools. Reading performance in Ukraine differs significantly between rural and urban students. Rural students score on average 420.6, falling more than 2.5 years of schooling behind their urban counterparts. Performance gaps in mathematics and science are even wider: the average mathematics score in rural schools is 408.1, which is nearly three years of schooling lower than in urban areas (494.1).

Average reading score in lyceums, gymnasiums, and specialized schools is 509.9, which is essentially higher than in regular schools (464.6) and vocational institutions (440.1). Vocational school students fall approximately 1.5–2 years of schooling behind their peers in lyceums, gymnasiums, and specialized schools.

The differences in educational quality between Ukraine and other countries revealed in the course of PISA can hardly be explained by any single factor. Interplay of various factors affecting the quality of education requires a deeper analysis that would account for a system of indicators reflecting different levels of education and types of educational institutions.

However, PISA results make it clear that educational quality in Ukraine is way below the European level. Among the 79 PISA-participating countries, Ukraine is ranked 40th in reading, 43rd in mathematics, and 38th in science. The average PISA score of Ukrainian students is 21 points lower than the OECD average, 57 points lower than in Estonia, 46 points lower than in Poland, and 8 points lower than in Belarus. Russia, too, outperforms Ukraine by 21 score points (Table 3).

Despite some decline in Russia's performance between 2015 and 2018, PISA experts still rank it among the successful countries that improved in at least two assessment areas.⁴ By 2018, Russia had made certain advancements in education development, compared to earlier assessments. An improvement in the educational standards had a positive effect on the learning process. Governance of educational institutions also underwent some positive changes. Decentralization initiatives provided conditions for enhancing financial stability of educational institutions. The network of small schools had grown. Performance in mathematics had improved by 20 score points since 2003.

⁴ Mironova K. (2019) Rossiyskie shkol'niki ne spravilis' s ekzamenom [Russian School Students Failed the Test]. *Kommersant*, February 17, 2020. Available at: <http://www.kommersant.ru/doc/4180047>

Table 3. Comparing the PISA-2018 performance of Ukraine and Russia to that of other countries.

	Mean PISA score
PISA average	453
OECD average	487
Russia	479
Ukraine	466
Benchmark countries:	
Estonia	523
Poland	512
Belarus	474
Slovakia	458
Moldova	424
Georgia	380

Note: Scores are converted into an international 1,000-point scale with a mean of 500.

Source: Ukrainian Center for Educational Quality Assessment (2019) *Natsionalny otchet po rezultatam issledovaniya kachestva obrazovaniya. PISA-2018* [Ukraine's National PISA-2018 Report], Kiev: Ukrainian Center for Educational Quality Assessment.

Scientific literacy, however, remained at the level of 2006, when it was first assessed.⁵

1.7. Resources Changes in education spending are indispensable to promote innovative development of the system. According to PISA, Ukraine's expenditure on education accounted for 13.1% of total public spending and 5.4% of GDP, almost meeting the benchmark levels of the sustainable development goal (SDG) targets for education. However, spending per student is much lower in Ukraine than in the majority of European countries. Apart from provision and equipment (infrastructure, instructional materials), education spending items also include teach-

⁵ Ministry of Education of the Russian Federation (2019) *Po itogam PISA Rossiya voshla v 18 stran s ustoychivym progressom kachestva shkol'nogo obrazovaniya* [PISA Ranks Russia among 18 Countries with Consistent Improvements in School Education Quality]. December 3, 2019. Available at: <https://edu.gov.ru/press/1979/po-itogam-pisa-rossiya-voshla-v-18-stran-s-ustoychivym-progressom-kachestva-shkolnogo-obrazovaniya/>

er remuneration and extracurricular activities. The average of OECD countries' cumulative expenditure per student between the age of 6 and 15 was in excess of 100,000 in equivalent USD converted to PPPs in 2018. Ukraine, meanwhile, spent only USD26,647 per student.⁶ This level of spending is insufficient to achieve the SDG targets for education, one of which consists in substantially increasing the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship by 2030.⁷

Insufficient funding inhibits not only infrastructure development but also the purchase of educational supplies, considerably complicating the learning process. Shortage or inadequate quality of the relevant infrastructure (e. g. buildings, HVAC systems, lighting, audio-visual aids) are experienced by over 40% of educational institutions in Ukraine⁸. Low access to computers for pedagogical purposes and computers connected to the Internet available for students for educational purposes, lack of adequate Internet connections, and low access to software are typical of 70% of schools. In addition, 62% of educational institutions lack computer service technicians. The level of school ICT equipment in Ukraine is below the OECD average and lower than in the benchmark countries. Ukraine's index of shortage of material resources in schools is 0.75, as compared to the OECD average of 0.02, 0.34 in Moldova, and 0.17 in Georgia. In Belarus and Poland, educational and material resources are even in excess, their indices of shortage being –34 and –33, respectively.⁹

2. Avenues for Improving National Education Policies

Education system as a public institution is inert, meaning that it adapts with a certain time lag to the changing requirements imposed by socio-economic transformations. Educational standards, which serve as benchmarks for upgrading the existing model of instruction, require that school students not only learn the basic skills and competencies but also develop personal qualities that will allow them to apply the acquired knowledge in everyday life.

Nowadays, the quality of education in Ukrainian schools is such that students' basic skills are below the baseline level of 15%, which

⁶ Ukrainian Center for Educational Quality Assessment (2019) *Natsional'ny otchet po rezul'tatam issledovaniya kachestva obrazovaniya. PISA-2018* [Ukraine's National PISA-2018 Report], Kiev: Ukrainian Center for Educational Quality Assessment, p. 157.

⁷ *Tseli ustoychivogo rozvitiya: Ukraina* [Sustainable Development Goals: Ukraine]. Available at: <http://www.un.org.ua/ua/tsili-rozvytku-tysiacholit-tia/tsili-staloho-rozvytku>

⁸ Ukrainian Center for Educational Quality Assessment (2019) *Natsional'ny otchet po rezul'tatam issledovaniya kachestva obrazovaniya. PISA-2018* [Ukraine's National PISA-2018 Report], Kiev: Ukrainian Center for Educational Quality Assessment, pp. 167–168.

⁹ *Ibid.*, p. 171.

was projected in 2016 to be universally achieved by 2020 as a critical indicator of education development in Ukraine.¹⁰ In terms of mean PISA scores, 29.4% of Ukrainian students perform below the baseline level of proficiency. Percentages of students scoring below the baseline level of functional literacy are 25.9% in reading, 36% in mathematics, and 26.4% in science.

One of the reasons for low performance is that school students in Ukraine were unfamiliar with the modern academic assessment standards. They had never taken tests assessing their ability to think independently, formulate their own viewpoint on social phenomena, apply mathematical knowledge to solve unconventional problems, synthesize knowledge from different subjects such as physics, chemistry and biology, apply the acquired scientific knowledge in everyday life, understand, explain, or reproduce natural phenomena and processes. Insufficiency of school knowledge for passing the PISA test is a major reason for Ukraine falling behind in educational quality. As a remedy to this situation, a number of important initiatives should be undertaken to make graduates of Ukrainian schools more competitive.

In the long-term perspective, a system of functional literacy assessment at all key stages of education should be introduced and developed to monitor individual trajectories of student progress. Prior educational assessments did not provide enough information. A regular student evaluation system should be established at the national level to allow for a differentiated assessment. Creating a national system for monitoring the learning gains of school students in Ukraine would allow for assuring an adequate level of educational quality at both national and local levels.

The existing instructional design priorities should be reviewed and new ones should be set to create conditions for the development of innovation skills. National educational standards in reading, mathematics, and science, updated with due regard for the new priorities, should become obligatory. Furthermore, national standards should be differentiated in accordance with the international levels of educational quality, including descriptions and the range of performance within each level.

To allow effective implementation of the new educational standards, it is vitally important to establish the minimum funding requirements and align them with the budgets of local educational institutions and authorities. So far, the budgetary capacity of the education system is not based on the educational standards. If these two instru-

¹⁰ National Academy of Educational Sciences (2016) *Natsional'ny doklad o sostoyanii i perspektivakh razvitiya obrazovaniya v Ukraine* [National Report on the State and Prospects of Education Development in Ukraine], Kiev: National Academy of Educational Sciences. Available at: <http://naps.gov.ua/ua/press/releases/1001/>

ments are not combined in a single mechanism over a medium-term horizon, educational quality will be impossible to improve.

The social demand for improvements in educational quality implies following the principle of equity in policy for lifelong learning. Today, equal access to quality education is achieved first of all by increasing funding for education to mitigate the harmful effects of education subsidies. Right now, the budgetary policy is rather formalized. The philosophy of competency-based learning suggests applying new budgeting methods to make funding allocation as objective as possible. The need to integrate such new methods is dictated by the ever-increasing instability of public investments in education and the growing inadequacy between public education spending and the population of students. The linear correlation coefficient between spending and enrollment decreased from 0.972 to 0.776 in 13 years, and there are no apparent reasons for this gap to start reducing. This inadequacy is a permanent factor of budgetary imbalances in educational institutions, making it hard to provide equal access to education. To overcome this disproportion, it is necessary to improve the mechanism of adjustment factors in educational budgeting. Ukraine's Budgetary Code provides for only two types of adjustment factors: population size and socioeconomic and demographic differences between regions. No allowance is made for educational infrastructure indicators, while they determine not only the physical condition and equipment of learning environments but also the size of funding. The budgetary mechanisms of Ukraine's education system should include coefficients of depreciation of school infrastructure, including buildings, facilities, and equipment.

Adequacy of Ukrainian schools' material and educational resources of is directly associated with their location and, to some extent, their socioeconomic context. Resources are the main prerequisite for achieving high levels of learning outcomes and promoting equity in education within low-SES schools. Socioeconomically disadvantaged schools are often found in rural areas of Ukraine, for example. A dedicated policy should be applied to upgrade the resources of such schools.

Teacher remuneration remains an area of concern, too. Ukraine's National PISA 2018 Report observes a difficulty of estimating the average salary of Ukrainian school teachers. This indicator depends on a number of factors including increments, supplemental pay, and other extra payments. The existing system for collecting data on teachers' salaries does not allow accurate calculations.¹¹ This budget management issue could be solved by establishing a minimum threshold for

¹¹ Ukrainian Center for Educational Quality Assessment (2019) *Natsional'ny otchet po rezul'tatam issledovaniya kachestva obrazovaniya. PISA-2018* [Ukraine's National PISA-2018 Report], Kiev: Ukrainian Center for Educational Quality Assessment, pp. 162.

spending per student. For this purpose, a model of educational standard has been introduced, which is based on projections for per-student costs of standard “budgetary services” and makes allowance for maximum class size, sanitary norms, differences in tuition at different stages of education, types of education programs and educational institutions, student composition, and other factors.

It is clearly understood by the general public that Ukraine’s education system has exhausted its potential for extensive development. New approaches meeting the modern requirements are needed to build up the country’s educational potential. In 2017, a new formula for allocation of educational subvention covering teachers’ salaries among the local budgets was introduced and endorsed by the government. The new formula allows allocating budgetary resources with due regard for class size and regional school differences.¹² The incentive effect of subvention on teaching quality is beyond doubt, but its life span is limited. The subvention part accounts for 56.6% of total expenditure on teachers’ salaries in the structure of Ukraine’s education spending. Meanwhile, the average annual growth rate of expenditure on teacher remuneration, all extra payments included, is 8.8%, and spending on goods and services (materials, equipment, energy supplies, etc.) decreases by an average of 10% every year. Such an imbalance in the structure of public spending on education emphasizes the need for new, comprehensive approaches to financing in the education sector, which require unconventional funding mechanisms.

Ukrainian periodicals have repeatedly addressed the salience of financial issues in education [Khomishin 2018; Kurko 2010]. Education budgeting practices need to be discussed widely and thoroughly.

In 2016, a policy concept of “New Ukrainian School” for the period of up to 2029¹³ was developed to enhance the system of secondary education. The fiercest disputes arose over the aspects of education policy that involved the most dramatic transformations: pedagogy of partnership, innovation readiness, new standards and learning outcomes, school and teacher autonomy, and education funding. Based on this concept, a law to reform the system of secondary education was adopted in 2020.¹⁴ A lot of effort has to be made in 2021 to prepare and submit implementation scenarios to the legislative authorities.

Reliable educational statistics is the core of education policy design. Ukraine’s government statistics provides very limited data on

¹² Resolution of the Cabinet of Ministers of Ukraine No. 114 “On Amending the Formula for Allocation of Educational Subvention among the Local Budgets” of February 19, 2020. Available at: <https://zakon.rada.gov.ua/laws/show/114-2020-%D0%BF#Text>

¹³ Resolution of the Cabinet of Ministers of Ukraine *On Endorsing the Policy Concept of “New Ukrainian School” for the Period of up to 2029* of December 14, 2016. Available at: <https://www.kmu.gov.ua/ua/npas/249613934>

¹⁴ On Secondary Education. Available at: <https://zakon.rada.gov.ua/laws/show/463-20#Text>

the economic and financial module of education. A deeper and more extensive statistical research is required to elaborate the objectives of education development in the context of the ever more rigorous education quality standards. Conceptual approaches to educational statistics have evolved over the last years in terms of national standards. However, such data is presented with a time lag and is essentially macroeconomic. The structure of statistical indicators gathered by the Ministry of Finance of Ukraine and the State Statistics Service of Ukraine is poorly associated with the demographic potential, labor market, teacher remuneration, employment patterns, household income, educational quality, and allocation of funding among the regions and types of educational institutions. Reform of the education system will imply solving the problem of gathering additional statistical data, including the statistical functionality of local governments and amalgamated territorial communities, and harmonization of data between them.

3. Conclusion PISA results reflect a modern approach to education development based on achieving functional literacy and improving educational quality, which implies not only the acquisition of subject knowledge but also learning to communicate and apply knowledge in real life and the development of adequate behavioral strategies.

Average PISA performance of Ukrainian students shows that their levels of functional literacy in reading, mathematics, and science are too low to solve problems that require not only subject knowledge but also ability to deal with the practical aspects of life. If nothing is done, the Ukrainian segment of national and global labor markets will face a shortage of employees with relevant production and organizational skills.

The inferences from analysis of PISA results allowed developing an action plan for improving the quality of education in Ukraine, which makes no pretense to exhaustiveness but is premised on objective data and education research findings.

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