# HIGHLIGHTS

## Highlight 1. Quality of Primary Education: Serbia in a Global Context

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### Introductory remarks

Internationally comparable tests are the most widespread way of measuring the quality of education because they provide insights into students' educational achievements in a standardized manner. The results on these tests are a good measure of education quality for several reasons: they can indicate how well the curriculum content is learned and understood; they can signal the quality of the students themselves, helping educational institutions and employers in selecting the best candidates for further education or the most qualified candidates for a certain job, and they provide a wealth of information for international comparison of education quality. These and other aspects have contributed to the development of numerous programs for assessing the quality of education (Vuksanović, 2015). The International Association for the Evaluation of Educational Achievement and the programs conducted within this association have spurred the development of other international and regional programs for assessing student achievements, i.e., the quality of education. The most significant is certainly the Programme for International Student Assessment (PISA), conducted since 1997 by the Organisation for Economic Co-operation and Development (OECD). Student testing has been organized every three years since then. The first PISA cycle involved 32 countries, while the latest survey in 2022 included nearly 700,000 students from 85 countries. The primary goal of PISA testing is to assess and monitor the extent to which students who have completed primary education have mastered competencies important for further schooling and active participation in society. The central concept is the literacy of fifteen-year-olds, which is examined in three different domains: reading, mathematical, and scientific literacy. The specificity of this program is that it measures the quality of education not by the degree to which students can reproduce what they have learned in schools but by how capable they are of understanding and using information when solving relevant problems from everyday life. Therefore, this program should be viewed more broadly than competing education quality evaluation programs. Thus, PISA focuses on competencies and is not aimed at monitoring the

extent of curriculum realization. Although it deals with competencies supported by the curriculum, education quality is understood as an interdisciplinary and functional category (OECD, 2012).

The latest PISA testing was conducted in 2022, during which many countries were still facing the negative effects of the coronavirus pandemic. As highlighted in the latest OECD report (2023), the fact that disruptions in school systems around the world were still present in that year emphasizes the importance of analyzing the results of the 2022 PISA testing. According to the results of this testing compared to the previous PISA cycle from 2018, there was a deterioration in students' educational achievements in OECD countries by about 10 PISA points in the domain of reading literacy and about 15 PISA points in mathematical literacy. However, although it is often stated that this deterioration of results is a consequence of school closures around the world in the conditions of the COVID crisis, a direct link between the pandemic and the results has not been proven.

Serbia first participated in the PISA testing in 2006 and has since taken part in all subsequent PISA cycles, with the exception of 2015. Generally, students from Serbia achieve results in reading, mathematical, and scientific literacy that are below the OECD country average. Serbian students made significant improvements in all three literacy domains in 2009 and 2012, followed by a period of stagnation. According to the 2022 PISA testing results, the average Serbian student scored 440 points in reading and mathematical literacy, and about 450 points in scientific literacy.

The subject of this Highlight is the analysis of the trend of Serbian students' results in PISA testing, with a focus on the results of the latest PISA test. To better illustrate Serbia's position in global framework, a comparative analysis of the results of students from Serbia and other selected countries has been conducted. Special attention has also been given to the analysis of the fairness and efficiency of the Serbian education system.

### Trend of Quality of Primary Education in Serbia

In 2022, students from Serbia achieved average results in reading, mathematical, and scientific literacy that were almost identical to those obtained in the previous PISA test in 2018. Graph 1 shows the trend of student results in the PISA testing across all three domains from 2006 to 2022. In the domains of reading, mathematical, and scientific literacy, the average Serbian student scored 440 points, 440 points, and 447 points, respectively, in the latest 2022 PISA test. Compared to the last PISA cycle, there is no difference in the

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results in the domain of reading literacy. However, in the domain of mathematical literacy, a decline of 8 PISA points was recorded, while an improvement of 7 PISA points was observed in the domain of scientific literacy. More importantly, compared to the OECD country average, the differences remain significant. In 2022, Serbian students scored about 40 points lower in reading, mathematical, and scientific literacy compared to students from OECD countries. Considering that, according to the OECD methodology, one school year is equivalent to 40 PISA points, this indicates that, according to the latest PISA testing, Serbian students are one school year behind in all three literacy areas. Observing the trend in reading, mathematical, and scientific literacy, it can be seen that Serbian students made significant progress from 2006 to 2012 (improvement ranged from 10 to even 40 PISA points, depending on the domain observed). In subsequent PISA tests, Serbian students achieved results that are at the level of those achieved in 2012. This indicates that the quality of primary education in Serbia, as measured by PISA testing results, has stagnated over the last decade at around 440 points, which is 40 PISA points lower than the OECD country average. It is also important to note that, unexpectedly, the quality of primary education in Serbia did not worsen during the coronavirus pandemic (unlike in OECD countries, where it is believed that the result declined by between 10 and 15 PISA points, depending on the literacy domain). One reason for this is that Serbian students did not spend a significant period out of school during the pandemic. According to the latest 2023 OECD report, a third of students in Serbia stated that they had not been in school for more than three months (but had other forms of home-based education), which is less than half of the students from OECD countries who did not attend school during the pandemic period.

Graph 2 shows the changes in the results of Serbian students in reading, mathematical, and scientific literacy, according to the latest PISA test in 2022 compared to the first PISA test in which Serbia participated in 2006. It can be observed that there has been significant progress in the domain of reading literacy during this period, as the score of Serbian students improved by 40 PISA points. Notably, Serbian students scored the lowest in reading literacy – 400 points – in their first PISA test, which was about 35 PISA points worse than in mathematical and scientific literacy. Since reading literacy is considered especially important, as it is the foundation of all other forms of literacy, many reports from Serbia published shortly after 2006 pointed out the need to improve results in this domain. Education policy makers in Serbia have made significant efforts to improve the quality of primary education through the reform of the school system, particularly in the segment of reading literacy. As a result of these efforts, Serbian students already showed an improvement of nearly 40 PISA points in the next PISA test in 2009. However, in subsequent PISA cycles, there was no further improvement in reading literacy. In the domains of mathematical and scientific literacy, Serbian students achieved an improvement of only 5 and 10 PISA points, respectively, in 2022 compared to 2006. Again, as with reading literacy, this improvement occurred during the 2009 and 2012 cycles, after which the level of achieved results remained the same in the subsequent PISA cycles during 2018 and 2022. It is important to note that in the case of OECD countries, a deterioration in results in all three literacy domains was observed in 2022 compared to 2006. Thus, students from OECD countries in this period scored worse by 13, 21, and 12 PISA points in reading, mathematical, and scientific literacy, respectively. This explains why the gap in the quality of education, as measured by PISA testing

**Graph 1: Trend of Student Results in PISA Testing in Reading, Mathematical, and Scientific Literacy for Serbia and OECD (2006-2022, Average)**
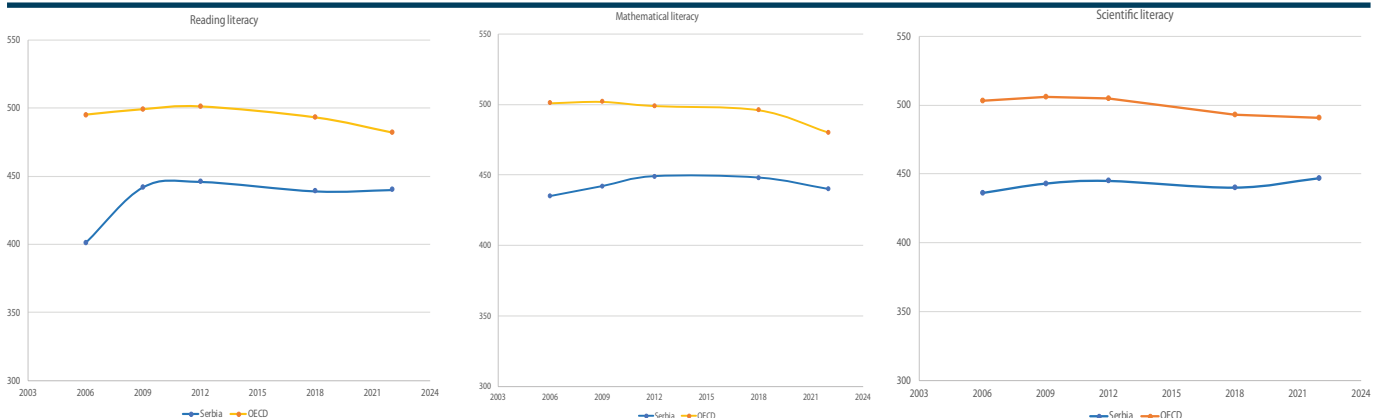


Source: OECD (2023).

**Graph 2: Changes in Student Results in PISA Testing in Reading, Mathematical, and Scientific Literacy for Serbia and OECD (2022 Compared to 2006, Difference in Averages)**
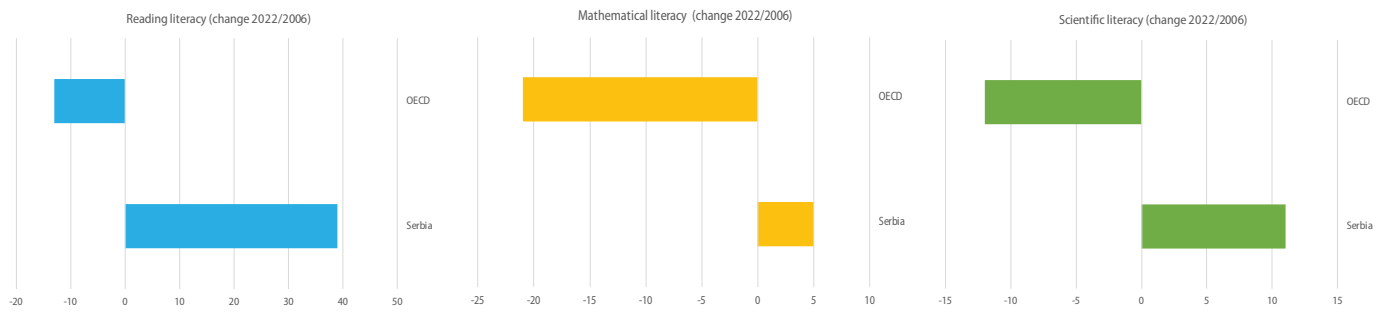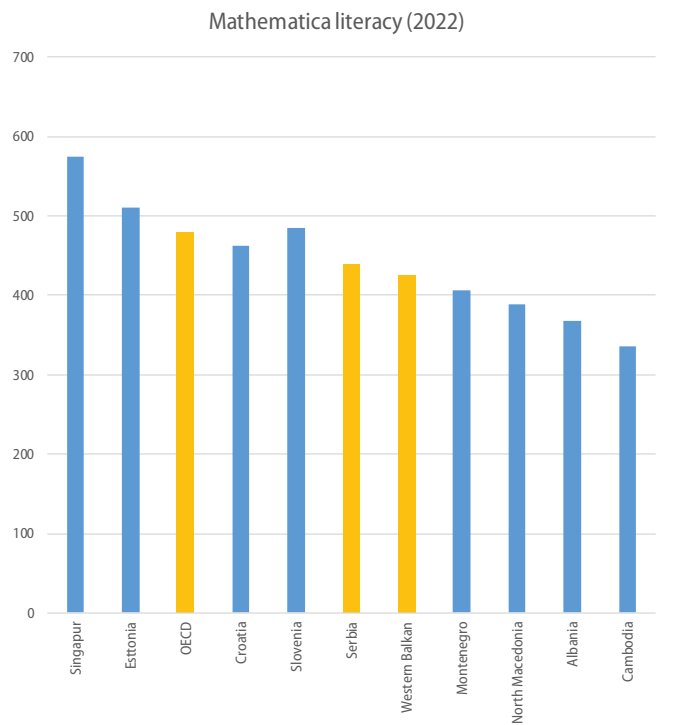


Source: OECD (2023).

results, between Serbia and OECD countries has narrowed. Despite the stagnation of results of Serbian students over the past few PISA cycles, students from OECD countries are achieving worse results, thereby reducing the gap on this basis.

## The position of Serbia according
## to the results of the latest PISA testing

The 2022 PISA test results indicate that Serbia ranked 42nd out of the 85 participating countries in the domain of mathematical literacy, which was the main focus of the test that year. With a score of 440 points, Serbian students performed in this literacy area significantly lower than students from Singapore, the top-ranking country, who scored 135 PISA points higher. Among European countries, Estonia had the best result, with its students averaging 510 points, which is 70 PISA points higher than Serbian students. To illustrate, this suggests that the average Serbian student is approximately 3.3 and 1.7 school years behind students from Singapore and Estonia, respectively. Among Western Balkan countries[2], the best result in mathematical literacy was achieved by students from Slovenia (485 points), followed by students from Croatia (463 points). In this domain, Serbia's result was 40 PISA points below the OECD country average but 15 PISA points better than the average of Western Balkan countries. Students from Montenegro, North Macedonia, and Albania scored lower than Serbia. Notably, Serbian students on average scored about 100 PISA points better than students from Cambodia, the lowest-ranked country in the 2022 PISA testing.

**Graph 3: Results of the Latest PISA Testing in Mathematical, Reading, and Scientific Literacy for Serbia and Selected Countries (2022, Average), Panel A**
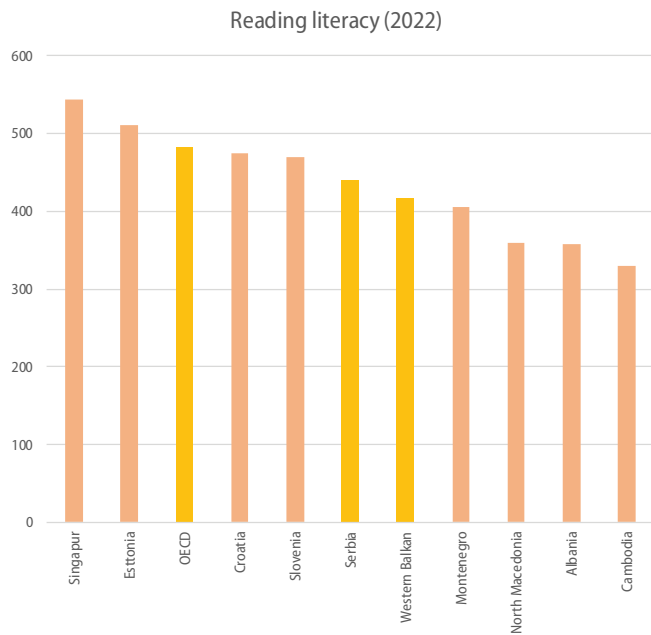


Source: OECD (2023).

In the domain of reading literacy, according to the 2022 PISA test results, Serbia is ranked 40th out of the 85 participating countries. Serbian students scored 440 points in reading literacy, which is about 100 PISA points lower than students from Singapore, the top-ranked country. In the European context, the best result in this domain was again achieved by students from Estonia – 511 points, wh ich is about 70 points higher than what Serbian students achieved. It can be said that Serbian students are approximately 2.5 and 1.7 school years behind students from Singapore and Estonia, respectively. Among the Western Balkan countries, Croatia and Slovenia outperformed Serbia, with their students averaging 475 and 469 points, respectively.

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2 In this text, the term Western Balkans refers to the countries of the former Yugoslavia that participated in the 2022 PISA testing – Serbia, Croatia, Slovenia, Montenegro, North Macedonia – as well as Albania.

Students from Montenegro, North Macedonia, and Albania scored lower than Serbia in reading literacy within this region. Serbia's performance in this literacy area is 40 PISA points below the OECD country average but about 20 PISA points better than the Western Balkan country average. Illustratively, Serbian students on average scored about 110 PISA points better than students from Cambodia, which ranked last in the 2022 PISA testing in reading literacy.

**Graph 3. Panel B**


Reading literacy (2022)

Source: OECD (2023).

According to the 2022 PISA test results, Serbia ranked 40th out of 85 participating countries in the domain of scientific literacy, similar to its position in reading literacy. With a score of 447 points, Serbian students' performance in this literacy domain was 115 PISA points lower than that of students from Singapore, the top-ranked country. In Europe, the best result in scientific literacy was achieved by Estonia, whose students averaged 526 points, which is 80 PISA points higher than the result of Serbian students. This indicates that the average Serbian student is approximately 2.9 and 2 school years behind students from Singapore and Estonia, respectively. Among Western Balkan countries[3], the best result in scientific literacy was achieved by students from Slovenia (500 points), followed by students from Croatia (483 points). In this domain, Serbia's result was about 40 PISA points lower than the OECD country average but around 16 PISA points better than the Western Balkan country average. Students from Montenegro, North Macedonia,

3 In this text, the term Western Balkans refers to the countries of the former Yugoslavia that participated in the 2022 PISA testing – Serbia, Croatia, Slovenia, Montenegro, North Macedonia – as well as Albania.

and Albania again scored lower than Serbia. Students from Cambodia, the lowest-ranked country in the 2022 PISA testing in scientific literacy, scored about 100 PISA points lower than Serbian students.

**Graph 3. Panel C**


Scientific literacy (2022)
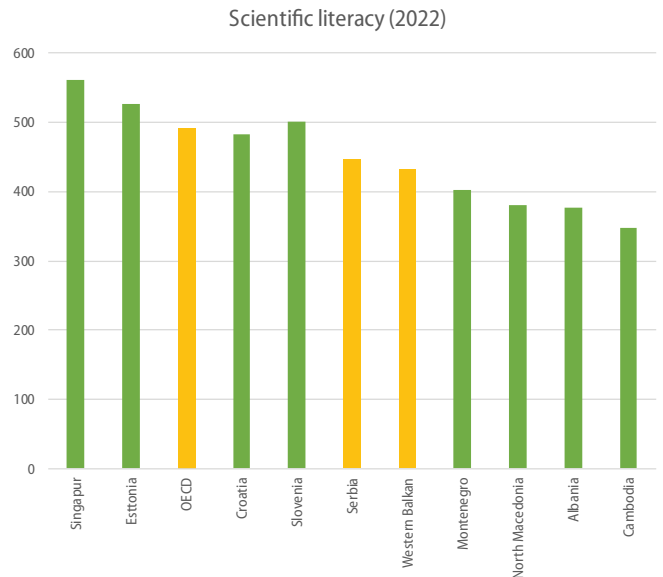
Source: OECD (2023).

## Fairness and Efficiency of the Education System in Serbia

One of the important segments of analyzing results from PISA testing relates to the fairness of educational systems. Using questionnaires completed by students and their parents as part of the PISA testing, researchers at the OECD have created an Index of Economic, Social and Cultural Status (ESCS). This index is based on responses related to the education, occupation, and wealth of parents in terms of educational and other aids significant for a child's schooling. Based on the values of this index, it's possible to categorize students into those with the worst and best socioeconomic characteristics. Graph 4 provides insight into the PISA testing results across all three literacy domains for students belonging to the first quartile (25% with the worst socioeconomic status) and the last quartile (25% with the best socioeconomic status). In the case of Serbia, in the domain of mathematical literacy, it can be observed that students from the first quartile scored an average of 400 points, which is 80 points lower compared to the results achieved by students from the last quartile. This suggests that in Serbia, students with the worst socioeconomic characteristics are two school years behind their peers with the best socioeconomic characteristics in this domain. Such a situation indicatively points to significant inequality in educational outcomes among students in Serbia. However, inequality observed based on the

differences in results achieved by students from the first and last quartiles of the distribution by socioeconomic status is not something that is exclusively characteristic of Serbia. At the OECD level, this difference in mathematical literacy is even greater, amounting to 95 PISA points. In Europe, the largest gap is observed in Slovakia, where students with the worst socioeconomic characteristics achieve an average score that is 134 PISA points lower than those achieved by students with the best socioeconomic characteristics (lag corresponds to 3.3 school years). In Singapore, the country that ranked highest in the latest PISA testing, the difference in results between students belonging to the first and last quartile according to the ESCS index value is 111 PISA points. In the case of the Western Balkan countries, the largest difference of 92 PISA points can be observed in Slovenia, while the smallest difference of 49 PISA points was recorded in Albania.

**Graph 4: Results of the Latest PISA Testing in Mathematical, Reading, and Scientific Literacy for Serbia and Selected Countries According to the Value of the ESCS Index (2022, Average) Panel A**
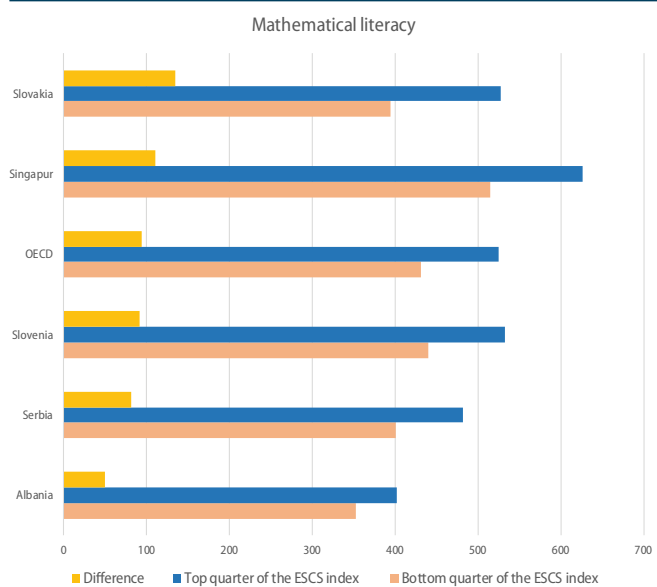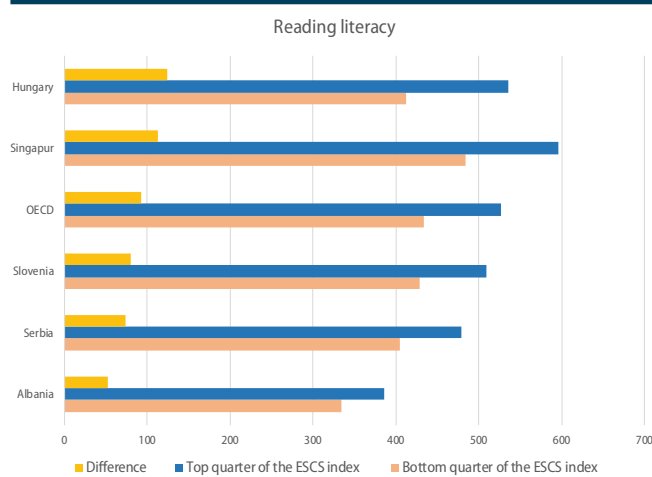


Source: OECD (2023).

When examining the domains of reading and scientific literacy, the gap in results between students from the first quartile and the last quartile according to the value of the ESCS index in Serbia is between 75 and 80 PISA points, similar to the case in mathematical literacy. This confirms the presence of significant inequality in educational outcomes among students in Serbia. In the area of reading literacy, a Serbian student with the worst socioeconomic characteristics achieved an average of 405 points, lagging about two school years behind a student with the best socioeconomic characteristics. At the OECD level, the observed gap in reading literacy is

93 PISA points. Among European countries, the largest difference in results in this area among students at the bottom and top of the distribution according to the ESCS index value was recorded in Hungary, amounting to 124 PISA points. In Singapore, the top-ranked country in the latest PISA testing results, a student from the first quartile achieved 484 points in reading literacy, while a student from the last quartile scored 596 points. For comparison, a Serbian student with the worst socioeconomic characteristics scores about 80 PISA points lower in this domain than a student with similar characteristics in Singapore. Focusing on Western Balkan countries, the largest difference can be observed in Slovenia (80 PISA points), while the smallest difference of 52 PISA points can be seen in Albania.

**Graph 4: Panel B**



Source: OECD (2023). Napome

Finally, in the area of scientific literacy, a Serbian student with the worst socioeconomic characteristics achieved an average of 411 points, which is 77 PISA points lower than a student with the best socioeconomic characteristics. In the case of OECD countries, the difference in the domain of scientific literacy amounts to 96 PISA points. In Europe, the largest difference in results in this area among students at the bottom and top of the distribution according to the ESCS index value was recorded in Slovakia, amounting to 137 PISA points. Observing the top-ranked Singapore, a student from the first quartile scored 504 points in scientific literacy, while a student from the last quartile achieved as much as 611 points. Illustratively, this indicates that a Serbian student with the worst socioeconomic characteristics scores 93 PISA points lower in this domain than a student with similar characteristics in Singapore. Among the Western Balkan countries, again, the largest difference was observed in Slovenia, amounting to 91 PISA points, while the smallest difference recorded in Albania is 48 PISA points.

**Graph 4: Panel C**



Scientific literacy

*Legend: Difference · Top quarter of the ESCS index · Bottom quarter of the ESCS index*
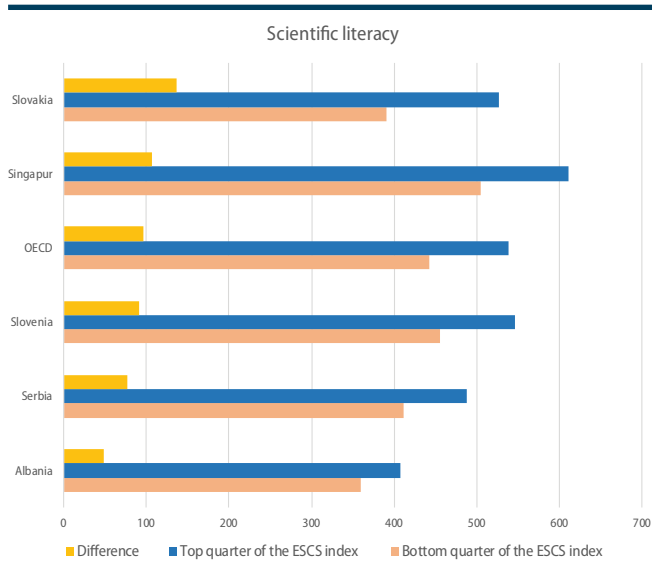
Source: OECD (2023).

In addition to the fairness of the education system, researchers also focus on the proportion of students achieving results below level 2 and those achieving above level 5. The proportion of students scoring below level 2 is particularly important as it indicates the extent of students in a country's education system who can be considered illiterate in a given domain. According to the latest 2022 PISA test results, as many as 43% of students did not reach level 2 in mathematical literacy, and are considered illiterate. A similar observation can be made in the domains of reading and scientific literacy, where the proportion not reaching level 2 is 36%. Thus, according to the 2022 PISA testing, nearly a third of students in Serbia can be considered illiterate, as they do not possess the basic level of knowledge in the domains of mathematical, reading, and scientific literacy. At the OECD level, the proportion of students not reaching level 2 varies between 20 and 25%, depending on the domain. Among Western Balkan countries, the situation is even more unfavourable. In Montenegro, for example, according to the results of the latest PISA testing, as much as 60% of students can be considered illiterate in mathematical literacy (a similar situation is in the other two literacy domains). In Slovenia, the best-ranked Western Balkan country, the proportion of students not reaching level 2 in all three literacy domains is at the OECD country average, around 20%. Singapore, whose students achieve the best results in the PISA testing, records only 8% of students not reaching level 2.

In addition to the proportion, the proportion of students reaching levels 5 and 6 on PISA testing, i.e., students with exceptional results, can also be insightful for analysis. In Serbia, the proportion of these students ranges from 2% in reading and scientific literacy to 4%

in mathematical literacy. The share of students with outstanding results in Serbia is 2-3 times smaller than that observed among OECD countries in all three literacy domains. Looking at the Western Balkans, Slovenia has the highest participation of students with outstanding results (ranging from 20 to 25% depending on the literacy domain observed), while Montenegro records the lowest participation of these students (with only about 1% in all three literacy domains). Singapore, on the other hand, records a value of as much as 40% of students reaching levels 5 and 6 in mathematical literacy, indicating that two-fifths of all students in this country achieved outstanding results in the latest PISA testing (this proportion is also high in the other two domains, around 25%).

**Graph 5: Participation of the Lowest and Highest Performing Students in the Latest PISA Testing in Mathematical, Reading, and Scientific Literacy for Serbia and Selected Countries (2022, in %)**



*Legend: Below level 2 (%) · Levels 5 and 6 (%)*
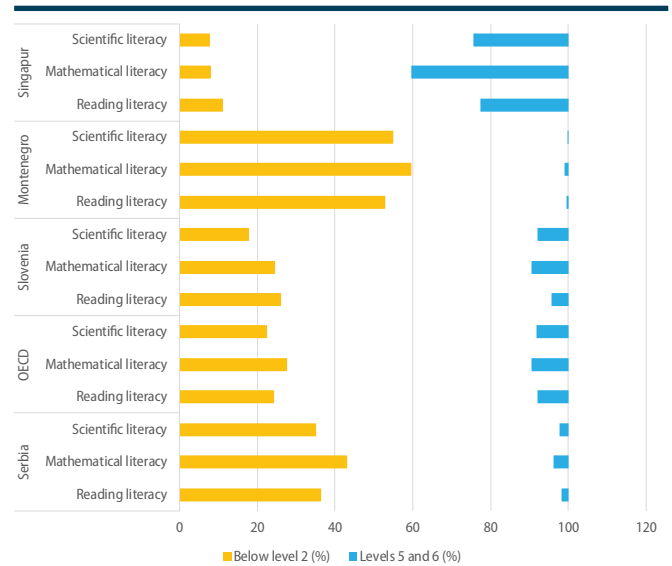
Source: OECD (2023).

Graph 6 shows the change in participation of the lowest and highest performing students in the 2022 PISA testing compared to 2006 for Serbia, Singapore, and OECD countries. Comparing the results of students in the latest and the first PISA testing in which Serbia participated, there appears to be an increased participation of students who do not reach at least level 2 in mathematical and reading literacy (0.5 and 2 percentage points, respectively). This trend of increasing participation of students who lack basic knowledge to be considered literate is also rising at the OECD level in all three domains (the increase ranges from 4.5 to 8 percentage points, depending on the domain). However, in Serbia, there is also a slight increase in the proportion of students achieving outstanding results (an increase of less than 2 percentage points in all three domains), while in the case of OECD countries, this proportion

is decreasing. Singapore shows positive trends in terms of participation of students with the worst and the best results. In 2022 compared to 2009 (the first year Singapore participated), the participation of students scoring below level 2 in this country decreased by 2 to 4 percentage points, while the proportion of students scoring at level 5 and above increased by 4.5 to 7 percentage points, depending on the literacy domain analysed.

**Graph 6: Change in Participation of the Lowest and Highest Performing Students in PISA Testing in Mathematical, Reading, and Scientific Literacy for Serbia, Singapore, and OECD (2022 Compared to 2006, in percentage points)**
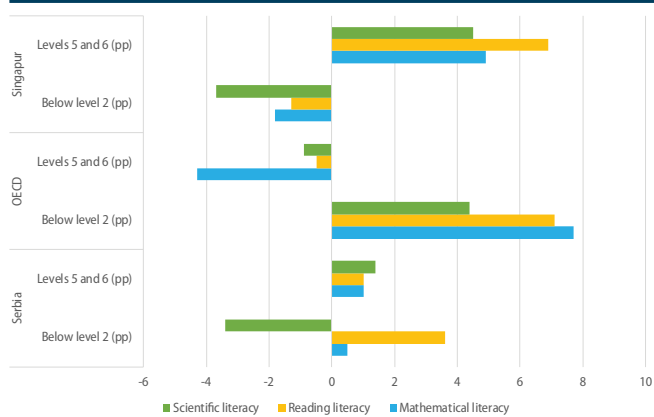


Source: OECD (2023).

## Conclusion

In this Highlight, the performance of students in PISA testing in reading, mathematical, and scientific literacy from 2006 to 2022 was analyzed. In the domain of reading literacy during this period, significant progress was made, as the score of Serbian students improved by 40 PISA points. In the domains of mathematical and scientific literacy, Serbian students in 2022 achieved an improvement of only 5 and 10 PISA points, respectively, compared to 2006. However, these improvements were made during the 2009 and 2012 cycles, after which the level of achieved results remained the same in subsequent PISA testing cycles during 2018 and 2022. The results of the latest PISA testing show that Serbia is positioned in the middle of the ranking list of the 85 participating countries in all three literacy domains. For instance, in the domain of mathematical literacy, with an average score of 440 points, the average Serbian student lags behind by 3.3 and 1.7 school years compared to students from Singapore and Estonia, respectively. A similar lag can be observed in reading and scientific literacy. Among Western Balkan countries, Croatia and Slovenia performed better than Serbia in all three literacy domains, while Montenegro, North Macedonia, and Albania scored lower than Serbia.

Compared to the OECD country average, Serbia scores about 40 PISA points lower, but it performs about 20 PISA points better than the average of Western Balkan countries in the observed literacy domains. When analysing the results based on the distribution according to the value of the ESCS index, significant differences among students in the domains of reading, mathematical, and scientific literacy are observed, indicating substantial inequality in educational outcomes among students in Serbia. For instance, in the domain of mathematical literacy, students from the first quartile scored an average of 400 points in PISA testing, which is 80 points lower compared to the results of students from the last quartile (indicating that in Serbia, students with the worst socioeconomic characteristics are two school years behind their peers with the best socioeconomic characteristics in this domain). It was also highlighted that inequality based on differences in results between students from the first and last quartiles, distributed by socioeconomic status, is not exclusive to Serbia, as this difference in mathematical literacy at the OECD level is even greater, amounting to 95 PISA points. It's also important to note that according to the latest testing results, as many as 43% of students did not reach level 2 in mathematical literacy and are considered illiterate. A similar situation is observed in reading and scientific literacy, where the proportion not reaching level 2 is 36%. Therefore, according to the 2022 PISA testing, nearly a third of students in Serbia cannot be considered literate, as they do not possess a basic level of knowledge in mathematical, reading, and scientific literacy. Additionally, it was pointed out that the proportion of students in Serbia reaching levels 5 and 6 in PISA testing, i.e., students with outstanding results, ranges from 2% in reading and scientific literacy to 4% in mathematical literacy. The share of students with outstanding results in Serbia is 2-3 times smaller than that observed among OECD countries in all three literacy domains.

## References

1. OECD (2023). *PISA 2022 Results (Volume I): The State of Learning and Equity in Education*, PISA, OECD Publishing, Paris.

2. OECD (2012). *PISA 2009 Technical Report*. OECD Publishing, Paris.

3. https://www.oecd-ilibrary.org/education/pisa-2022-results-volume-i_53f23881-en

4. Vuksanović, N. (2015). *The quality of education: notion, measurement and determinants*. Conference Proceedings from the 17th EBES Conference, pp. 602-632.