HIGHLIGHTS

Highlight 1. The Quality of Primary Education in Serbia: an Analysis of Rural-Urban Differences in Students' Academic Achievement

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Introductory considerations

Up to the end of the 1990s, the common practice for comparison of education outcomes, and therefore efficiency of education systems, were mainly based on indicators of education quantity (e.g. an average years of schooling, enrollment rate, drop-out rate etc.), which showed to be inappropriate. Namely, such a practice was not reliable because it does not provide insight into what students actually know and can do, that is, it does not provide much information on education quality. The Programme for International Student Assessment, known as PISA, changed this practice. The idea behind this program lay in testing the knowledge and skills of students through a metric that was internationally agreed upon; linking that with data from students, teachers, and principles of schools. The implementation of this idea enables to understand differences in performances of education systems and then empowers the idea of using the data by education policy makers in order to carry out education system reforms in a way that will improve the quality of education. Since 2000, when the first testing took place, PISA has shown that education systems can provide both high-quality instruction and equitable learning opportunities for all, with supporting academic excellence in an environment that also nurtures students' well-being. PISA shows what countries are doing to support their students and provides an opportunity for countries to learn from each other through an example of good practice. PISA is not only the world's most comprehensive and reliable indicator for measuring students' capabilities, it is also a powerful tool that countries and economies can use to fine-tune their education policies. Therefore, a large number of experts within the OECD participate in producing various reports on the state of education around the world, to share evidence of the best practices and offer targeted support in order to help countries provide the best education outcomes possible for all of their students (OECD, 2019).

An emerging topic in the education economics dealt by many researchers is an analysis of factors that affect education outcomes. An increasing availability of various statistics for this analysis has made this analysis possible in many countries, which is of particular importance for developing countries. A factor important for academic achievement gap among students, which has been increasingly popular with education policy makers, is school location. A large number of studies (e.g. Gamoran and Long, 2006; Wossmann, 2010; Behrman, 2010) indicate that there are variations in the education outcomes between students who attend rural and those who attend urban schools. It is known that on average across OECD countries, students in rural schools score 30 points fewer than students in urban schools. This difference is also later manifested in decreased chances, but also motivation, of rural students to remain in the education system, namely to acquire a university degree. This can be supported by a fact that on average across OECD countries 30% of students in rural schools expect to complete a university degree, compared to 50% of students in urban schools (OECD, 2019).

Having in mind that with regard to PISA results Serbian students lag behind both students from OECD countries and students from the countries in Central and Eastern Europe, exploring factors affecting educational outcomes gains in importance.

The subject of this paper is to analyze the quality of education and explore differences in urban and rural students' achievements in Serbia according to the latest PISA survey and make their comparison with the countries in Central and Eastern Europe. The aim of the paper is to determine the level of differences in educational outcomes of students who attend schools in different regions, with particular emphasis on the importance of the student socio-economic status. The first part of this paper covers a comparative analysis of trends in the quality of education in Serbia according to PISA results from 2003 to 2018. This is followed by an analysis of the differences in education outcomes of rural and urban students, and linking these identified differences with the efficiency and equity of the education system. A separate section of the paper presents a study of differences in the socio-economic status between students who attend rural schools and those who attend urban schools, as a variable to explain the differences in academic achievement. This is followed by a section outlining the characteristics and problems pertaining to education in rural schools.

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Trends in the quality of education in Serbia according to PISA results from 2003 to 2018 and comparison with other countries

PISA enables international comparison of students' academic achievements. PISA testing started in 2000, and is conducted every three years. The main aim of PISA testing is to assess and monitor the extent to which students who completed primary education have acquired the competences essential for continuing education and full participation in society. The central concept is an assessment of 15-year old students in three different literacy domains: (1) reading, (2) mathematics and (3) science. The specificity of this programme is precisely that the quality of education is not measured by assessing whether students can reproduce what they have learned in school, but how well they understand and use information when solving relevant everyday problems. Serbia is participating in PISA since 2003.

With regard to reading literacy domain, a decrease in the variance in achievement of students from Serbia compared to OECD countries has been recorded over time. In 2003, Serbian students on average scored 412 points, 82 points lower than the OECD average[2]. This variance is significant having in mind that, according to PISA testing methodology, 40 points is equivalent of one year of schooling. Thus, it appears that, according to the results achieved, Serbian students lag behind the OECD students on average by two years of schooling in reading literacy. A substantial improvement in reading literacy was achieved in 2009, when students attained on average 30 points more than they did in 2003, reducing the variance from OECD countries by about 40%. However, this is followed by a period of stagnation as the academic achievements of Serbian students in the observed domain hardly changed at all in 2012 and 2018.[3] According to the results of the last PISA test, the average score in reading literacy of Serbian students was 439 points, which is 48 points behind the OECD average. According to this most recent assessment, students from Serbia lag behind their peers from OECD countries by an average of 1.2 years of schooling.

Figure 1. Student literacy scores for Serbia and OECD average, 2003-2018
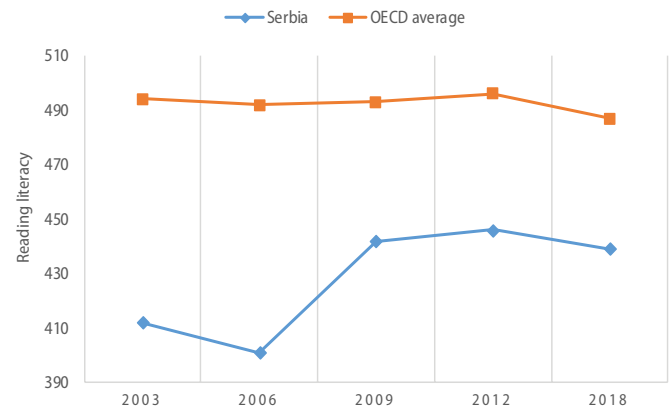
Source: OECD-based author calculations

The mathematical literacy results indicate a gradual decline in the education quality gap between students from Serbia and OECD countries. According to the 2003 results, Serbian students averaged 437 points, down 63 points from the OECD average. This result showed that students from Serbia lagged behind their peers from the most developed countries in the world by slightly more than a year and a half of schooling. In subsequent PISA testing cycles, students from Serbia achieved results indicating an improvement in mathematics. However, these improvements are not significant, as the effect of this improvement in academic achievement is equivalent to the only one third of a year of schooling. According to the 2018 PISA testing, students from Serbia on average scored 448 points, which is still 41 points behind the OECD average. It should be emphasized that the academic achievement of students in mathematical literacy in the last PISA testing cycle was almost identical to the achievement in previous years, and that the decline in the gap from OECD countries can be explained by a decline in mean performance of this group of countries over time.

Figure 2. Mathematical literacy student outcomes for Serbia and OECD average, 2003-2018
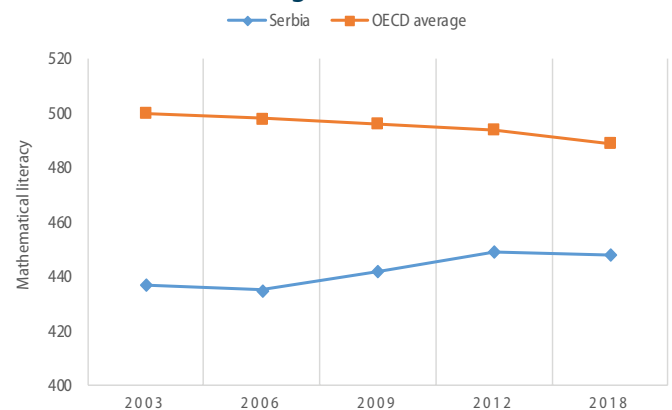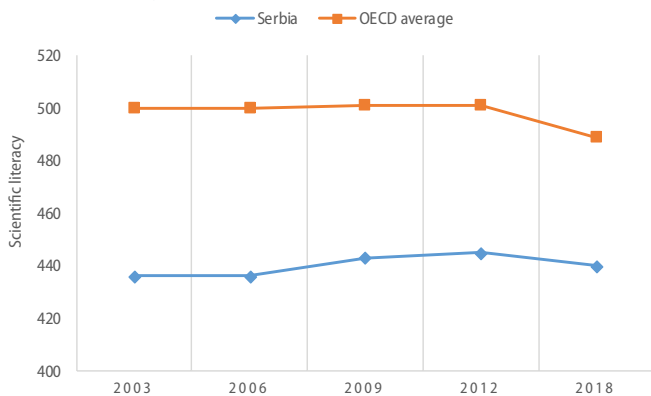

Source: OECD-based author calculations

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2 The average of OECD countries, not all countries participating in PISA testing.

3 Serbia did not participate in PISA testing in 2015.

In scientific literacy, Serbian students attained the results similar to those attained in mathematical literacy domain. According to the 2013 PISA results, students in Serbia achieved a mean score of 436 points, which is 64 points behind the OECD average. Significant improvements in scientific literacy of Serbian students are not noticeable, since this increase amounted to a few points only per each PISA testing cycle. The decline in the variance from the OECD average is also not noticeable on a large scale. According to the results of the 2018 PISA testing, students from Serbia scored 440 points, which is about 50 points fewer than their peers from the most developed countries in the world. Hence, according to the last PISA test results, students from Serbia lag 1.3 years of schooling behind students from OECD countries. Similar to mathematical literacy, the drop in the variance in scientific literacy cannot be explained by a significant improvement in the academic achievement of Serbian students, but is rather the result of a decline in the mean performance in OECD countries.

Figure 3. Student scientific scores for Serbia and the OECD average, 2003-2018

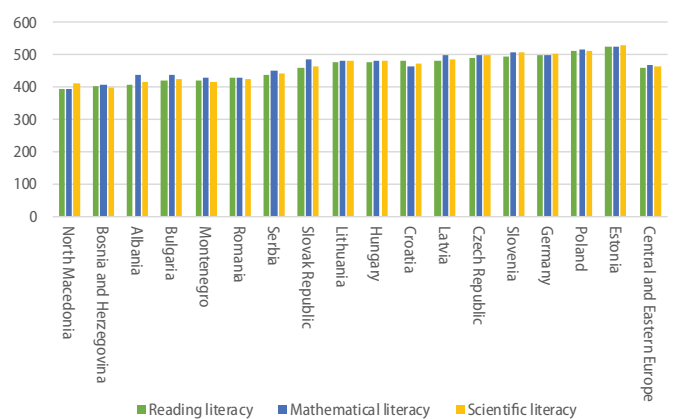Source: OECD-based author calculations

Comparing Serbia's education outcomes with OECD countries is important because the OECD is the organization which conducts PISA testing. However, given the significant differences in the level of development between Serbia and OECD countries, it is necessary to include countries with similar levels of development in the comparative analysis.

If observed the results of the last PISA test conducted in 2018, Serbia is one of the countries in Central and Eastern Europe whose students achieve below-average results in reading, mathematics and science. According to the results achieved, students in Serbia scored about 20 points fewer in all three literacy domains compared to the average of the countries in this region. Countries in Central and Eastern European whose students performed below the average include, in addition to Serbia, North Macedonia, Bosnia and Herzegovina, Albania, Bulgaria, Montenegro and Romania. Students from Slovakia, Lithuania, Hungary, Croatia, Latvia, the Czech Republic, Slovenia, Germany,[4] Poland and Estonia performed above the average. The two worst ranked countries in the observed region in terms of education quality were North Macedonia and Bosnia and Herzegovina. Students from these two countries on average scored about 50-70 lower than the average of Central and Eastern Europe countries, depending on the domain observed. Two best performing countries of this region were Poland and Estonia. Students from these countries scored 50-60 points above the average, depending on the observed literacy domain. Moreover, average results of students in Poland and Estonia are also above the OECD average, indicating the high quality of education systems in these countries.[5]

It is also important to note the fact that a smaller percentage of students in Serbia, compared to the average of Central and Eastern European countries, attain at Pisa testing the baseline level of proficiency (level 2 or above) or highest levels of proficiency (level 5 or 6), in any of the three assessment domains. In Serbia, about 60% of students in all three literacy domains attained at least level 2, which is about 10 percentage points behind the average of the countries in this region. Also, in Serbia, only 2-5% of students, depending on the domain observed, scored at level 5 or 6, which is twice less than the average of the countries of the observed region.

Figure 4. Student, mathematical and scientific literacy scores for Central and Eastern European countries in 2018

Source: OECD-based author calculations

4   Germany is included in the analysis as a reference country, even though economically-politically it belongs to the Western Europe region.
5   According to the 2018 PISA results, in Europe, students from Estonia and Finland attained best results, while in the world, students from China and Singapore performed the best.
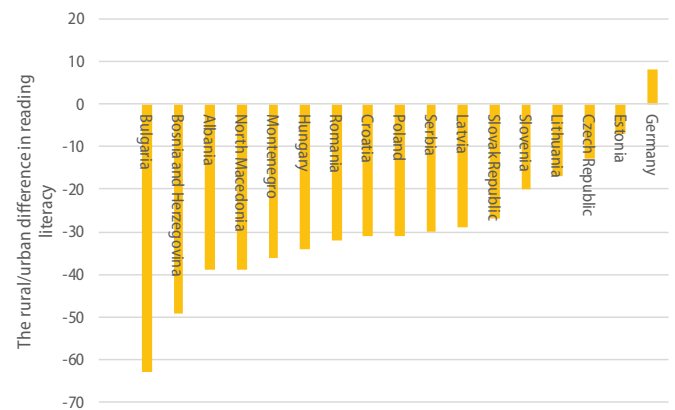
Rural-urban differences in students' academic achievement: Serbia and other countries[6]

Rurality has been defined based on different demographic, geographic and socio-economic factors. [7] An analysis of rural education requires a clear understanding of the context in which rural schools operate. While differences among rural areas can be significant, the following traits according to the OECD methodology cab be used to analyze differences between rural and urban areas: (1) geographical distance, (2) small population size, (3) dwindling share of the population, (4) low socio-economic status, (5) ethnical homogeneity. Rural areas usually tend to be at a significant geographical distance from other populated centers. This significantly affect the capacities of these areas to hire, retain and develop professionals. Also, rural areas are thinly populated. Accordingly, when delivering services, scarcely-populated areas find it difficult to reach a critical mass and take advantage of economies of scale, resulting in fewer or costly services. Similarly, low fertility rates and high rural out-migration have contributed to dwindling population in rural areas. For instance, across OECD countries, only 20% of the total population in 2018 lived in rural areas, while this share was about 50% only seventy years earlier. A particular challenge is a change in demographic and age composition of rural population. An increasing ratio of the elderly to the working population create challenges in producing sufficient resources to provide for social needs and public services. Consequently, rural areas tend to be poorer than urban areas, especially in developing countries. In rural areas, therefore, the capacity to provide or pay for quality services is constrained. It is also true that rural areas are ethnically more homogeneous compared to urban areas, although in recent years there has been an increase in ethnic diversity as a result of international migration (Echazarra and Radinger, 2019). These differences are also significantly shaped by differences in the education system, which are reflected through rural and urban schools.

The 2018 PISA results indicate that in reading literacy in Serbia, students who attend rural schools scored on average 30 points lower than students who attend urban schools. This performance gap is significant because it indicates that students from rural areas lag behind their peers from urban areas by almost a year of schooling, even though all schools belong to the same education system. Differences, although their levels vary, are also noticeable in other Central and Eastern Europe countries. The greatest negative performance gap between rural and urban students is recorded in Bulgaria and Bosnia and Herzegovina – 63 and 49 points, respectively. The smallest gap in student performance in PISA testing in reading literacy can be observed in the Czech Republic and Estonia, with 13 and 7 points, respectively. The only country in the analyzed region where a positive difference in academic achievement between rural and urban students was observed is Germany. In Germany, students who attend urban schools score on average 8 points lower than their peers who attend rural schools.

Figure 5. Differences between rural and urban schools in reading literature for Central and Eastern European countries in 2018

Source: OECD-based author calculations

A potential explanation for these differences in rural-urban students' performance can be the fact that the delivery of education services in rural areas is characterized by a lack of critical mass of students, that affect their price and/or quality negatively. Low population density means that rural areas find it more difficult to take advantage of economies of scale, which increases the communication, transport and other costs. As a result, many rural families deal with unavailable, inadequate or costly services, especially in those sectors where government spending is marginal (Asthana et al. 2003).

Differences in education outcomes between students who attend rural schools and those who attend urban schools have a negative impact on the efficiency and equity of education systems. In terms of efficiency, a negative association can be observed between the level of variance in the performance of students in reading from rural and urban schools and the average academic achievement of students in reading literacy at the country level. This means that countries with greater rural-urban

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6 The focus of the 2018 PISA testing was on reading, so the analysis below is limited to this literacy domain. Certainly, variations in both mathematical and scientific literacy are similar.

7 Definition of rural and urban schools according to OECD methodology is based on the population size in a certain region. Thus, schools located in a community with less than 100 000 residents are rural, while schools located in a community with more than 100 000 residents are urban. This definition for distinction between rural and urban schools was applied in this paper. Also, having this in mind, rural schools in this paper does not only refer to schools in villages, but also in small and medium towns.

differences in students' academic achievement score worse in reading literacy in PISA tests. This indicates that countries which are not successful in closing the rural-urban gap have less effective education systems.

Figure 6. Relationship between the difference in educational attainment of students from rural and urban schools and the total educational attainment in the field of reading literacy for Central and Eastern European countries in 2018
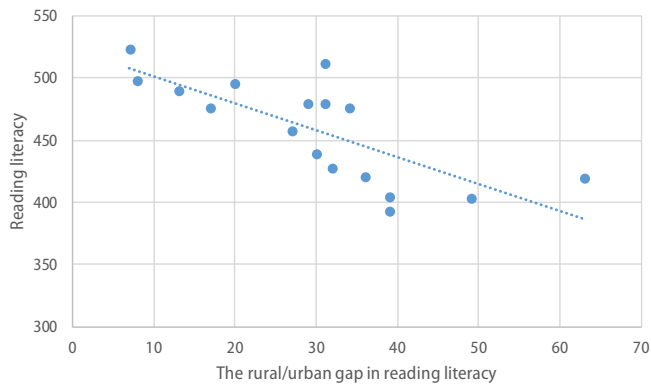
Source: OECD-based author calculations

Rural-urban differences in students' education outcomes are also reflected in the equity of education systems. There is a noticeable positive relationship between the level of variance in the performance of students in reading literacy from rural and urban schools and the percentage of variance in reading literacy, explained by differences in students' socio-economic status[8] at the country level. That is, countries where the differences in students' academic achievement between rural and urban schools are greater also have a higher percentage of variance. In fact, countries which are not successful in closing the rural-urban gap also have less equitable education systems.

A high quality education system, both in terms of efficiency and equity, therefore, entails the provision of a high standard of education, regardless of the geographical location of the school which the student attends.

A certain number of studies (e.g. Young, 1998; Ramos et al., 2012) shows that differences in academic achievement among rural and urban students cannot be explained by school location per se, but differences in students' socio-economic status.[9] In other words, the different socio-economic profiles of students attending rural and urban schools are in fact a factor explaining variation in students' academic achievement.

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8   A higher percentage of variance in a specific assessment domain which ix explained by differences in students' socio-economic status shows less equitable education system.

9   Socio-economic status comprises parental occupational status, parental educational attainment and family material, educational and cultural resources.

Figure 7. Relationship between difference in educational attainment of students from rural and urban schools and the percentage of variation in educational attainment explained by differences in socio-economic status of students in the field of reading literacy for Central and Eastern European countries in 2018
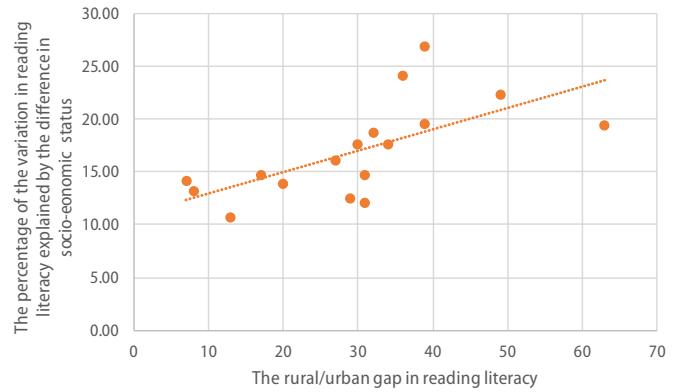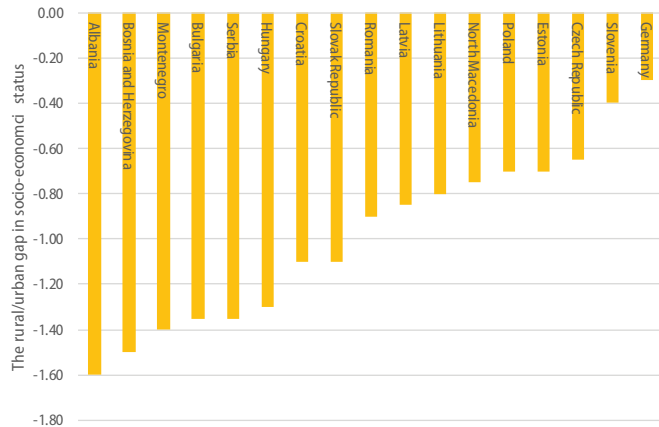

Source: OECD-based author calculations

Differences in students' socio-economic status as an explanation for differences in rural-urban students' achievement: Serbia and other countries

In Serbia, there is a significant difference in the socio-economic status between students who attend rural and those who attend urban schools. Specifically, according to the 2018 PISA results, the index of economic, social and cultural status of a student's family, created within the OECD database, on average, is lower for students who attend rural schools by about 1.4[10] compared to students who attend urban schools. This variance is significant, given that the standard deviation of the index of economic, social and cultural status of a student's family is 1. This indicates that students who attend rural schools in Serbia have a significantly worse socio-economic profile. A similar trend can be observed in all countries in Central and Eastern Europe, although these differences vary from country to country. With regard to countries in the region, Bulgaria and Hungary are countries most similar to Serbia in terms of differences in socio-economic status of students from rural and urban areas. The biggest difference in the socio-economic status of students from rural and urban schools is evident in Albania and Bosnia and Herzegovina, where this variance is 1.6 and 1.5, respectively. The smallest difference in the index of economic, social and cultural status of students from rural and urban schools is recorded in Slovenia and Germany, 0.4 and 0.3, respectively.

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10 Difference in the index of economic, social and cultural status of a student's family is absolute.
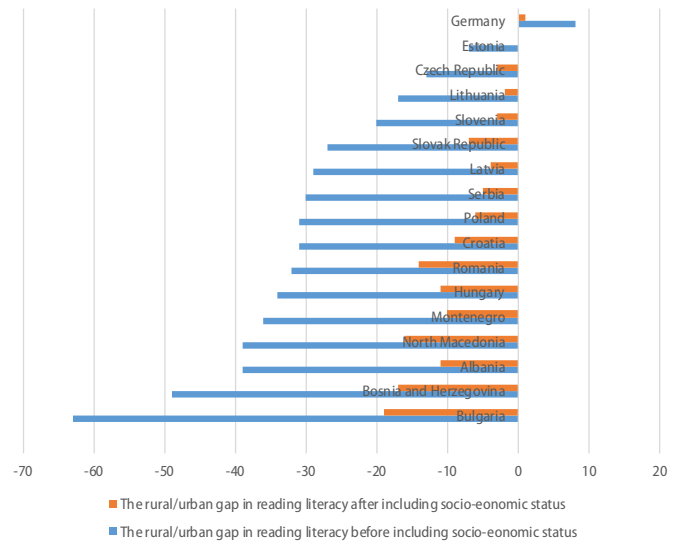
Figure 8. Differences in socio-economic status of students from rural and urban schools in Central and Eastern Europe in 2018

Source: OECD-based author

After accounting for students' socio-economic status in the analysis it is observed a significant decline in the rural-urban differences in students' academic achievement in reading literacy, i.e., the students' socio-economic status significantly explains these differences. When the differences in students' socio-economic profile are taken into account, the rural-urban gap is significantly narrowed in all countries in Central and Eastern Europe. In Serbia, this reduces the achievement gap in reading literacy by slightly over 80%, from 30 to only 5 points. The same can be observed in other countries. In Bulgaria and Bosnia and Herzegovina, for example, which have the largest rural-urban gap, after taking into account the socio-economic status, this variance is reduced by 40 and 30 points, respectively, i.e. by about 70%. In Estonia and Germany, where the rural-urban gap is least pronounced, when the students' socio-economic status is taken into account, this difference disappears. What can be observed, however, is that, despite the significant reduction in differences in achievement in reading literacy among students from rural and urban areas, negative variances persist in many countries. That is, students who attend urban schools continue to achieve PISA testing results which are slightly better that those achieved by students who attend rural schools. The student's socio-economic status, therefore, is a factor that can largely explain, but not completely eliminate, the variances in education outcomes of students who attend schools in different regions. This stems from the fact that, in addition to school characteristics, student's individual characteristics and family characteristics are also important in the analysis of factors which impact academic achievement.

Figure 9. Difference between rural and urban schools in the field of reading literacy for Central and Eastern European countries in 2018 before and after inclusion of socio-economic status of students

Source: OECD-based author calculations

Differences in school location may, however, be associated with the different expectations of students on continuing their education, i.e. studying further to acquire a university degree. The gap between rural and urban schools is also reflected in the smaller percentage of students who expect to remain in the education system after completing secondary education. The ratio of expectations between rural and urban students with regard to higher education in all Central and Eastern European countries is less than 1, indicating that a smaller percentage of students attending rural schools expect to continue their education. In Serbia, according to the 2018 PISA testing results, the ratio of the percentage of rural students to the percentage of urban students who expect to go on to study at university is 0.60. The similar ratio is observed in Hungary and Montenegro. Among Central and Eastern Europe countries, the worst ranked are Albania and Romania, in which this ratio is 0.45 and 0.50, respectively. The best ranked countries in the observed region are Slovenia and Estonia, in which this ratio is 0.75 and 0.77, respectively.[11]

However, these differences in the expectations of rural and urban students with regard to continuing education can be explained by differences in students' socio-economic profile. Specifically, the analysis indicates that accounting for students' socio-economic status significantly increases the ratio of the percentage of rural students to the percentage of urban students who expect to go to a university. Thus, in the case of Serbia,

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11 A smaller ratio of the percentage of rural students to the percentage of urban students who expect to go to a university indicates lower social mobility.

the value of this ratio increases from 0.60 to 0.84, which significantly reduces the differences in expectations among rural and urban students. The same can be observed in other countries in Central and Eastern Europe. However, this gap, after taking into account socio-economic differences, persists suggesting that other aspects of rurality, such as geographical barriers and a lack of highly-skilled jobs in rural areas, may also play a role. Some studies (e.g. Bauch, 2001, Alpe, 2012) show that the availability of various opportunities for continuing education in rural areas may influence students' motivations and choices. While urban areas tend to have more diversified labor market and often concentrate universities and other tertiary institutions that provide opportunities to acquire required qualifications. Moreover, the levels of educational attainment are typically lower among parents of children in rural areas, which can affect student's motivation to continue education.

This result is important because, considering the fact that the education system facilitates the ascent up the social ladder, poorer academic achievements and a weaker motivation to further their education for students from rural schools will result in these students reproducing their current socio-economic status in the future.

Figure 10. Ratio of expectations of students from rural and urban schools regarding the enrollment of faculties for Central and Eastern European countries in 2018 before and after inclusion of socio-economic status of students
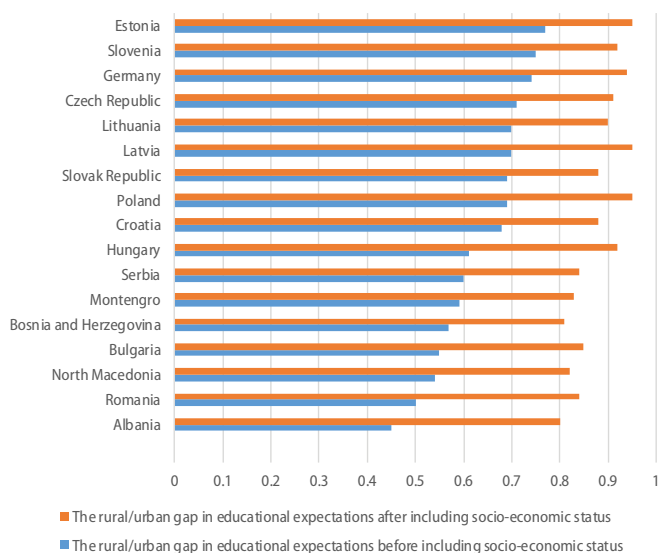

Source: OECD-based author

Characteristics and problems of education in rural schools

Rural schools are often viewed from a negative perspective. Their geographic isolation, small population size and socio-economic composition are believed to increase their chances of suffering from (1) inadequate infrastructure, (2) a lack of quality teachers, and (3) limited educational resources. However, as certain reports (e.g. OECD, 2016; OECD, 2019) show, these problems are far from universal, and urban schools can also face these issues, but with a less intensity.

Class size is considered to be a factor impacting student's academic achievement. A number of studies have shown that students who attend smaller classes on average achieve better PISA test results. One of the most commonly observed features of rural education is the fact that schools and classes are smaller in size, and consequently a student-teacher ratio is low.

In Serbia, the student-teacher ratio in rural schools is by 4.6 lower than in urban schools. Difference in the number of students per teacher is Serbia, together with Bosnia and Hercegovina, North Macedonia, Estonia and Latvia, and Montenegro, is among the highest. Moreover, in almost all countries in Central and Eastern Europe the student-teacher ratio is lower in rural schools than in urban schools, indicating smaller classes in rural areas. The only countries which deviate from the observed pattern are the Czech Republic and Albania. In the Czech Republic, there is no difference in the student-teacher ratio, while this difference is positive in Albania. Thus, in the Czech Republic, the class size in rural and urban schools is the same, while classes are larger in urban areas in Albania.

Figure 11. Student / teacher gap between rural and urban schools in Central and Eastern Europe in 2018
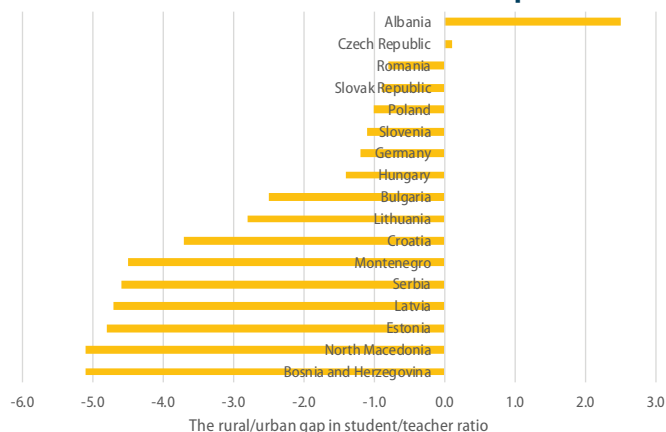
Considering that the classes in rural schools are smaller, and that academic achievement of students from these schools is worse on average, it can be concluded that other factors determine results in education systems. It has been demonstrated in literature (e.g., Lazear, 1999; Checci, 2008; Benhabit et al., 2011) that the class size depends on the student's propensity to learn. In other words, the greater the students' propensity to learn, the larger the class size; the greater the students' propensity for disruptive behavior, the smaller the class size. This claim is significant because it can explain the fact that empirical research has found it difficult to determine the negative relationship between the quality of education, as measured by the students' academic achievement, and class size.

The small size of rural areas makes the provision of education in these areas much more expensive per capita than in urban areas and implies high fixed costs to maintain small schools with low student-teacher ratios. Also, education systems in terms of school funding are based on allocations for current expenditure that are primarily based on student enrolment, which do not sufficiently reflect the higher costs of delivering comparable programmes and services in low density and remote environments. Consequently, the small size of rural schools furthermore means that budgets are less stable and predictable, and that changes in enrolment will lead to great changes in costs per student. Rural schools and authorities face considerable fiscal pressures to avoid school closures when enrolments decline. Also investments in infrastructure and maintenance may be more difficult for small rural communities where such funds are distributed on a competitive basis. At the same time, the higher per-student cost in rural schools might direct financial resources away from other priorities due to limited budgets (Mathis, 2003; Showalter et al., 2017).

One could expect differences in the material resources available to rural schools. However, school principals' reports for the last PISA test in 2018 indicate that this is not always the case. School principals reported, as part of the PISA testing, on the various types of material resources available to the school, relating to (1) the quantity and quality of educational material and (2) the quantity and quality of physical infrastructure. Also, based on various responses from school principals, OECD experts have created an index of reading-specific resources.

In Serbia, according to school principals, urban schools are better equipped in terms of quantity and quality of educational material than rural schools, while there is no difference in the quantity and quality of physical infrastructure. Central and Eastern European countries Albania, Bosnia and Herzegovina, Montenegro, Romania and Northern Macedonia are in a similar position. In these countries, school principals report that rural schools are not as well-equipped as urban schools, with regard to most or all types of available material resources. In these countries, rural students also lag significantly behind urban students in terms of academic achievement. Bulgaria, the Czech Republic and Lithuania are some countries in Central and Eastern Europe where school principals report that urban schools are better equipped only in terms of the quality of educational materials. In a number of countries in this region, such as Estonia, Croatia, Poland and Slovakia, there is no difference in the material equipment available to rural and urban schools. However, according to responses from school principals, in Latvia, Hungary, Germany and Slovenia, rural schools are generally better equipped than urban schools. In these Central and Eastern European countries, the difference in academic achievement of students who attend rural schools and those who attend urban schools is not major. Therefore, student's socio-economic status, combined with the availability of material resources can largely explain the existence of differences in the education outcomes of students coming from different regions.

Table 1. Differences in availability of material resources between rural and urban schools for Central and Eastern European countries in 2018 in the opinion of the school principals

Country	Quantity of educational resources	Quality of educational resources	Quantity of physical infrastructure	Quality of physical infrastructure	Index of specific resources regarding reading literacy
Albania	urban	urban	urban		urban
Bosnia and Herzegovina	urban	urban	urban	urban	urban
Bulgaria					urban
Montenegro	urban	urban	urban	urban	urban
Czech Republic		urban			
Estonia					
Croatia					
Latvia	rural		rural	rural	rural
Lithuania		urban			
Hungary			rural	rural	rural
Germany					
Poland					
Romania	urban	urban			urban
North Macedonia	urban				urban
Slovak Republic					
Slovenia		rural	rural	rural	rural
Serbia	urban	urban			urban

- urban schools are better equiped than rural schools
- no difference between rural and urban schools
- rural schools are better equiped than urbanl schools

6. Conclusion

The subject of this paper was to analyze the quality of primary education and explore differences in achievement of urban and rural students in Serbia according to the latest PISA testing and make their comparison with the countries in Central and Eastern Europe. The aim of the paper was to determine the level of differences in education outcomes of students who attend schools in different regions, with particular emphasis on the importance of students' socio-economic status.

The analysis shows that according to 2018 PISA test results in reading literacy in Serbia, students who attend rural schools scored on average 30 points lower than students who attend urban schools. This performance gap is significant because it indicates that students from rural areas lag behind their peers from urban areas by almost a year of schooling, even though all schools belong to the same education system. Differences, although their levels vary, are also noticeable in other Central and Eastern Europe countries.

The analysis shows that differences in education outcomes of rural and urban students have a negative impact on the efficiency and equity of education systems. In terms of efficiency, a negative association can be observed between the level of variance in the performance of students in reading literacy from rural and urban schools and the average academic achievement of students in reading literacy at the country level. This means that countries with greater differences in academic achievement between rural and urban students score worse on reading literacy in PISA tests. This indicates that countries which are not successful in closing the rural-urban gap have also less efficient education systems. The analysis also shows that differences in rural-urban students' education outcomes are also reflected in the equity of education systems. There is a noticeable positive relationship between the level of variance in the performance of students in reading literacy from rural and urban schools and the percentage of variance in reading literacy, explained by differences in the students' socio-economic status at the country level. In fact, countries which are not successful in closing the rural-urban gap also have less equitable education systems.

In Serbia, there is a significant difference in the socio-economic status between students who attend rural schools and those who attend urban schools. Specifically, according to the 2018 PISA test results, the index of economic, social and cultural status of a student's family, created within the OECD database, on average, is lower for students who attend rural schools by about 1.4 compared to students who attend urban

schools. After accounting for students' socio-economic status in the analysis it is observed a significant decline in the rural-urban differences in students' academic achievement in reading literacy, i.e., students' socio-economic status significantly explains these differences. When the differences in students' socio-economic profiles are taken into account, the rural-urban gap is significantly narrowed in all countries in Central and Eastern Europe. In Serbia, this reduces the achievement gap in reading literacy by slightly over 80%, from 30 to only 5 points. The same can be observed in other countries. What can be observed, however, is that, despite the significant reduction in achievement in reading literacy among students from rural and urban areas, negative variances persist in many countries. That is, students who attend urban schools continue to achieve PISA testing results which are slightly better that those achieved by students who attend rural schools. The student's socio-economic status, therefore, is a factor that can largely explain, but not completely eliminate, the variances in education outcomes of students who attend schools in different regions.

Differences in school location may, however, be associated with the different expectations of students on continuing their education, i.e. studying further to acquire a university degree. The gap between rural and urban schools is also reflected in the smaller percentage of students who expect to remain in the education system after completing secondary education. The ratio of expectations of rural and urban students with regard to higher education in all Central and Eastern European countries is less than 1, indicating that a smaller percentage of students attending rural schools expect to continue their education. In Serbia, according to the 2018 PISA testing results, the ratio of the percentage of rural students to the percentage of urban students who expect to go on to study at university is 0.60.

This result is important because, considering the fact that the educational system facilitates the ascent up the social ladder, poorer academic achievements and a weaker motivation to further their education for students from rural schools will result in these students reproducing their current socio-economic status in the future.

If material resources analyzed, in Serbia, according to school principals, urban schools are better equipped in terms of quantity and quality of educational material than rural schools, while there is no difference in the quantity and quality of physical infrastructure. Central and Eastern European countries Albania, Bosnia and Herzegovina, Montenegro, Romania and Northern Macedonia are in a similar position. In these countries,

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school principals report that rural schools are not as well-equipped as urban schools, with regard to most or all types of available material resources. The analysis shows that in these countries, rural students also lag significantly behind urban students in terms of academic achievement. In fact, the analysis indicates that student's socio-economic status, combined with the availability of material resources can largely explain the existence of differences in academic achievement of students coming from different regions. This suggests that in order to reduce the observed differences, it is necessary to define regional development policy measures that would reduce disparities in rural-urban students' socio-economic status. Also, given the bigger challenges teachers face in rural schools, with regard to the availability of different educational and infrastructural resources, some forms of stimulation for teachers who teach in rural areas can be introduced.

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