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ORIGINAL PAPER

Quality education as a determinant of progress towards the Sustainable Development Goals

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Abstract:
The quality of education is recognized at the international level as an important part of the structural factors that support sustainable development, both as a specific goal of the Agenda 2030 and as a cross-cutting element that affects a majority of the global goals set at that level. It is recognized that education as a key factor in social and economic transformation and one of the most important investments with a high return. The study aims to highlight the role that achieving a high level of education plays in strengthening a more aware and resilient global society, by assessing its role through a comparative analysis between Romania and the European average. The recent data confirm that there is a gap between Romania and the European Union average. The interpreted results showed us that the average score of a Romanian student is 428 points, lower than both the European Union average and the OECD average, with over 40% of students below the minimum level of proficiency in all domains. These gaps reveal the constraints that affect human capital and highlight the necessity of systemic measures that aim to support an improvement in educational performance and reduce inequalities between social classes. The role that education plays in sustainable development is a complex process that aims to support individuals' capacities to make informed decisions and responsible actions, both for the present and for future generations. The comparative studies carried out at the European level highlight that a third of the member states, including Romania, are still below the optimal level of performance regarding this domain. Therefore, under these circumstances, closing the educational gap between Romania and the European Union average is a key element that can support an acceleration of progress regarding sustainable development goals.

Keywords: *Quality education, sustainable development, SDG 4, human capital, educational performance.*

JEL Classification: I21, I25, Q01

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1. Introduction

Educational performance continues to be crucial in the process of sustainable development. Not only access to learning opportunities but also the competencies gained and used throughout the whole lifetime are covered within the term. It is more than just academic success since such skills as comprehension of the complex processes and issues and the ability to participate economically and socially and take informed decisions matter as well. Under the 2030 Agenda, the fourth sustainable development goal (SDG 4) is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

The connection between education and sustainable development implies consideration of both learning results and the equal opportunities provided by the country. Participation in the process of formal education cannot serve as the decisive factor for assessing whether a learner gains required competencies. Moreover, national averages give partial information when there are large inequalities in achieving particular results. Thus, the evaluation of the educational performance includes not only performance but also the ability to achieve a minimum standard of competencies and educational inequalities.

Comparing the performance in Romania to the average EU level, the latter becomes the suitable framework for addressing those issues. Gaps in the results presented in the data used for this study indicate problems concerning the capability of the education system to develop competencies in learners. Such gaps need to be considered not only as differences in test scores but also as obstacles to the development of human capital and achievement of sustainable development goals. Knowing their nature and characteristics becomes crucial for understanding in what areas improvements in education should be done.

Thus, the main problem addressed by the current research is the difference between the educational performance of Romania and the European reference level discussed in the context of the goals of quality education and sustainable development. While educational attainment and learning outcomes cannot be considered interchangeable terms, the latter become the key focus in the analysis, thus being the core of the research design. Expanding educational participation and improving the quality of learning are the two sides of educational advancement.

The research aims to evaluate the educational performance of Romania in comparison with the average level in Europe and discuss implications of the identified gaps for human capital and for the achievement of SDG 4. The focus of the analysis is made on the levels of achievements in math, reading and science and the percentage of students scoring below minimum competency levels. In addition to these parameters, the analysis is supported by the indicators of educational participation and attainment chosen selectively.

To investigate the research issue, two research questions have been formulated. They are the following: how the educational performance of Romania compares to the European Union average and what are the implications of these differences for the progress towards quality education and sustainable development of the country? Descriptive and comparative methodological approach is used to identify the magnitude and characteristics of these differences. Interpretation makes the difference between educational results and their larger implications. No causal connection is drawn between education and sustainable development.

The contribution of the research into the literature comes from the integration of performance gaps and selectively chosen educational indicators into a single analytical framework based on SDG 4. The approach allows connecting the analysis of learning outcomes to the goal of developing human capital and discuss possible policy priorities concerning both of these aspects.

2. Theoretical Background and Literature Review

In this regard, the link between education and sustainable development consists not only of the acquisition of basic skills but also the ability to engage with complex social, economic, and environmental issues. For this reason, education for sustainable development (ESD) entails much more than providing information related to sustainability. UNESCO (2017) presents this idea when linking the three learning dimensions: cognitive, socio-emotional, and behavioural, since knowledge, values, and action are different aspects of learning.

Such an approach requires the separation of quality education as a development goal from education for sustainable development as an educational concept. While quality education is focused on inclusiveness, equity, and effectiveness of learning, ESD deals with the competences necessary to cope with sustainability challenges. Despite some similarities, these ideas cannot be confused. UNESCO's framework considers the relationship between education and Sustainable Development Goals, while identifying the specific learning objectives and educational activities which make it possible to integrate sustainability into teaching and learning (UNESCO, 2017).

It is important to note that the issue of foundational competencies is relevant in such a framework. Reading, mathematics, and science provide the tools needed for information processing, analysis, and problem solving. However, success in these areas does not mean that a person has all the necessary knowledge and engages in responsible behaviour. The inclusion of socio-emotional and behavioral dimensions by UNESCO implies that ESD involves learning outcomes other than cognitive achievement. Therefore, educational assessment results could be used to analyze the basics of learning but not to conclude whether or not learners have all the competencies (UNESCO, 2017).

The significance of education in economic terms extends beyond participation in schools but also through knowledge and skills acquired by individuals. This distinction forms the crux of the theory of Hanushek & Woessmann (2008), who examine the role of cognitive skills in economic development. The critical review by Hanushek and Woessmann (2008) raises the problem of using years of education as a sufficient measure of human capital due to different levels of achievement despite identical periods of educational participation. In turn, educational quantity and educational quality denote two distinct sides of human capital accumulation.

Hanushek and Woessmann (2008) point out that there exists abundant evidence for the effect of cognitive skills on individual earnings, income distribution, and economic growth. Such an approach makes it possible to place learning outcomes in the core of the relationship between education and economic performance rather than consider increased school participation to be automatically beneficial in terms of economics. Therefore, one can consider the case for using achievements as a measure of contribution of education to economic development.

The differentiation between achievement and attainment has significant implications for methodology. Educational attainment indicators are the measurements of qualifications or attained level of education, while achievement measurements reveal

performance in particular fields. None of these measurements can substitute each other completely. The results reviewed by Hanushek and Woessmann (2008) make it possible to propose an analysis, which uses both attainment and achievement measures to assess human capital.

The economic meaning of cognitive performance needs to be compatible with the research design used. The existence of evidence in the body of literature on the relationship between skills and economic development, however, cannot itself confirm causality by means of a simple comparison of achievement scores. For the current study, human capital approach provides an appropriate perspective: educational achievement denotes competence differences, which can be economically analyzed in the context of existing literature.

Average performance is insufficiently informative about the dynamics of education because it does not show how educational achievements are distributed within the student population. In the study of equity in PISA 2022, the OECD found the persistence of the link between students' socioeconomic status and their performance. In OECD countries, disadvantaged students were significantly more likely than advantaged students to fall short of the minimal proficiency standard in mathematics (OECD, 2023a).

Specifically, the issue of socioeconomic inequalities is particularly important for the case of Romania. According to the OECD country note, students who belonged to the most advantaged socioeconomic quartile performed 132 points higher than those who belonged to the least advantaged quartile in mathematics in PISA 2022. At the same time, the share of performance variance attributable to students' socioeconomic status was 26% in Romania against the OECD average of 15% (OECD, 2023b). These results suggest a comparatively strong relation between the two factors under analysis although they cannot be considered as the measure of the causal influence of families.

Another aspect of the discussed issue is the inequality in the distribution of low-performance levels. The OECD found that the difference in the proportion of low-performing mathematics students between advantaged and disadvantaged groups exceeded 50 percentage points in Romania (OECD, 2023a). This information indicates that the problem of national education concerns not only the average performance of students but the unequal distribution of educational challenges among different groups of children.

These considerations provide a justification for the joint analysis of the aspects mentioned above. The national average cannot mask significant disparities in the opportunities and performance of specific groups of children. At the same time, assessing educational disadvantage requires taking into account the actual competencies acquired by students and not their educational engagement.

The extant literature suggests using an analytical framework based on three complementary dimensions: competencies achieved, distribution of educational results and their connection to sustainable development. In particular, Hanushek and Woessmann (2008) explain the economic logic of considering educational results as part of human capital. Equity analysis by the OECD stresses the necessity of considering differences between different socioeconomic strata in terms of the results attained. Furthermore, UNESCO (2017) considers education as one of several components which include knowledge, values and ability to act responsibly.

Combining these findings, it becomes clear that the use of one educational indicator is not enough to assess the quality of education provided. Achievement measures provide information about students' success in some specific areas; proficiency measures

help to identify the number of insufficiently skilled people; participation and attainment indicators present additional aspects of educational progress. Joint interpretation of these indicators will serve as more objective basis for evaluating the place occupied by Romania in relation to the EU average, maintaining the separate meanings of the indicators.

In addition, this framework identifies one essential interpretative boundary. Cognitive assessment is relevant to the formation of human capital but does not measure sustainable behavior, societal resilience or progress in other dimensions of SDG 4. Differences between countries' achievements do not necessarily identify the reasons for these differences. Therefore, the contribution of the comparison is in documenting the gaps in education and interpreting them from the point of view of human capital, equity and sustainable development, rather than measuring sustainability itself or identifying the reasons behind it.

3. Data and Research Methodology

This research is based on a descriptive and comparative methodology for an assessment of Romania's educational performance compared to the EU average. In the analysis, both indicators of demonstrated competencies and some educational participation and educational attainment indicators are used. Such approach allows distinguishing between learning outcomes, the sustainability of participation in education, and the achievement of higher educational levels, and not considering the last three components as equivalents of educational development.

The empirical methodology includes two components. The first one considers achievement in mathematics, reading, and science and the proportion of low-performing students. It uses the PISA 2022 assessment as an empirical base for the performance data analysis presented in the study. The second component concerns the issue of early leaving from education and training and tertiary educational attainment and uses Eurostat indicators included in the framework of monitoring of SDG 4 at the European level (OECD, 2023; Eurostat, n.d.-a, n.d.-b).

The use of PISA 2022 is determined by a clear choice of reference cycle, but does not mean that these data are the latest educational information available. In order to provide a consistent reference year for the main comparison, Eurostat indicators are analyzed for 2022 as well. The temporal consistency contributes to understanding, without meaning that the indicators relate to the same individuals or educational generations.

This paper uses publicly available statistics that are aggregate data obtained through official sources. Statistics for PISA are derived from OECD reports and the National Report of Romania, while additional educational statistics are taken from the Eurostat database. This paper does not use microdata to make an estimate of achievement scores but uses publicly available statistics while retaining the definitions, population, and units of measurement of each source (OECD, 2023b; Ministerul Educației, 2023).

Table 1. Indicators and analytical dimensions

ANALYTICAL DIMENSION	INDICATOR	POPULATION	UNIT
Demonstrated competencies	Mean achievement in mathematics, reading and science	Students covered by PISA 2022	PISA score points
Insufficient proficiency	Students performing below Level 2, separately for each domain	Students covered by PISA 2022	%
Socioeconomic inequality	Mathematics performance gap between the nationally most advantaged and least advantaged socioeconomic quarters	Students covered by PISA 2022	PISA score points
Educational discontinuity	Early leavers from education and training	Population aged 18–24	%
Educational attainment	Population with tertiary educational attainment	Population aged 25–34	%

Sources: OECD (2023b), Ministerul Educației (2023)

The PISA indicators evaluate performance in three different domains. Individual mean scores are considered separately, without trying to produce an overall performance indicator in education. Likewise, the percentage of students scoring below Level 2 is analyzed separately for mathematics, reading, and science. These percentages do not indicate the percentage of students scoring below the threshold in all three domains (OECD, 2023).

The socio-economic performance gap is a contextual indicator of inequality. It evaluates the performance in mathematics of students situated in the top quarter and bottom quarter of the PISA socio-economic distribution. As these two socio-economic categories are constructed on the level of each country, they capture the relative rather than absolute differences in the level of resources available to students. Romania's result is presented together with the OECD benchmark stated in the source. In addition, the latter is not shown as an EU average (OECD, 2023b).

According to Eurostat, early school leavers are people aged 18–24 years old that completed at most lower secondary education and did not participate in any education or training programs in the four weeks preceding the survey. It is important to emphasize that this measure, taken from the EU Labour Force Survey, is not an administrative number of students leaving schools (Eurostat, n.d.-a).

Indicators of tertiary educational attainment represent the proportion of individuals aged 25-34 years who completed tertiary education, meaning levels 5-8 of the International Standard Classification of Education 2011. This indicator is taken from the EU Labour Force Survey. It represents completed educational attainment and not participation or assessment results (Eurostat, n.d.-b).

The unit of analysis is Romania, while the European Union acts as the main comparative reference group. In the case of Eurostat indicators, the benchmark is the published EU aggregate consisting of 27 member states, EU27_2020. The observations related to the entire population are used, not those broken down by sex. The published EU aggregate is kept as it is and is not replaced with the unweighted arithmetic mean of national percentages (Eurostat, n.d.-a, n.d.-b).

As for PISA achievement, the European reference values are determined from the Romanian national report and are clearly marked as the averages of EU reported in the document. The OECD average is kept as an additional benchmark. Such explicit distinction prevents the two reference groups from being confused and keeps the original source of comparison (Ministerul Educației, 2023).

The primary dataset includes observations for 2022. The source, labels, units, and any qualifications related to the observation are kept during the data preparation. No interpolation or imputation of missing observations is done. Calculations are done using the precision of the published values, while the display is rounded only after the calculation of the difference. If the source supplies only rounded values, the gap should be interpreted at the same precision level.

The approach does not involve the construction of a composite index out of the indicators. The PISA scores and population percentages are measures of different constructs and their combination by summation or averaging is impossible without additional normalization and weighting procedure.

The main comparative measure is the difference between Romania's value and the corresponding European reference value. For PISA achievement, the score gap is calculated as:

$$G_d = S_{RO,d} - S_{EU,d}$$

where $S_{RO,d}$ denotes Romania's mean score in domain d and $S_{EU,d}$ denotes the EU reference score for the same domain. A negative value indicates that Romania performs below the European reference. The magnitude is expressed in PISA score points, not as a percentage shortfall, because the comparison concerns positions on an assessment scale rather than a ratio-scale measure.

For indicators expressed as percentages, the gap is calculated as:

$$G_k = P_{RO,k} - P_{EU,k}$$

where $P_{RO,k}$ and $P_{EU,k}$ represent the respective percentages for indicator k. The resulting difference is reported in percentage points.

Interpretation depends on the direction of the indicator. A positive gap in early leaving or low proficiency indicates a less favourable outcome for Romania, whereas a negative gap in tertiary educational attainment indicates a lower attainment rate. These directional differences are made explicit in the presentation of results to avoid treating every positive numerical difference as an improvement.

The socioeconomic achievement gap is calculated as:

$$I_{RO} = S_{RO,Q4} - S_{RO,Q1}$$

where $S_{RO,Q4}$ is the mean mathematics score of students in the most advantaged national socioeconomic quarter and $S_{RO,Q1}$ is the corresponding score for the least advantaged quarter. A larger value indicates a wider difference in achievement between these groups. The measure describes an association between socioeconomic position and performance; it does not estimate the causal effect of family background.

The analysis pays particular attention to the size, direction and educational meaning of the identified differences. Comparative tables and graphs are used to distinguish between achievement gaps and disparities in participation and attainment. No new statistical significance tests are performed based on rounded aggregate figures. Statistical significance claims are made based on the findings of the source publications only; otherwise, differences are referred to as gaps.

There are several restrictions on the scope of interpretation. Firstly, PISA evaluates skills in particular domains of the target students, while Eurostat indicators cover

a wider age spectrum and various education cycles. Secondly, the average figures and aggregate percentages can hide the differences by social groups, schools, regions. The socioeconomic indicator is one of the measures of this diversity, but it does not give the whole picture of educational inequality.

Thirdly, a cross-sectional analysis cannot reveal whether the educational gaps narrowed or widened. It requires another analysis that will compare different years. Fourthly, the chosen indicators do not evaluate sustainable behavior, economic resilience, or other aspects of SDG 4 goals. The contribution of those indicators is the evaluation of certain educational gaps related to the research topic.

The general principle of methodology in the analysis is comparability: each indicator is compared according to its own definition, target population, and reference benchmarks. In this way, the research identifies Romania's educational gaps without going beyond what evidence suggests.

4. Results and Discussion

The findings from the PISA 2022 test show that Romania has continued to lag behind European benchmarks on mathematics, reading, and science. Romania performed at around 428 points in each of the subjects tested, whereas the average scores for the European Union, according to the Romanian report, stood at 469 points in reading and 481 points in science (Ministerul Educației, 2023). The gaps suggest that below-average performance by Romania is not specific to a particular subject area.

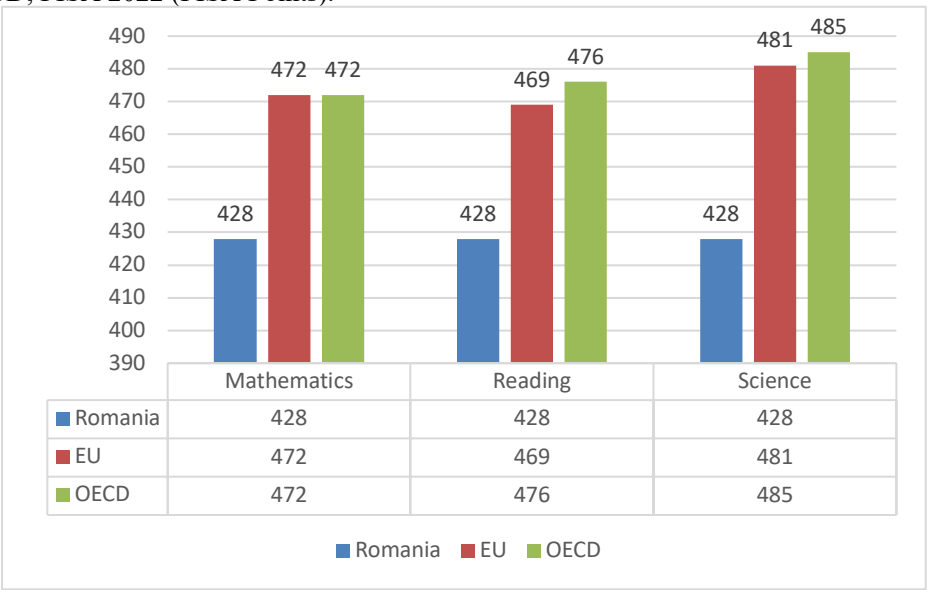
Table 2. Mean PISA achievement and Romania's performance gaps, 2022

Domain	$\bar{X}$Ro	$\bar{X}$EU	$\bar{X}$OECD	Ro–EU gap	Ro–OECD gap
Mathematics	428	472	472	−44	−44
Reading	428	469	476	−41	−48
Science	428	481	485	−53	−57

Sources: Developed by the author based on the research methodology

The largest observed gap relative to the EU average concerns science, at 53 points, followed by mathematics at 44 points and reading at 41 points. These differences should be interpreted within each assessment domain rather than as directly interchangeable quantities. Nevertheless, their common direction indicates that Romania's educational challenge extends across the three types of competencies considered. The identical rounded national scores do not imply that students demonstrate equivalent abilities across subjects, since each domain has its own assessment framework and proficiency scale.

Figure 1. Mean achievement in mathematics, reading and science: Romania, EU and OECD, PISA 2022 (PISA Points).



Sources: Developed by the author based on the research methodology

According to the human capital approach, the results are consistent with differentiating between schooling and the skill acquisition process. According to Burks et al. (2009), cognitive skills allow one to receive information about the economic value of education beyond mere schooling years. This way, one can interpret Romanian gaps as signals about disparities in measured skills rather than discrepancies in educational participation only. In terms of economic importance, Romanian achievement gaps can be viewed in light of the existing research on skills and development, but this paper's comparison cannot serve as an estimate of this effect.

Furthermore, the interpretation needs to take into account the issue of population representation. As indicated by the OECD, the sample of PISA 2022 in Romania included around 76% of the total 15-year-old population. In that regard, it is important to stress that the outcomes pertain to the competence levels achieved by the population sample used in the assessment process and not by all Romanian adolescents. This clarification is important in view of the relation to inclusive education goals.

Mean scores identify the overall position of an education system but do not show how widely insufficient competencies are distributed. The proportion of students below Level 2 provides a complementary perspective by identifying those who do not reach the baseline proficiency threshold in each domain. In Romania, the rounded proportions were 49% in mathematics, 42% in reading and 44% in science.

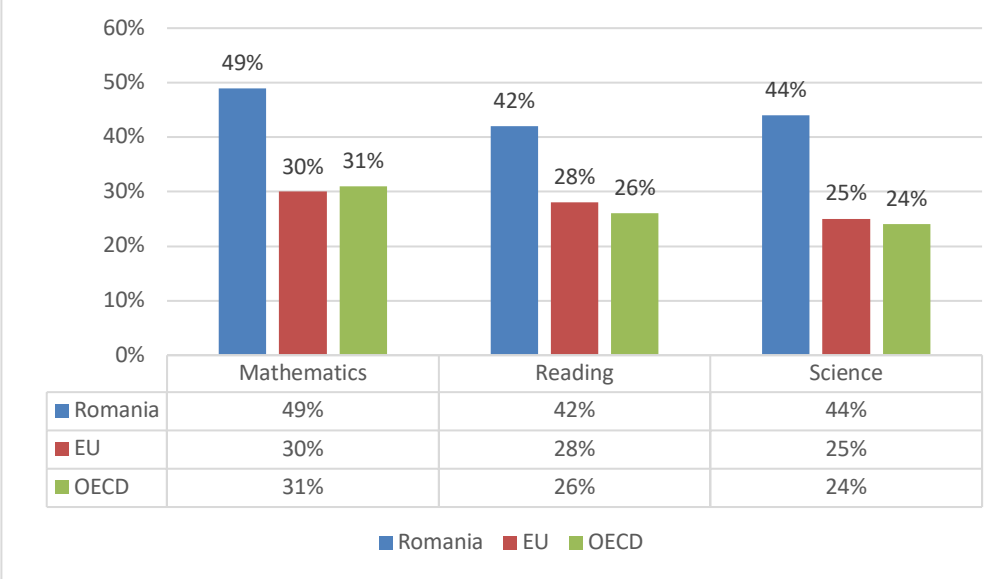
Table 3. Students below Level 2 proficiency and Romania's comparative gaps, 2022

Domain	Ro%	EU%	OECD%	Ro–EU gap %	Ro–OECD gap%
Mathematics	49	30	31	+19	+18
Reading	42	28	26	+14	+16
Science	44	25	24	+19	+20

Sources: Developed by the author based on the research methodology

In mathematics, the proportion of underperforming students is the largest among all other subjects; about half of the students evaluated did not reach the second level. As compared to the European standard, the difference in the proportion of underperformance was 19 percentage points in mathematics and science, while that in reading was 14 percentage points. In conclusion, the national problem involves low average results and a significant number of underperforming students.

Figure 2. Students performing below Level 2 in mathematics, reading and science: Romania, EU and OECD, PISA 2022.



Sources: Developed by the author based on the research methodology

The educational implications of this research become clear if one considers the proficiency thresholds. In mathematics, the Level 2 includes the recognition of the way in which a simple situation may be described in terms of mathematics without specific directions on this point. In reading, it consists in the identification of the key idea in a long enough piece of text and finding the required information based on some predetermined criteria. In science, it involves the recognition of the explanations of well-known phenomena and evaluation of whether a simple conclusion is made based on the provided data (OECD, 2023).

Lack of skills at this level cannot be considered as a sign of having no knowledge and being unable to do anything in this field. It shows only that the level of proficiency

has not been reached yet. It helps to avoid the simplification of a graduated assessment of skills into an absolute category of ability.

Moreover, the obtained results help to find the connection between educational attainment and sustainable development. According to UNESCO (2017), the latter implies several aspects including cognitive, socio-emotional, and behavioral aspects of education. While PISA does not provide the measures of all three components, it evaluates the competencies related to its cognitive dimension. The problems of interpretation of texts, numbers, and evidence can limit the availability of means necessary for addressing complicated development issues.

There are performance gaps for Romania which correlate to social inequality in the country. According to the OECD, there is a performance difference of 132 points between the students who are most privileged in terms of SES, and those who are less privileged in the nation, which is greater than the average 93 point gap for other OECD countries. Romania's performance gap exceeds the OECD standard by 39 points.

Table 4. Socioeconomic inequality and academic resilience in mathematics, PISA 2022

Indicator	Romania	OECD average	Romania–OECD difference
Achievement gap between the most and least advantaged socioeconomic quarters	132 points	93 points	+39 points
Variation in mathematics performance accounted for by socioeconomic status	26%	15%	+11 percentage points
Disadvantaged students reaching the top national quarter of mathematics performance	7%	10%	−3 percentage points

Sources: Developed by the author based on the research methodology

The share of the influence of socioeconomic factors on the level of mathematics performance in Romania amounted to 26%, in contrast to 15% across the OECD countries. This figure shows the strength of the relationship in question within the framework of the assessment. Neither does it say that socioeconomic factors play a role of causal determinants of 26% of each student's achievements; it does not separate the independent roles of schools, families, or neighborhoods (OECD, 2023).

Academic resilience provides another view of the issue. Seven percent of disadvantaged children managed to reach the highest national quartile of mathematics

performance in Romania against 10% in the OECD reference. It means that the disadvantage cannot preclude high relative achievement. However, the smaller proportion of Romanian students means that overcoming the disadvantage via educational success occurs less often than in the OECD reference.

This evidence makes one think about understanding the educational quality and equity from the perspective of two dimensions together. One cannot conclude that the growth of the mean would show inclusiveness of learning opportunities in itself. Likewise, increased participation could not mean sufficient competencies of disadvantaged children. Within the human capital it is necessary to pay attention to both the mean level and the distribution of cognitive skills, which turns the persistent achievement inequality into the issue relevant to the economic opportunity and its distribution in terms of education.

This evidence means that it is necessary to prioritize those interventions that combine learning support programs with efforts to decrease the barriers of participation. They may comprise early detection of learning disabilities, provision of continued remediation, and assistance for teachers working in diverse environments. These policy recommendations address problems that exist in reality but not those proven to be effective by the evidence presented. Teacher preparation and professional development and assistance to disadvantaged schools are the priorities in terms of the European Commission's analysis of Romania (European Commission, 2023).

The results from PISA can be placed within an educational framework by making reference to the early school leaving and higher education indicators. The aforementioned indicators relate to different age groups and do not follow the tested pupils throughout their development. However, they provide additional insight into educational enrollment and completion.

Table 5. Complementary educational indicators: Romania and the European Union, 2022

Indicator	Age group	Romania (%)	Eu average (%)	Romania–EU gap (percentage points)
Early leavers from education and training	18–24	15.6	9.6	+6.0
Tertiary educational attainment	25–34	24.7	42.0	−17.3

Sources: Developed by the author based on the research methodology

The early-leaving indicator in Romania exceeded the one of the European Union countries on average by 6 percentage points. This result means that there is a higher percentage of people who have limited education and do not participate in further education or training. It should not be viewed as the number of drop-outs per year since it describes the characteristics of the population instead of flows in schools.

At the other end of the education indicator scale, 24.7% of the Romanians had tertiary qualifications compared to 42.0% in the European Union. The 17.3-percentage-point difference shows that there is a shortage in higher education. However, this does not prove the quality of these qualifications or clarify the reason for the difference in rates (entry, completion, migration, etc.).

Combining these indicators, it is possible to conclude that the country faces three problems: lack of competencies in many assessed persons, relatively high early leaving and a smaller number of young adults with tertiary qualifications. At the same time, it does not mean that there is a causal relationship between these measures. But it confirms the fact that educational achievements cannot be measured using a single indicator of schooling or qualification.

From these results, it follows that Romania's move towards quality education requires consideration of achievements not only as regards its level but also its distribution. Coexistence of subreference achievements, wide-spread under-proficiency, and substantial socioeconomic disparities reveals educational problem combining skills' and inclusiveness aspects. In the context of the UNESCO approach, the importance of overcoming such foundations lies within the framework of enabling the learners to engage with sustainable development; nevertheless, foundation improvements do not cover all educational aspects of sustainability (UNESCO, 2017).

In regard to linking to resilience, it is possible to develop a conservative relationship based on the regional development literature. Mitrache et al. (2024), studying regional resilience using a bibliometric approach, stress the importance of the concept for policies aimed at ensuring economic balance, social inclusion, and environmental protection. This contribution provides the wider developmental perspective for understanding educational gaps. It does not measure the influence of education nor proves that better assessment scores lead to greater regional resilience.

From this position, educational disadvantage can be viewed as a potential barrier to inclusive adaptive capacity instead of being an indicator of resilience. Such interpretation combines the human capital theory by Spulbar and Mitrache (2025) and the policy concerns of Mitrache et al. (2024). It retains the difference between the empirical findings of the current comparison and conclusions made by other studies.

Three priorities follow from the suggested interpretation:

- ✓ Improvement of foundations of learning with explicit focus on the learners lagging behind the proficiency baseline.
- ✓ Reduction of the concentration of educational disadvantage through targeted support of learning and participation.
- ✓ Promotion of educational continuity and success in completing studies as well as complementary objectives of qualification levels.

These priorities represent the evidence-based agenda rather than a ranking of different policies in terms of their efficiency. Existing comparisons reveal the areas of educational gaps but do not prove which intervention will bring more progress. For policy evaluation, additional information about implementation, cost, participation, and outcome is needed.

The major conclusion drawn is that overcoming educational gaps in Romania cannot be reduced to the raising of the national average. It requires the improvements in the acquired competencies, greater opportunities to reach them, and continuity in participation in education. Such dimensions can provide a plausible link between the educational achievements revealed and goals of human capital development, not considering sustainable development or resilience as the measured outcomes.

5. Conclusions

Comparative analysis demonstrates a consistent gap between the performance of Romanian education and the reference values set by European Union standards. The mean

achievements of Romanian students in mathematics, reading, and science, based on the PISA 2022 study, appear significantly lower than the reference value of European Union. The gap is especially noticeable in the area of science skills. The presence of low proficiency is another proof of it as 40% or more of the tested students demonstrated the skills below the second proficiency level when considered individually. It means that the problem goes beyond the national average as many students lack basic skills in different areas of knowledge.

Equity is another important aspect that should be taken into account while assessing the quality of education. The large mathematics achievement gap between advantaged and disadvantaged students proves that the national performance conceals some disparities within the population. The high correlation between socioeconomic status and learning achievements together with the low share of disadvantaged resilient learners suggests that increasing the national average will not solve all problems of Romanian educational system.

The additional indicators complement this assessment without establishing a causal link between the different educational stages. A higher rate of early leaving from education and training and lower rate of tertiary education are two other gaps relative to the EU average. As those indicators refer to different populations, they do not show how individual students progress from lacking proficiency to early departure or to lower qualification level. Still, when analyzed together, they highlight that the problem of education is connected with learning outcomes, continuity, and successful conclusion.

In general, the contribution of this research is the integration of those aspects into one framework related to quality education and sustainable development. Qualifications, participation, and competencies cannot be used interchangeably as it is needed to keep them separate in the context of the research but to analyze their complementary importance for human capital.

The policy implications of this research concern three interrelated priorities. It is necessary to develop foundational competencies, reduce the socioeconomic inequality in learning, and ensure continuity in education. Additional help for the learners with difficulties, enough support for disadvantaged schools, and solutions for overcoming barriers to participation can be considered possible directions for actions. The effectiveness of these solutions and the optimal use of resources require further consideration, though.

The connection with sustainable development should be analyzed under the conditions described above. More competencies and learning inclusivity provide a strong basis for participation in economy and society. The indicators selected for analysis do not reflect the behavior and the adaptation abilities related to sustainable development, neither do they measure economic resilience. Consequently, the research supports a discussion about the educational conditions relevant for sustainable development but does not imply that increasing scores in assessments leads to sustainability.

Several limitations limit the scope of conclusions. This research is based on aggregate data and mostly consists of cross-sectional observations and therefore is not able to establish causal relationships or analyze changes over time. Different populations, age groups, and measurements frameworks further limit the extent to which the indicators can be integrated. Finally, the comparison on national level does not reflect all differences at regional, school-level and individual level.

Future research may include the comparison of the data across different assessment cycles, regional breakdown of the results, and student-level analysis of the

factors that affect achievement. The evaluation of educational interventions may help to understand what measures contribute to competencies and learning equality.

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