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No locality left behind? Structural and institutional drivers of eighth-grade achievement and early human capital development in Romania

Ștefan-Marius DEACONU• Alina ROINIȚĂ••

Abstract

This study explores the structural and institutional determinants of early human capital formation in Romania, from a territorial perspective. The paper focuses on educational performance measured at the lowest administrative and territorial unit in Romania. Data from the National Evaluation (final exam of lower secondary education) from 2022–2024 is used to analyse how local socioeconomic context, school organisation, and spatial configuration interact to shape student performance. We combine gender-disaggregated educational data with indicators of human development as well as income, education stock and further demographic characteristics. In this sense, the present analysis provides one of the first nationwide studies to investigate how local communities are converging or diverging in terms of educational outcomes.

The results highlight that educational performance is highly path-dependent, as localities with historically higher education stock and human development in the past have an advantage in comparison with rural and less developed communities. As the latter tend to fall behind, the findings confirm that territorial inequalities are indeed reinforced through institutional differentiation – schools with legal personality (administrative autonomy) achieve better results than satellite structures, even when the socioeconomic context is similar. The moderation effect of institutional autonomy on the relationship between local development and exam performance outlines that human development alone is not sufficient to deliver convergence in the absence of strong capacity and flexible governance.

Results outline that educational inequality in post-socialist Romania is more than a simple function of economic disparity, as it also works for institutional and spatial configurations. The study contributes to further European and international debate on regional convergence, decentralisation and human capital development, as it emphasises that equity in education cannot be achieved in the absence of policy and measures that address governance and autonomy of schools.

Keywords: lower secondary education, educational inequality, territorial development, institutional autonomy

• Lecturer (PhD), Faculty of History, University of Bucharest, stefan-marius.deaconu@istorie.unibuc.ro.
•• Associate Lecturer (PhD), Faculty of Letters, University of Bucharest, alina.roinita@unibuc.ro.

Introduction

The traditional educational advantages of former socialist countries and the former Soviet Union are slowly diminishing as inequalities not only persist but increase (Pop-Eleches, 2015). Romania is no exception in this respect, displaying persistent inequalities across communities based on long-term social, economic, and territorial divides. To understand why students in some areas consistently outperform those in others, we need to analyse not only the characteristics of individual pupils, but also the structural and institutional factors that influence learning environments. The present study aims to analyse the extent to which these determinants impact the educational performance of lower-secondary school leavers in Romanian localities at the LAU (local administrative unit) level, the lowest administrative level. This paper aims to identify possible mechanisms of convergence and/or divergence that could characterise post-socialist systems in terms of educational disparities.

Several academic works have already addressed disparities in the Romanian pre-university education system (Tufiș, 2008; Hatos, Impactul segregării și diferențierii asupra performanțelor școlare ale elevilor din clasele 10–12. O analiză multinivel, 2008; Țoc, 2016; Gheba, 2021). Despite their consistent findings, the previous studies have not systematically incorporated structural development indicators relating to the institutional configurations of schools within a single empirical framework. This article aims to address the research gap regarding whether institutional characteristics, particularly school autonomy, can moderate the relationship between local development and student performance. This study uses LAU-level quantitative evidence at a national scale to address the literature gap on educational inequality in Romania and post-socialist Europe more broadly. The study combines structural development variables with institutional, school-level characteristics to explain variation in National Evaluation (NE) - (ro: *Evaluarea Națională*)[1] results at locality level between 2022 and 2024.

The present analysis is based on Pierre Bourdieu's theory of cultural and social reproduction, which explains how families and communities pass on cultural resources, such as language, attitudes, habits and expectations, that are more in line with the dominant culture of the school (Bourdieu, 1977). Consequently, schools tend to value and reward students who already possess these forms of capital, thus perpetuating existing social hierarchies rather than challenging them. Although cultural capital helps to explain why students from more advantaged educational backgrounds often perform better, there is limited empirical evidence on this mechanism in large-scale settings (Tzanakis, 2011). Bourdieu's concept of the field provides a useful framework for analysing whether schools operate as structured environments that recognise and reward different types of capital, or fail to convert them into academic success (Nolan, 2012; Krarup & Munk, 2016; Dingel & Sage, 2023).

[1] The National Evaluation evaluates competencies in the Romanian language and mathematics, as it served as the main selection criterion for high school admission in the period under review.

Territorial contexts introduce an additional dimension of differentiation, as structural inequalities tend to accumulate over time across different areas, creating "geographies of (dis)advantage" (Waters, 2012). Communities with historically higher levels of education and stronger human capital tend to reinforce their advantages, while less developed areas struggle to translate material resources into educational outcomes. This aligns with Myrdal's (1957) theory of cumulative causation, which suggests that disparities can widen in the absence of institutional mechanisms that promote convergence.

Based on the aforementioned perspectives, the study examines whether structural development alone is sufficient to explain variation in educational performance at the local level, or whether institutional design also plays a role in modifying the relationship between local development and learning outcomes. To achieve this, NE data from 2022 to 2024 will be linked with structural indicators such as the Local Human Development Index (LHDI), education stock, demographic statistics and income at the LAU level, as well as institutional characteristics at the school level. This will provide the first national and LAU-level analysis of how low local development and institutional capacity interact to shape early human capital formation in Romania.

Theoretical framework

Educational performance is the result of the interaction between social structures, institutional arrangements and territorial contexts. To illustrate how these multi-layered mechanisms operate across Romanian LAUs, our study draws primarily on Bourdieu's theory of cultural and social reproduction, complemented by insights from institutional sociology and territorial development theory. By combining these perspectives, we aim to provide an integrated and unique framework for understanding why students with similar backgrounds achieve different outcomes depending on where they live and how schools are organised.

Cultural capital, habitus, and reproduction

Bourdieu (1973; 1977) conceptualised cultural capital as a set of linguistic competencies, cultural dispositions, behavioural codes, and forms of self-presentation that are transmitted through families and communities. These embodied forms of capital align differently with the dominant culture of schools (Edgerton & Roberts, 2014). Consequently, this affects how easily students navigate educational expectations. In this regard, cultural advantages may be rewarded through teachers' perceptions, opportunities for feedback and differential guidance (DiMaggio, 1982; Jæger & Møllegaard, 2017).

Within this theoretical framework, schools operate as fields – structured spaces governed by norms, rules, and power relations that determine which types of capital are recognised and valued. However, reproduction is probabilistic rather than deterministic, as students from educationally advantaged communities are more likely to perform

better, although their outcomes depend heavily on contextual and institutional conditions.

Institutional mediation of cultural and social inequality

Cultural capital does not automatically lead to achievement; it is mediated by the institutional environment of schools (Buchmann & Hannum, 2001). These environments differ in terms of autonomy, leadership capacity, teacher allocation and organisational routines, all of which influence their ability to support student learning (Ferrare & Apple, 2015). The relationship between cultural capital and achievement strengthens in low-performing or resource-constrained school environments (Andersen & Jæger, 2015). This suggests that institutional characteristics have an impact on the amplification or reduction of structural inequalities.

Similar to other post-socialist countries, Romania's decentralisation process has been partial and uneven (Cătană & Cătană, 2010). This has created substantial variation in institutional capacity, with some schools operating with full legal personality and managerial autonomy, while others function as satellite structures dependent on a central school. In our opinion, this institutional diversity is a decisive factor in explaining why students with similar social and economic backgrounds perform differently across regions (Stăiculescu, Enăchescu, & Dobrea, 2014; Filip, Todrican, & Clinciu, 2023).

Marks (2005) argued that cross-national variations in social-class inequalities are more closely linked to the organisation and modernisation of school systems than to overall levels of societal inequality. This reinforces the idea that institutional design plays an independent role in shaping educational outcomes. Therefore, schools tend to act as a conversational mechanism that determines whether structural advantages, such as high levels of human development, are translated into improved learning, or whether institutional constraints lead to a "translation gap" where potential remains unfulfilled.

Territorial distribution of capital and cumulative differentiation

Last but not least, the distribution of cultural and human capital is shaped by territorial dynamics. Historically higher educational attainment in certain areas leads to the accumulation of resources over time, creating persistent "geographies of (dis)advantage" (Waters, 2012). In economic terms, the concentration of human capital drives local growth and reinforces territorial disparities, as highlighted by Lucas (1988) and Moretti (2004). These cumulative processes align with Myrdal's (1957) theory of circular and cumulative causation. According to this theory, prosperous areas attract skilled labour, institutional capacity and investment, while disadvantaged localities face stagnation and demographic decline.

Romania's post-socialist transition has intensified these patterns. While urban centres such as Bucharest, Cluj-Napoca, Timişoara and Iaşi have evolved into knowledge-based economies, rural and former industrial regions have stagnated and experienced

population decline. These territorial inequalities could explain why structural factors strongly predict localised educational outcomes (Petrakos, 2008).

The present study adopts a multi-layered conceptual framework that brings together three areas of research: (1) cultural and social capital, which shapes students' dispositions, expectations and interactions with schooling; (2) institutional design, which determines whether these advantages or disadvantages are amplified or mitigated through autonomy, governance and organisational capacity; and (3) territorial development patterns, which create persistent structural inequalities that influence schools' ability to support learning and shape the distribution of opportunity across localities.

Educational context in Romania and the "No Child Left Behind" policy framework

Although Romania's educational system is organised and governed centrally by the Ministry of Education and Research, it operates through a multi-layered governance model involving local authorities and county school inspectorates. Compulsory education spans twelve grades, covering primary (ISCED 1), lower secondary (ISCED 2) and upper secondary (ISCED 3) levels[2]. Romania's schools are either legal entities with administrative and managerial autonomy, or satellite schools operating under the authority of a parent school. This dual structure is important for understanding institutional disparities, as school status determines the degree of financial and managerial autonomy available to each educational unit.

Funding remains highly centralised and is based on a per capita allocation formula ("cost per student"), which may be supplemented by local contributions. However, this formula often fails to account for structural disadvantage, geographical barriers, or the additional costs of serving small and rural schools. Local authorities administer infrastructure and maintenance budgets, while the Ministry of Education and Research controls staffing norms, the curriculum and national assessment policies. As a result, a school's capacity to deliver quality education depends on national policies and the fiscal and administrative strength of local authorities.

The pre-university education system features a highly fragmented school network with numerous small rural and satellite schools, which has a negative impact on equity, resource distribution and learning outcomes (OECD, 2024). Data show that Romania's public-school network is dominated largely by satellite, rural, and very small schools. Of the 16,507 schools in total, 64% are satellite schools enrolling only 19% of students, and 69% are in rural areas serving 34% of the student population. Furthermore, 45% of all schools are very small institutions with fewer than 50 students, attended by just 6% of learners.

[2] The national education system in Romania includes early childhood education (ISCED 0) through to primary (ISCED 1), lower secondary (ISCED 2) and upper secondary (ISCED 3) education. It also includes post-secondary, non-tertiary programs (ISCED 4), short-cycle tertiary education (ISCED 5), and higher education at the bachelor's, master's, and doctoral levels (ISCED 6–8).

Public investment in education in Romania remains well below international standards. Per-student expenditure is less than one-third of the OECD average at the primary level (USD 3,150 compared with USD 10,562) and approximately half at the secondary level (USD 6,474 compared with USD 11,597) (OECD, 2023). These low spending levels, combined with weak redistribution, continue to widen territorial disparities (Popa, 2023; Iulia & Trandafir, 2025). Although the 2023 education laws aim to increase annual public spending to 15% of total government expenditure, implementation remains incomplete (Ministry of Education, 2025).

International assessments consistently addressed the consequences of these structural and institutional disparities. For example, the PISA 2022 results revealed that approximately four out of ten Romanian 15-year-olds do not achieve the minimum proficiency level in reading, mathematics or science, categorising Romania as one of the lowest performing countries in Europe (OECD, 2023; Nausica Noveanu, 2023). Inequalities between socio-economic groups and between rural and urban areas are among the highest in the EU. For example, 84% of rural schools scored below Level 2 in mathematics, compared with 34% in urban areas (OECD, 2023). Such type of inequalities reflects up to higher education graduation (Deaconu & Roiniță, 2024).

Teacher-directed instructional practices further contribute to low performance, even when controlling for students' socioeconomic background (Borș, 2024). Additional disparities emerge from early childhood participation, with 19% of five-year-olds not enrolled in kindergarten (OECD, 2024), and from ethnic and linguistic disparities, which particularly affect Hungarian and Roma students (Hatos, 2008).

Recent reforms introduced through the 2023 "Educated Romania" legislative package seek to address these systemic weaknesses. These reforms include targeted funding for disadvantaged schools, a competency-based curriculum revision, and enhanced school leadership roles in the context of expanding remedial programmes. A key principle of these reforms is the commitment that "no student, no child, no young person will be left behind", as set out in the Ministry of Education and Research's Institutional Strategic Plan for 2024–2027 (Ministry of Education, 2024). However, the majority of these measures are still in the early stages of implementation, if they are being implemented at all, as there is a significant gap between legislative intent and operational reality. In addition, the new legal framework means that it is more important than ever to examine how structural, institutional and territorial factors shape educational performance at the local level.

Methodology

The empirical analysis relies on administrative and statistical data covering all Romanian localities (LAU level, SIRUTA classification). National evaluation microdata respecting student-level exam results at the end of lower secondary education (ISCED 2) were obtained from data.gov.ro and aggregated to the locality-year (LAU x year) level for analysis for the period 2022–2024. School-level information was extracted from the same

database provided by the Ministry of Education and Research and was assigned to LAUs based on each school's physical location (as expressed through the SIRUTA classification).

Structural indicators, on the other hand, were drawn from the Local Human Development Index (LHDI 2018) dataset, the 2011 and 2021 National Censuses administered by the National Institute of Statistics (NIS), and the Ministry of Development, Public Works and Administration (MDLAP) (Sandu, Ionescu-Heroiu, Frant, & Butacu, 2020; Sandu, 2025).

Despite the fact that the data originates from multiple observational levels (students, schools and localities), the empirical models are estimated at the locality (LAU) level because the National Evaluation results are analysed as aggregated LAU x year outcomes. However, institutional determinants remained measured at the school level, as these vary across schools within the same locality. To link school-level information to locality-level performance, each school was retained as a separate observation and assigned to its corresponding LAU. Thus, localities with multiple schools contribute multiple institutional observations to the dataset, whereas structural determinants remain uniquely measured at the LAU level.

Table 1

Operationalization of variables used to analyse structural, institutional, and territorial determinants of educational performance in Romania.

Category	*Name*	*Definition*	*Measurement*
Dependent variable	Educational performance	Assesses student achievement at the end of lower secondary education, as a proxy for local human capital formation.	Median National Evaluation (NE) scores aggregated at locality (LAU) level for each year (2022–2024).
Structural determinants	Local Human Development Index (LHDI) (2018)	Composite index of local development calculated for 2018 (Sandu, Ionescu-Heroiu, Frant, & Butacu, 2020), combining three pillars: human capital (education stock + digital access), material capital (income per inhabitant), and health capital (standardized mortality ratio).	Normalised index (0–1) combining income per inhabitant, education stock, and health indicator.
	Education stock (2011)	Long-term accumulated human capital of the locality, measured using the census distribution of the adult population by highest educational attainment, based on 2011 Census.	Share (%) of adult population by highest level of completed education.

Category	*Name*	*Definition*	*Measurement*
	Income from own sources per inhabitant (2023)	Material capital indicator reflecting the local fiscal capacity and economic resources available within a locality.	Calculated as the total revenue from own sources (local taxes, fees, property-related revenues, and other autonomous income) divided by the number of residents, based on Ministry of Development, Public Works and Administration and National Institute of Statistics.
	Life expectancy at birth (2011)	Overall health and well-being indicator of the population, for 2011.	Estimated average life expectancy at birth at locality level (2011), where available.
	Resident population (2021)	Total number of residents living in the locality (LAU), capturing demographic scale, settlement hierarchy, and degree of urbanisation. Reflects the local human resource base and developmental capacity of the territory.	Census 2021 resident population (NIS); used in log-transformed form as lnpoprezid21 to correct skewness and ensure comparability across localities.
Institutional determinants	School status	Dummy variable: 1 = legal personality; 2 = subordinate structure.	Administrative autonomy of the educational unit: 1 – school with legal personality; 2 – assigned school structure (satellite school).
	Operating mode	Dummy variable based on school timetable structure.	Organisational structure and schedule adaptation: 1 – regular schedule; 2 – adapted or shift-based schedule.
	Funding type	Dummy variable indicating predominant funding source.	Source of financial support: 1 – state budget; 2 – fees and sponsorship.
	Ownership type	Dummy variable indicating ownership/administrative model.	Governance mode: 1 – public; 2 – private.

Local administrative units (LAUs) reveal meaningful variations in terms of human capital, fiscal capacity, demographic structure, and access to educational infrastructure. Higher territorial units (NUTS2 – development regions; NUTS3 – counties) demonstrated negligible explanatory power in preliminary tests. For example, there is virtually no correlation between NUTS3 regions and national exam results (r = -.007), confirming that educational inequalities in Romania are fundamentally local phenomena.

Institutional determinants were measured at school level. Each school forms an observation linked to its LAU, meaning that: (1) structural variables remain constant within localities, (2) institutional variables vary between schools within the same locality, and (3) the dependent variable (median NE score) is shared by schools belonging to the same LAU in the same year. This structure therefore introduces an intra-locality dependence.

The present analysis will use Ordinary Least Squares (OLS) regression to estimate the association between local development indicators and educational performance at the LAU level for structural and institutional determinants. Median scores are used instead of means because many rural localities have small cohorts of fewer than 10 graduates, making means highly sensitive to outliers and resulting in skewed score distributions in small populations. Lastly, using the median ensures comparability across LAUs.

Gender and urban-rural inequalities in lower secondary education

This section addresses two key sources of variation in students' educational outcomes: gender and the urban-rural divide. While these differences are not considered spatial inequalities in an econometric sense, they nevertheless represent important contextual factors that influence educational conditions and the development of human capital in Romania. By analysing both individual-level disparities (gender) and contextual disparities (urban-rural), this section offers insights into how structural and institutional determinants operate across localities.

Between 2022 and 2024, the total number of NE remained stable – 155.561 (2022), 161.652 (2023) and 160.467 (2024). The results confirm a persistent rural-urban performance gaps across all three years. Urban schools consistently outperform rural ones in both internal (lower secondary averages) and external assessments (National Evaluation).

Internal grading showed remarkable stability, suggesting continuity in assessment practices at school level. In contrast, NE scores exhibit a declining trend, particularly in urban areas, falling from an average of 7.40 in 2022 to 7.11 in 2024. The discrepancy between internal grades and standardised exam scores is particularly evident in rural areas, widening from 2.50 to almost 2.91 points.

This divergence could be due to one of the following: (1) grade inflation, (2) unequal preparation for standardised exams, or (3) the impact of disruptions related to the pandemic. International findings suggest that disadvantaged learners were among those who experienced learning losses during and after the pandemic. (Betthäuser, Bach-Mortensen, & Engzell, 2023).

To statistically validate these differences, an independent samples t-test was conducted. Urban students significantly outperformed rural students, with mean scores of 7.28 (SD = 1.86) and 5.76 (SD = 1.86), respectively. As the Levene test indicated unequal variances ($F = 169.43$, $p < .001$), a Welch's t-test was applied, resulting in a mean

difference of 1.51. This represents one of the largest gaps in the Romanian education system, highlighting the robustness of the urban-rural divide.

Table 2

Residence environment differences in National Evaluation exam averages, 2022–2024.

Residence environment	*N*	*Mean*	*SD*	*t(df)*	*p*	*Mean diff.*	*95% CI [LL, UL]*
Rural	173,803	5.76	1.86	–269.85 (361,568.36)	< .001	–1.51	[–1.53, –1.50]
Urban	281,711	7.28	1.81				

Such magnitude highlights the structural disadvantages that are embedded in LAU contexts. Therefore, the urban-rural divide is not merely a spatial disparity, but a contextual inequality shaped by differential access to qualified teachers, school infrastructure, digital resources and transport, and entrenched in community-level socio-economic conditions.

Across all three years analysed, female students consistently outperform male students in both lower secondary education grades and National Evaluation exam averages. The gender pattern is stable and statistically meaningful, in line with findings in the broader literature on female advantage in the first stages of educational attainment (Voyer & Voyer, 2014; Buchmann, DiPrete, & McDaniel, Gender inequalities in education, 2008; Jere, Eck, & Zubairi, 2022), including in Romania (Robayo-Abril & Rude, 2023).

A t-test comparing the pooled gender results confirmed significant differences. Female students achieved a mean score of 6.95 with an SD of 1.92, while male students achieved a mean score of only 6.45 with an SD of 2.00. Although this difference is smaller than the urban-rural gap (0.49), it is statistically robust across all years analysed.

Table 3

Gender differences in National Evaluation exam averages, 2022–2024.

Gender	*N*	*Mean*	*SD*	*t(df)*	*p*	*Mean diff.*	*95% CI [LL, UL]*
Female	228,716	6.95	1.92				
Male	226,798	6.45	2.00	85.06 (454,327)	<.001	0.49	[0.48, 0.50]

To examine the effects of gender and exam on students' National Evaluation averages, a two-way ANOVA was conducted. The result consisted of a statistically significant main effect of gender. $F(1, 455{,}508) = 7268.32$, $p < .001$, with female students outperforming males across all years.

Table 4

Two-way ANOVA results for the effects of gender and exam year on National Evaluation exam averages, 2022–2024.

Source	*df*	*Mean Square*	*F*	*p*
Gender	1	27,700.19	7268.32	< .001
Exam year	2	4561.46	1196.89	< .001
Gender × Exam year	2	60.03	15.75	< .001
Error	455,508	3.81		
Total	455,514			
R^2 = .021 (Adjusted R^2 = .021)				

The interaction between gender and year was also significant, F (2, 455,508) = 15.75, p < .001, despite the small effect size. Nevertheless, it could be concluded that the gender gap remained stable across time. More important is that the model explains only approximately 2.1% of the variance in exam averages, a fact that leads us to further search other indicators.

Structural determinants

The table below shows the correlations between educational attainment at a local level and a series of structural indicators. The median national evaluation score is strongly associated with both educational attainment (r = .793) and the local human development index (r = .686). This indicates that student achievement is deeply linked to the long-term accumulation of human capital. The results reinforce the idea that educational performance is path-dependent, as communities that have historically invested in education continue to produce higher-performing student cohorts.

Table 5. Correlation between local educational performance and human development indicators, per LAU, year, 2022–2024.

Variable	*Median EN score*	*EN – Grades 5–8 diff.*	*LHDI*	*Income*	*Population*	*Education stock*	*Life expectancy*	*Environment*
Median NE	1	.940	.686	.497	.393	.793	.483	.720
Median NE − Grades 5–8 diff.	.940	1	.611	.461	.377	.715	.448	.641

Note: All coefficients are significant at p < .001 (two-tailed). N ranges: 396,136–477,448 locality-year observations due to pairwise missingness.

A key variable in Table 5 is the difference between NE scores and lower secondary school grades (between the fifth and eighth grade). This indicator was introduced to capture the misalignment between internal assessments and external examinations. The proposed conceptual value of this variable resides in assessing the reliability and validity of school-based grading as a proxy for educational competence. The very strong correlation between NE scores

and this difference (r = .940) highlights that, in areas where the gap between internal grades and NE scores is smaller, school grading practices more accurately reflect students' preparedness for national assessments.

Even more relevant is the fact that this gap tends to shrink as local development improves – better alignment between internal and external evaluations is exhibited by more developed localities. This pattern indicates a higher level of pedagogical consistency and more rigorous grading standards, which are characteristics of a robust instructional environment. In contrast, larger discrepancies in less developed areas could reflect grade inflation, weaker instructional quality, or limited exam preparation, which ultimately adds to previous layers of structural inequality.

The urban environment further amplifies these disparities. The strong correlation between residential area and median NE scores (r = .720) confirms that the urban-rural divide remains one of the most persistent educational inequalities in Romania. Schools in urban areas benefit from concentrated teacher expertise (Hanushek & Woessmann, 2010), more favourable teacher allocation patterns (Greenberg & McCall, 1974; Hanushek, 1979), and a more advantaged socio-economic composition of pupils (Perry & McConney, 2010). These factors generate cumulative advantages that reinforce higher educational performance. Income per inhabitant (r=.497) and resident population (r=.393) are correlated with educational performance but only moderately. In this sense, economic and demographic scales do exist and have an effect but are insufficient to overcome historical educational disparities within a community.

Table 6.

Multiple OLS regression with structural determinants predicting Median National Evaluation Scores at the LAU level (2022–2024).

Predictor	*B*	*SE*	*β*	*t*	*p*
(Constant)	3.002	0.010	—	302.119	< .001
LHDI (2018)	0.001	0.000	0.011	5.371	< .001
Income per inhabitant (2023)	0.000008	0.000	0.007	5.216	< .001
Resident population (2021)	4.293×10^{-7}	0.000	0.085	81.790	< .001
Education stock (2011)	0.048	0.000	0.572	218.239	< .001
Life expectancy at birth (2011)	0.005	0.000	0.029	23.937	< .001
Residence environment (urban/rural)	3.002	0.010	—	302.119	< .001

Note. R = .807; R^2 = .650; Adjusted R^2 = .650; Standard error of the estimate = 0.750. Dependent variable: Median NE score at the LAU × year level, 2022–2024. Coefficients represent OLS estimates; significance tests are based on conventional OLS standard errors.

Regression analysis shows that 65% of the variance in local educational performance can be explained by structural development factors (R^2 = .650). The results are statistically significant for all variables. The chosen model highlights the combined influence of human capital, demographics and the local environment.

Education stock emerges as the dominant driver (β = .572), providing renewed confirmation that, even from a territorial perspective, educational performance is deeply

path-dependent due to accumulated human capital. Localities with historically higher educational attainment consistently produce better student outcomes at the end of lower secondary education.

Another significant factor is the urban–rural environment (β = .193), with students from urban areas performing substantially better even when controlling for development and population. Access to higher-quality educational infrastructure and school concentration remain key drivers of systemic inequalities. In line with this finding, population size contributes modestly (β = .085), underlining that larger communities tend to provide stronger institutional infrastructures.

LHDI (β = 0.011) and income per inhabitant (β = 0.007) demonstrate small yet statistically significant effects. While economic and developmental conditions enhance educational performance, they are not determinant in relation to education stock. The very high correlation between LHDI and educational resources (r = 0.840) suggests that local human development is a reflection of, and an outcome of, accumulated educational capital. Finally, life expectancy (β = 0.029) plays a minor yet positive role, suggesting that better health and well-being contribute modestly to young people's academic outcomes.

Institutional determinants

Another layer of analysis covers the institutional model, based on organisational characteristics such as school status (whether the school has legal personality or is a satellite school), operating mode (whether the school has a regular schedule or is adapted to multiple groups of students per day), funding type (whether the school is funded by the government or through fees and sponsorship) and ownership type (whether the school is publicly or privately owned). Bivariate correlations indicate that institutional variables correlate modestly but significantly with educational performance. The strongest associations are shown by school status (r = .263) and operating mode (r = .258). As funding type is perfectly collinear with ownership type (r = 1.000), the former is automatically excluded from the model.

Table 7.

Multiple OLS regression with institutional determinants predicting Median National Evaluation Scores at the LAU level (2022–2024).

Predictor	*B*	*SE*	*β*	*t*	*p*
(Constant)	2.770	.020	—	137.691	< .001
School status	.999	.006	.233	171.610	< .001
Operating mode	.638	.004	.239	175.439	< .001
Ownership type	1.241	.016	.103	76.274	< .001

***Note**: R = .364; R^2 = .133; Adjusted R^2 = .133; Standard error of the estimate = 1.218. Dependent variable: Median NE score at the LAU × year level, 2022–2024. Coefficients represent OLS estimates; funding type was excluded from the model due to perfect collinearity with ownership type.*

The mode explains only 13.3% of the variance in local educational performance, significantly lower than the human capital model. Nevertheless, the results are still meaningful given the scale of analysis. In this sense, the results reflect that school-level governance and organisation do exert a distinct influence, which is complementary to other local structural development factors.

The school's status, either with or without a legal personality ($\beta = .239$, $p < .001$), does reflect that educational units with a larger degree of administrative and managerial autonomy consistently outperform assigned school structures. Indeed, decentralisation and institutional autonomy are correlated with higher educational performance, especially through resource management and pedagogical flexibility.

Furthermore, the operating mode effect ($\beta = .103$, $p < .001$) showed that schools with a regular daily schedule perform better than those operating multi-shift or adapted programmes. Such organisational arrangements are typically found in rural or resource-constrained settings, where schools often combine multiple year groups or share limited facilities. These results align with the disparities in equality of opportunity highlighted by Hanushek and Woessmann (2010), which emphasise that structural constraints perpetuate inequalities in achievement.

As ownership and funding are less relevant to the results, their absence reflects Romania's highly centralised financing system. As funding type is perfectly collinear with ownership type ($r = 1.000$), the model cannot estimate both simultaneously. The findings are reflected in the educational legal framework, which states that private schooling at this level was marginal in terms of both number and geographical spread.

Why schools need autonomy? Institutional moderation of educational performance

School status, as an important factor of educational performance in lower secondary education, represents a satisfactory proxy for what we can relate to as *institutional autonomy*. In this sense, we will further analyse if the effect of local human development on educational performance (median NE score per locality per year) depends on the institutional status of the school. We choose a general moderation equation that was applied throughout a UNIANOVA test in SPSS, based on the formula below.

$$Y = \mu + \alpha Z + \beta X + (\alpha\beta)(XZ) + \varepsilon$$

- Y Median score at National Evaluation per locality per year
- X LHDI2018
- Z School status (dummy coded: 0 = legal personality, 1 = assigned structure)
- α Main effect of school status (categorical factor)
- β Main effect of LHDI (covariate)
- ε Error term

Table 8.

Moderation of the local development - educational performance relationship by institutional autonomy (school status).

Source	*df.*	*F*	*p*	*Partial η²*
LHDI2018 (local development)	1	94,127	< .001	.165
School status	1	3,237	< .001	.007
LHDI × School status	1	7,926	< .001	.016
Model fit	R^2 = .491	—	—	—

Note: *Parameter estimates are:* $Intercept = 3.202$; $\beta_{LHDI} = 0.062, p < .001$; $\beta_{School\ status} = 0.929, p < .001$; $\beta_{Interaction} = -0.028, p < .001$.

The results, summarised in the table above, proved a statistically significant interaction between LHDI and school status ($F(1, 476282) = 7926.15, p < .0001, n^2 = .016$). These results clearly show that the strength of the association between local human development and student performance depends on the institutional configuration of schools.

As LHDI has a strong main effect ($F = 94126.97, \eta^2 = .165$) on educational performance, demonstrating that socioeconomic context is the baseline determinant of student performance in National Evaluation, the institutional differentiation acts as an amplifier.

School status effect ($F = 3237.38, \eta^2 = .007$) indicates that schools with legal personality outperform assigned structures, even after accounting for local development factors. In this sense, schools that have a larger managerial and financial autonomy function as an amplifier of local potential. Through these schools, human and material capital at the community level can be more efficiently converted into positive learning outcomes, as outlined by Woessmann (2005) and Bray and Varghese (Bray & Varghese, 2011), whom emphasized that an increased governance flexibility enhances educational responsiveness.

The negative coefficient of the interaction term ($\beta_{Interaction} = -0.028, p < .001$) underlines that in satellite schools, the positive influence of LHDI on educational performance at NE is significantly weaker. This is particularly remarkable, as even in more developed localities, where schools lack legal status and depend administratively on larger institutions, developmental advantages fail to translate to a higher degree into better results. This suggests a *translation gap*, which is defined as a structural inefficiency whereby territorial prosperity does not automatically generate human capital gains without adequate institutional mediation.

The above moderation analysis provides quantitative confirmation of the broader theoretical claim that institutions do indeed shape the impact of socioeconomic structures on educational outcomes. For Romania, as well as other post-socialist countries, the results are particularly revealing. As decentralisation has been partial and uneven, autonomy gaps between schools contribute to the reproduction of inequalities

in opportunities, even within the same developmental region. Institutional efficiency, derived from autonomy, is a significant new factor in educational convergence, complementing the traditional focus on economic and territorial resources.

The results outline that though local human development provides the potential for educational achievement, it is the institutional organisation (and its autonomy) that determines the realisation of that potential. In the absence of institutional capacity, development is slightly inert. As pointed out by Sen (1999), the c*apability approach* applies to organisations, such as schools, as resources have meaning, particularly if individuals and organisations exercise agency.

Discussion and Conclusions

The analysis provided a comprehensive and multi-level understanding of early human capital formation in Romania by integrating structural, institutional and territorial determinants of educational performance. By linking the *Evaluarea Națională* results (2022–2024) with socioeconomic and institutional data at the LAU level, this study enhanced the empirical understanding of how local development, school organisation, and spatial context interact to shape learning outcomes.

A key finding was that the relationship between educational stock and local education performance (β = .572) is statistically strong. The statistical strength confirms the path-dependent nature of human capital formation. In this sense, localities with historically higher educational attainment continue to produce better performing cohorts, illustrating the cumulative and self-reinforcing mechanisms described by Myrdal (1957). This *circular and cumulative causation* demonstrates once again that educational performance cannot be separated from the historical geography of human capital.

Furthermore, the Local Human Development Index (LHDI) and income per inhabitant played significant, though smaller, roles. This positive but rather modest coefficient suggests that material prosperity alone is insufficient to generate educational convergence unless it is translated through the effective social and institutional mechanisms. These findings nuance conventional human capital theory, showing that while economic resources matter, these are not decisive in contexts with strong regional and institutional disparities.

The strong effect of educational attainment and the persistence of rural-urban inequalities indeed reflect the cumulative causation mechanism described in the theoretical section. This reinforces the idea that territorial disadvantages tend to reproduce themselves over time. This challenges the assumption that economic growth automatically improves educational outcomes. It also aligns with evidence from Central and Eastern Europe showing that increases in GDP have not consistently led to parallel improvements in social or educational indicators. This finding is particularly relevant for Romania and other Central and Eastern European countries that have started

to show an increase in economic indicators while neglecting social outcomes, including those related to education.

The rural-urban divide was consistently visible across all the models used in this paper, which underlines once again that it is one of the defining features of Romania's education system. Cities, through teacher concentration, resource density and parental education, outperform rural areas and produce a persistent territorial divergence in early human capital. Therefore, spatial inequality remains a major constraint on Romania's human development.

This reinforces structural spatial inequality rather than marginal performance differences. This aligns with international evidence that the urban concentration of resources strongly predicts educational advantages, as outlined by Hanushek and Woessmann (2010).

The most significant contribution of this present study is the demonstration that institutional characteristics moderate the effect of local development on educational performance. The moderation model revealed that schools with legal personality – those that have an enhanced administrative and financial autonomy – outperform assigned structures even after controlling for local human development ($F = 3{,}237$, $p < .001$). Furthermore, the significant interaction effect ($\beta_{Interaction} = -0.028, p < .001$) showed that territorial advantages translate less effectively into performance when schools are administratively dependent.

This result is particularly novel and policy-relevant, as it highlights institutional moderation as a crucial component missing from the traditional model of educational inequalities. Previous analysis typically focuses on economic or territorial disparities. The findings support the argument that institutions act as conversion mechanisms: even in socioeconomically developed regions, educational outcomes rely on how effectively schools do managerial and pedagogical agency. In the absence of institutional capacity, local prosperity does not automatically provide better learning outcomes – a phenomenon we relate to as a translation gap.

In this respect, the findings provide empirical support for Sen's (1999) capability framework as applied to organisations: resources alone do not automatically generate outcomes, but rather, outcomes are generated when institutional actors have the autonomy and capacity to transform resources into meaningful achievements.

The results confirmed that educational performance in Romania remains a deeply territorialised process, governed by the interplay of historical, institutional and other developmental forces. Structural variables such as education stock and LHDI explained much of the variance, but institutional moderation, especially school autonomy, defines how effectively local development translates into learning outcome. Thus, institutional autonomy emerges as an independent axis shaping not only organisational outcomes, but also educational trajectories.

The moderating role of institutional autonomy confirms the theoretical expectation that schools serve as mediating structures, capable of amplifying (or weakening) the influence of local surroundings on student achievement.

In this light, early human capital formation emerges as both an outcome and a driver of local development. Having a persistent rural-urban gap as well as the limited role of county-level governance highlights the need for more context-sensitive educational policies that indeed recognise the uneven geography of institutional capacity.

At a broader scale, our findings contribute to the international debate on territorial inequality and educational governance, demonstrating that, based on an EU member state case, convergence in education requires not only material investment but also institutional capability – that kind of capacity that schools and local systems need to transform resources into equitable learning opportunities. Policies that could upscale rural schools and improve their status as transmission nodes that receive resources but are unable to convert them effectively, rather similar to urban, more frequently autonomous schools that act as human capital multipliers.

Finally, the findings suggest reframing equity-oriented education policies. While "no child left behind" remains a guiding principle, the Romanian context indicates the need for "no locality left behind". Achieving educational equity in post-socialist Central and Eastern Europe depends now not only on economic growth but also on empowering people and building institutions to act as engines of human capital convergence. Thus, the findings address the empirical gap identified in the introduction by demonstrating that structural development alone cannot fully explain educational disparities. Rather, the design of institutions plays a crucial role in shaping how territorial resources translate into learning outcomes.

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