https://doi.org/10.26565/2524-2547-2026-73-04
UDC 331.101.262

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EDUCATION AS A CATALYST FOR HUMAN CAPITAL DEVELOPMENT: CONCEPTUAL AND EMPIRICAL INSIGHTS

Abstract. Human capital is a fundamental driver of long-term economic growth, productivity, and global competitiveness. In an increasingly knowledge-based economy, differences in growth performance across countries are largely explained not by the quantity of education, but by the quality of skills and competencies acquired through education systems. High-quality human capital enhances innovation capacity, facilitates the adoption of advanced technologies, and strengthens macroeconomic resilience, while persistent deficiencies in educational outcomes generate long-term productivity losses and widening development gaps.

Aim and tasks. This study aims to assess the macroeconomic effects of investment in human capital, with a particular focus on education quality, learning outcomes, and the efficiency of public spending. The paper examines international empirical evidence and comparative productivity trends to evaluate how education systems, higher education financing models, and innovation-oriented policies influence long-term economic growth and productivity dynamics.

Results. The findings indicate that learning outcomes have a strong and persistent positive impact on GDP growth and labor productivity. Modest gains in education quality generate substantial long-term economic returns, while increased spending without quality improvements yields limited effects. The analysis also highlights significant productivity divergence between advanced economies, largely driven by differences in investment in human capital, research, and innovation. Education systems that are poorly aligned with labor market needs and innovation ecosystems create fiscal inefficiencies and constrain growth potential.

Conclusions. The study concludes that human capital investment must prioritize quality, system efficiency, and innovation linkages rather than expansion alone. Strategic investment in early education, higher education, and research-oriented institutions is essential for sustaining long-term growth and preventing productivity divergence. An integrated policy approach linking education, innovation, and economic development is critical for enhancing competitiveness and ensuring durable economic resilience.

Keywords: Human capital, Macroeconomic growth, Investment in education, Innovation.

JEL Classification: I25; O15; O40; E24.

In cites: Kintsurashvili, L. (2026). Education as a catalyst for human capital development: conceptual and empirical insights. *Social Economics,* 73, 46–57. https://doi.org/10.26565/2524-2547-2026-73-04

Introduction. Human capital is universally recognized as one of the most vital internal resources underpinning economic development. At the national level, both labor productivity and the country's competitive standing in the international marketplace are directly contingent upon the volume and qualitative dimensions of its

human capital stock. The primary objective of capital investments in human capital is the amelioration of individuals' knowledge, health, and skill sets, which, in turn, ensures a sustainable, long-term increase in labor efficiency and productivity.

The object of the study is human capital, considered as a fundamental and multidimensional driver of long-term economic development, encompassing the accumulation of knowledge, skills, and health that collectively determine the productive capacity of an economy.

The subject of the study is the mechanism through which human capital development: particularly via investment in education, vocational training, and skills formation affects key macroeconomic outcomes, including labor productivity, economic growth, and national competitiveness, as well as the extent to which these effects contribute to sustainable and knowledge-based economic transformation.

These critical investments encompass key domains such as formal education, vocational training, healthcare provision, and migratory dynamics. Empirical research consistently demonstrates that investment in education yields the highest rate of return among these sectors (Khitarishvili, 2010).

Targeted investment in education serves as a direct stimulus for the growth of the Gross Domestic Product (GDP), thereby establishing the requisite conditions for the systematic elevation of the workforce's qualifications. Strengthening the educational system enhances the populace's accessibility to high-quality knowledge, which is indispensable for the modernization of the economy and the effective absorption of innovation (Psacharopoulos & Patrinos, 2018). Human capital development is no longer merely an instrument of social policy; the experience of developed economies positions it as the foremost strategic pillar of economic progression (Chakrabarti et al., 2020). Moreover, in the context of persistent globalization (Bedianashvili & Tsartsidze, 2023), the robust augmentation of human capital constitutes a geopolitical and commercial prerequisite for the nation.

This paper contributes to sustainable economic development by highlighting the strategic role of human capital in fostering labor productivity, innovation and national competitiveness. Human capital serves as a foundational resource for economic growth and its effective development aligns with global priorities that emphasize inclusive and knowledge-based economies.

Investment in education, health and skills formation not only enhances workforce efficiency but also supports the capacity of economies to adapt to structural and technological changes. Strengthening human capital is therefore central to promoting long-term sustainable development and economic resilience in the context of rapid globalization.

Despite extensive research on the role of human capital in economic growth, there is still a limited understanding of how investments in education and skills interact with broader economic processes to influence productivity and national competitiveness. Most studies have focused on the individual contributions of education to economic performance, while fewer have addressed the integrated effects of human capital components on sustainable development outcomes.

The objectives of the paper are to assess the role of human capital in enhancing labor productivity. It explores the theoretical and empirical relationships between human capital development and key macroeconomic indicators, including labor productivity and GDP. Particular emphasis is placed on assessing the effectiveness of investment in education as a primary driver of human capital accumulation and on examining its relative returns in comparison with other forms of investment and to consider the broader implications of human capital accumulation for national competitiveness and resilience in the global economy. In this context, the growing significance of human capital reflects its transformative role in shaping modern economic systems and enhancing their adaptability to rapid structural changes. As economies become increasingly knowledge-based, the capacity to generate, accumulate and effectively utilize human capital emerges as a crucial factor for long-term development.

Literature Review. The maximization of economic returns from resources invested in education is contingent upon a policy framework that is rigorously concentrated on learning outcomes. The seminal work by Hanushek and Woessmann compellingly asserts that the quality of cognitive proficiency, rather than the mere quantum of years spent in educational institutions, constitutes the decisive leverage point for sustained economic growth. This conclusion mandates a cardinal shift in policy focus toward enhancing

ISSN 2524-2547 *Соціальна економіка / Social Economics*. 2026. Випуск/Issue 73

systemic internal efficiency, elevating teacher qualifications, and refining curricular design.

Their empirical quantification delineates that a modest 25-point amelioration in PISA scores across the European Union would cumulatively engender an economic expansion valued at an estimated 71 trillion euros in GDP growth over the long-term horizon. Such strategic investment in human capital serves as the paramount indicator of heightened productivity, vastly eclipsing the efficacy and durability of any transient cyclical fiscal stimulus.

Conversely, if educational policy is not strictly anchored to demonstrable improvements in outcomes, allowing for the inertial escalation of expenditures without a commensurate surge in quality, this approach proves inherently suboptimal. Resource allocation that fails to directly advance cognitive skills yields negligible economic benefits, thereby fabricating a fiscal deficit within the education sector a deficit not rooted in a scarcity of funds, but in their unproductive deployment.

Securing the stability and robustness of educational quality is pivotal for a nation's macroeconomic resilience. Research conducted by Hanushek et al. (2020) comprehensively assessed the protracted economic consequences stemming from global schooling disruptions. The study identified that the educational system's failure in 2020 resulted in projected lifetime income losses equivalent to approximately 3% reduction for the affected student cohorts. At the national aggregate level, the resultant deceleration of the long-term growth trajectory is forecasted to manifest as an average of 1.5% lower annual GDP growth extending until the close of the current century. This empirical finding unequivocally confirms that even an abrupt degradation in educational quality instantly precipitates enduring macroeconomic impairments. Consequently, policy resistance in implementing essential educational reforms represents a direct and demonstrable fiscal liability.

Innovation is strongly correlated with the quality of human capital and serves as the principal impetus for economic expansion in developed nations. The composition of human capital, including both the quality and distribution of educational attainment, significantly shapes technological progress and sustained economic development (Carillo, 2024). The rigorous analysis by Biasi, Deming, and Moser substantiates that education, particularly facilitated by concentrated research investments in university settings, plays a critical role in catalyzing innovative activity (Biasi et al., 2021).

Education is widely acknowledged as a critical driver of human capital development, influencing not only individual skill acquisition but also broader socio-economic outcomes (Li et al., 2025; Wang et al., 2016). In recent years, empirical studies have increasingly focused on how various forms of education, from primary schooling to tertiary and vocational programs, contribute to human capital formation, productivity, and labor market performance.

The combined effects of labor force characteristics and human capital development have been shown to significantly enhance productivity in the manufacturing sector, with evidence suggesting that investments in human capital aligned with workforce composition and structure can effectively improve production efficiency (Babasanya et al., 2024). These findings

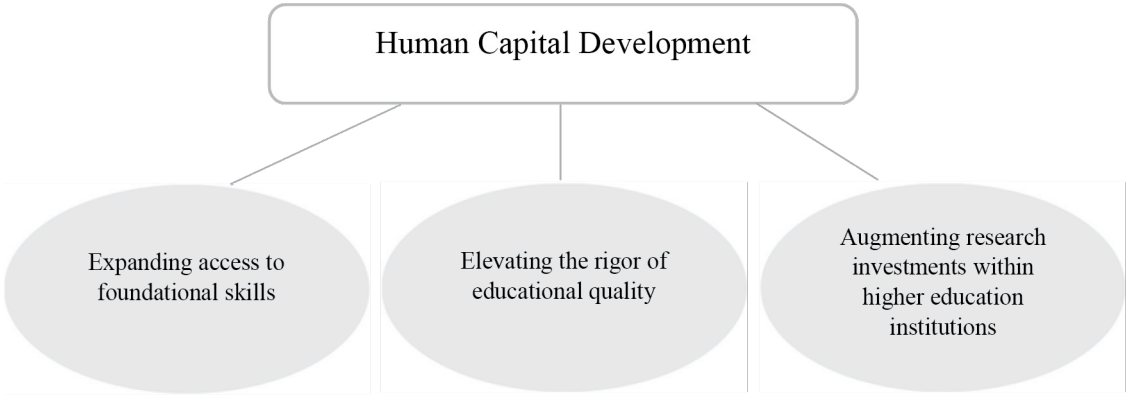

Fig. 1. Interconnected Policy Thrusts for Human Capital Development

highlight the importance of human capital in driving sectoral performance and economic growth, particularly in contexts where labor dynamics and skill development are closely interconnected.

Recent literature further extends the discussion by emphasizing the growing importance of advanced technologies in education systems. Investment in artificial intelligence (AI) in education and training has been found to have a positive and statistically significant impact on economic growth, reinforcing the link between technologically enhanced human capital and macroeconomic performance (Kirikkaleli & Kirikkaleli, 2025).

Zhang et al. (2025) emphasize the mediating role of social capital, showing that human capital development is closely linked to employability and job quality among graduates. Roldan Villela shows that in Honduras, higher educational attainment improves workforce productivity, emphasizing the cross-country relevance of education policies. Empirical firm-level analyses in OECD countries show that investment in higher education significantly increases innovation outputs and overall human capital productivity.

A highly skilled labor pool fosters the environment required to execute complex research and development processes. An effective human capital strategy, therefore, necessitates the concurrent advancement of three interconnected policy thrusts:

1. Expanding access to foundational skills.
2. Elevating the rigor of educational quality.
3. Augmenting research investments within higher education institutions.

The capacity of a national economy to effectively assimilate and implement global technological advancements is vitally instrumental for its economic competitiveness. Research conducted within the context of the European Central Bank (ECB) underscores that the accretion of human capital enhances the aptitude of firms to optimize the efficiency of production processes through the utilization of technologically sophisticated machinery. Conversely, a deficit in human capital inherently constrains a country's seamless integration into high-value global supply chains.

The global study by Contreras, Galindo and Lepe (2025) empirically validated that superior educational attainment significantly amplifies the effect of education expenditure on aggregate economic growth. This pivotal finding suggests that investment in human capital is disproportionately productive in economic environments already characterized by a high initial endowment of human capital stock. Thus, if a nation possesses robust foundational cognitive skills, each incremental resource deployed generates a higher marginal economic return.

A rigorous investigation by the International Monetary Fund (Cevik, Naik, & Primus, 2024) established that the impact of human capital is more pronounced in technologically advanced nations. This implies that in developed economies, human capital functions not merely as a mechanism for overcoming developmental lag, but rather as a critical factor that elevates the capacity for generating novel knowledge and expanding the very frontiers of economic potential. Policies aimed at fortifying human capital must therefore be strategically oriented toward maximizing this advanced potential. In this context, national policy frameworks increasingly recognize the need to prioritize education and skills development as core components of economic strategy. For instance, Georgia's draft state budget explicitly highlights investments in education and human capital as essential for enhancing productivity, supporting innovation, and ensuring long-term economic resilience[1]. However, evidence from the National Statistics Office of Georgia points to persistent challenges related to skill mismatches and the limited alignment between educational outcomes and labor market demands, suggesting that increases in educational attainment do not automatically translate into higher productivity gains[2].

A significant divergence in productivity growth trajectories has been observed between the Euro Area and the United States since 2020. A report by Dias da Silva et al. (2024) noted that within the period spanning the fourth quarter of 2019 and the second quarter of 2024, labor productivity per hour worked in the Euro Area registered a meager increase of only 0.9%, while the United States recorded a robust growth of 6.7%.

1 Citizen's guide 2025: Draft state budget law. Ministry of Finance of Georgia (MFO). URL: https://www.mof.ge/ka/fl/mokalakis_gzamkvlevi?page=1 (date of access: 25.01.2026).

2 National Statistics Office of Georgia (Geostat). URL: https://www.geostat.ge (date of access: 25.01.2026).

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Table 1. Labor Productivity Divergence: The United States versus the Euro Area (Q4 2019–Q2 2024)

Indicator	Eurozone Growth	USA Economic Growth	Outcomes of Human Capital Policy
Labor Productivity Growth (Per Hour Worked)	+0.9%	+6.7%	The European economy exhibits a deficit relative to the United States regarding investment in innovation and intangible capital.
Identified Challenges	Cyclical Factors and Research Deficiencies	Policies aimed at fortifying human capital must be holistically integrated with the promotion of research and innovation incentives.	

Source: Author's Own Compilation based on Dias da Silva et al. (2024)

This divergence is largely attributable to Europe's lag in investment across both research and intangible capital. For the Georgian economy, these figures serve as a critical warning regarding the risk of technological obsolescence. Policy governing human capital must be holistically integrated with the promotion of research and innovation incentives to effectively surmount this structural deficit.

Research Methodology. GDP per capita data were used as a proxy for economic development, while education system indicators were employed to assess human capital formation and its potential association with income levels. The education variables include enrolment at pre-primary, primary, secondary, and tertiary levels relative to the corresponding school-age population, government education expenditure as a percentage of GDP, and the share of total government expenditure allocated to education. These variables collectively allow an evaluation of whether more developed and well financed education systems correspond to higher income per capita across countries.

Data were collected from six countries representing diverse economic and institutional contexts: Georgia, Latvia, Sweden, Switzerland, Ukraine, and the United States. The selection includes post-Soviet transition economies (Georgia and Ukraine), a Baltic EU member country (Latvia), advanced European economies (Sweden and Switzerland), and a global frontier economy (United States). High-income economies serve as benchmark cases to evaluate structural differences in education systems and economic outcomes relative to transition and developing economies.

Table 2. School Age Population by Education Level (in thousands)

Country or territory	School-age population (000)			
	Pre-primary	Primary	Secondary	Tertiary
Georgia	207	334	290	205
Latvia	83$_i$	124$_i$	122$_i$	88$_i$
Sweden	486$_i$	754$_i$	736$_i$	585$_i$
Switzerland	179$_i$	537$_i$	608$_i$	454$_i$
Ukraine	1,090$_i$	1,828$_i$	3,160$_i$	1,879$_i$
United States	11,637$_i$	24,254$_i$	25,853$_i$	22,505$_i$

Source: Author's Own Compilation based on World Bank statistics

The inclusion of post-Soviet countries is particularly relevant, as Georgia and Ukraine share historical educational legacies and institutional frameworks, yet demonstrate divergent economic performances. Latvia provides an intermediate case, reflecting successful EU integration and convergence toward higher income levels. This combination allows for meaningful cross-country comparisons, highlighting differences in both fiscal commitment and enrolment coverage across all education stages.

Georgia has a relatively small school-age population across all education levels compared with larger countries like the United States or Ukraine.

The United States has the largest population in each education stage, particularly in secondary and tertiary education.

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In Europe, Sweden and Switzerland have similar trends: high primary and secondary populations relative to pre-primary, showing strong enrollment in compulsory education.

Latvia's population is the smallest among these European countries, reflecting its overall smaller population size.

Ukraine shows a significant increase in secondary and tertiary populations, indicating a large youth cohort transitioning through higher education.

The enrolment data across different educational levels: pre-primary, primary, secondary, and tertiary reveals several notable patterns among the selected countries and territories.

Firstly, there is a clear positive correlation between the level of development and the scale of enrolment. High-income countries, such as the United States, Sweden, and Switzerland, exhibit substantially higher absolute enrolment figures at all educational levels compared to smaller or lower-income countries like Georgia and Latvia. For instance, the United States shows a pronounced scale across all stages, with 8,297,000 children in pre-primary, 23,520,000 in primary, 25,200,000 in secondary, and 17,860,000 in tertiary education. This reflects both the country's large population and its comprehensive education infrastructure.

Secondly, the distribution across educational levels varies by country. In Sweden and Switzerland, secondary enrolment surpasses primary enrolment, indicating high retention and transition rates within the education system. For example, Sweden reports 1,009,000 students at the secondary level, exceeding its primary enrolment of 878,000. This pattern may reflect delayed school entry, effective policies promoting progression, or a strong emphasis on upper secondary education.

In contrast, Georgia, Latvia, and Ukraine display relatively balanced distributions across primary and secondary levels, although Ukraine demonstrates markedly higher absolute numbers, reflecting its larger population. In Georgia, primary enrolment (345,000) exceeds secondary enrolment (303,000), which may indicate early school dropout or demographic trends affecting the youth population.

Tertiary enrolment exhibits considerable variation and appears proportionally lower relative to primary and secondary enrolment in smaller countries. For instance, Georgia's tertiary enrolment of 165,000 represents roughly 11% of the total school-age population across all levels, whereas in Sweden and Switzerland, tertiary enrolment constitutes a more substantial proportion of the population, suggesting stronger access to higher education opportunities. The United States again stands out, with tertiary enrolment of 17,860,000, indicating both high participation rates and extensive higher education infrastructure.

Overall, the trends highlight three key dynamics: (1) population size and economic development significantly influence absolute enrolment figures, (2) higher retention and progression are more pronounced in wealthier countries, particularly in secondary and tertiary education, and (3) smaller or less affluent countries face challenges in achieving proportionate tertiary enrolment relative to the population completing secondary education. These patterns underscore the interplay between demographic factors, policy frameworks,

Table 3. Educational Enrolment Trends Across Selected Countries

Country or territory	Enrolment (000)			
	Pre-primary	Primary	Secondary	Tertiary
Georgia	149	345	303	165
Latvia	82	119	124	77
Sweden	471	878	1,009	484
Switzerland	182	539	617	339
Ukraine	827	1,524	2,645	1,441
United States	8,297	23,520	25,200	17,860

Source: Author's Own Compilation based on World Bank statistics

Table 4. Government Education Expenditure and GDP per Capita[1]

Country or territory	Government education expenditure (% of GDP)	GDP per capita (current US$)
Georgia	3.7	8,284
Latvia	4.6	22,710
Sweden	7.6	54,950
Switzerland	4.9	100,624
Ukraine	5.9	5,140
United States	5.4	81,032

Source: Author's Own Compilation based on World Bank statistics

1 World Bank Open Data. World Bank. URL: https://data.worldbank.org/ (date of access: 15.01.2026).

and educational capacity across different national contexts.

The presented data illustrate the relationship between government expenditure on education, measured as a percentage of GDP, and GDP per capita across selected countries and territories. Notably, Sweden allocates the highest proportion of its GDP to education (7.6%), coinciding with a high GDP per capita of USD 54,950, suggesting a potential association between substantial public investment in human capital and elevated economic performance. Switzerland exhibits a moderate education expenditure (4.9%) but the highest GDP per capita (USD 100,624), indicating that while government investment in education is important, other factors also contribute to economic affluence. In contrast, Georgia demonstrates a relatively low education expenditure (3.7%) alongside a modest GDP per capita of USD 8,284, reflecting constrained fiscal allocation to education and limited economic output per individual. Latvia (4.6%; USD 22,710), Ukraine (5.9%; USD 5,140), and the United States (5.4%; USD 81,032) occupy intermediate positions, highlighting diverse national approaches to funding education relative to economic capacity. Overall, the data suggest that while higher investment in education often aligns with higher GDP per capita, this relationship is mediated by broader structural, institutional, and economic contexts.

Main Results. The results presented in Tables 1 and 2 reveal substantial cross-country heterogeneity in both the size of the school-age population and enrolment coverage across educational levels. As expected, absolute population and enrolment figures closely reflect national demographic scale, with the United States and Ukraine exhibiting markedly larger cohorts at all stages of education compared to smaller European countries such as Georgia and Latvia.

Despite these differences in scale, notable structural patterns emerge. In all countries, primary and secondary education account for the largest shares of the school age population, reflecting the compulsory nature of these levels. Advanced economies, particularly Sweden and Switzerland, display relatively balanced distributions between primary and secondary cohorts, suggesting stable demographic transitions and sustained participation throughout compulsory education. In contrast, Georgia and Latvia show a gradual decline in cohort size moving from primary to secondary levels, which may reflect demographic contraction, migration, or early exit from the education system.

Enrolment figures further illuminate differences in system performance. High-income countries consistently demonstrate near-universal enrolment at primary and secondary levels, with secondary enrolment exceeding primary enrolment in Sweden and Switzerland. This pattern indicates strong retention rates and effective institutional mechanisms supporting progression through upper secondary education. By contrast, Georgia and Ukraine exhibit lower secondary enrolment relative to primary cohorts, suggesting potential challenges related to dropout risks, economic constraints, or institutional capacity.

Tertiary enrolment displays the greatest degree of cross-country variation and appears most strongly associated with economic development. In high-income economies, tertiary enrolment constitutes a substantial proportion of the school-age population. Sweden, Switzerland, and the United States demonstrate extensive participation in higher education, reflecting both strong demand for advanced skills and well-developed higher education infrastructure.

In contrast, transition economies exhibit comparatively limited tertiary enrolment coverage. In Georgia, tertiary enrolment represents a considerably smaller share of the population completing secondary education, indicating a narrowing of the educational pipeline at higher levels. Ukraine, while exhibiting large absolute numbers due to population size, similarly shows weaker proportional participation in tertiary education relative to advanced economies. These findings suggest that constraints on access to higher education - whether financial, institutional, or labor-market driven remain a critical barrier to human capital accumulation in lower-income contexts.

Overall, the results indicate that while basic education coverage has largely converged across countries, tertiary education remains a key differentiating factor in human capital formation and economic stratification.

Table 3 presents government education expenditure as a percentage of GDP alongside GDP per capita, revealing a nuanced relationship between fiscal commitment to education and economic outcomes. Countries with higher income levels generally allocate a substantial share of national resources to

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education, although the relationship is not strictly linear.

Sweden stands out as the country with the highest education expenditure relative to GDP (7.6%), accompanied by a high GDP per capita, suggesting a strong alignment between sustained public investment in education and economic prosperity. The United States and Switzerland achieve high GDP per capita with moderate education expenditure shares, indicating that while education spending is essential, economic performance is also shaped by broader structural factors such as productivity, innovation capacity, and institutional quality.

Conversely, Georgia exhibits the lowest education expenditure share (3.7%) alongside a relatively low GDP per capita, reflecting both limited fiscal capacity and constrained investment in human capital. Ukraine presents an instructive case: despite allocating a relatively high share of GDP to education (5.9%), GDP per capita remains low, highlighting the role of macroeconomic instability, institutional inefficiencies, and external shocks in weakening the translation of education spending into economic returns.

Taken together, the results suggest a positive but mediated relationship between education system strength and income per capita. Higher-income countries tend to combine three reinforcing characteristics: high enrolment coverage across all education levels, strong retention into secondary and tertiary education, and sustained public investment in education. These factors collectively support advanced human capital formation, which aligns with higher productivity and income levels.

Conclusion. Human capital constitutes the foremost factor of macroeconomic growth, whose productivity is contingent upon the quality of learning and the initial level of human capital. The strengthening of human capital is an indispensable prerequisite for the effective adoption of global technological progress and for mitigating the risk of productivity divergence. Investment in human capital must be viewed as a quality-oriented fiscal policy aimed at eliminating fiscal deficits caused by the inefficient utilization of resources.

In the contemporary economic environment, human capital represents significantly more than simply the number of employees. It encompasses the collective capacity for individuals to update their skills and knowledge, which fundamentally determines the potential for economic value creation.

This study provides a comparative perspective on the interaction between demographic structure, educational participation, and public investment in education across countries at different stages of economic development. By jointly examining school-age population dynamics, enrolment coverage across educational levels, and education expenditure relative to GDP, the analysis offers an integrated view of how education systems contribute to human capital formation and income differentiation.

The findings demonstrate that convergence has largely been achieved in basic education, particularly at the primary level, where enrolment rates are high across both advanced and transition economies. This reflects the global diffusion of compulsory education frameworks and the prioritization of foundational human capital. However, the persistence of cross-country disparities at the secondary level most notably in Georgia and Ukraine indicates that retention beyond primary education remains sensitive to demographic pressures, migration, economic constraints, and institutional capacity. These structural vulnerabilities suggest that universal access alone is insufficient; sustained participation and progression are equally critical dimensions of educational effectiveness.

The most pronounced divergence emerges in tertiary education, which functions as a key stratifying mechanism in the international distribution of human capital. Advanced economies exhibit broad and sustained participation in higher education, reinforcing their capacity to generate high-skill labor, foster innovation, and sustain productivity growth. In contrast, the relatively narrow tertiary pipeline observed in transition economies signals a structural bottleneck in human capital accumulation. Limited access to higher education whether driven by affordability, institutional quality, or labor-market incentives constrains the translation of basic educational attainment into advanced skills and long-term economic returns.

Public expenditure patterns further underscore the mediated relationship between education and economic performance. While higher-income countries generally maintain substantial and stable investment in education, the results show that spending

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intensity alone does not guarantee superior economic outcomes. The contrast between Sweden and Ukraine illustrates that the effectiveness of education expenditure depends critically on complementary factors, including macroeconomic stability, governance quality, institutional efficiency, and the alignment between education systems and labor-market demand. Education investment thus operates not as an isolated driver of growth, but as part of a broader development ecosystem.

Taken together, the evidence suggests that economic stratification across countries is increasingly shaped by differences in post-secondary educational capacity rather than by access to basic education. Countries that successfully combine high enrolment continuity, strong tertiary participation, and effective public investment are better positioned to achieve sustained income growth and resilience to structural change. For lower-income and transition economies, policy priorities should therefore extend beyond expanding enrolment to improving retention, strengthening tertiary education access, and enhancing the efficiency and targeting of education spending.

The focus of investment in human capital must shift towards enhancing internal system efficiency, improving teacher qualifications, and advancing cognitive abilities. This represents the sole pathway to achieving the maximum economic return on expenditures incurred and to prevent non-optimal spending. The strategic development of human capital must incorporate increasing research investments in universities, thereby ensuring the synchronization of human capital potential with innovative activity, which is essential for expanding economic frontiers. Paramount attention must be dedicated to ensuring the quality of the initial level of human capital and the achievements of higher education. Policies that fail to ensure high investment in the formation of foundational qualifications automatically diminish the return on all subsequent capital investments.

It is imperative that the strengthening of human capital be addressed not in isolation, but as a comprehensive, strategic element of the country's development. It must be integrated with economic, social, and environmental policies. Such an all-encompassing approach will enable the creation of systems that support the nation's sustainable development and the enhancement of citizen welfare.

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ОСВІТА ЯК КАТАЛІЗАТОР РОЗВИТКУ ЛЮДСЬКОГО КАПІТАЛУ: КОНЦЕПТУАЛЬНІ ТА ЕМПІРИЧНІ ПОГЛЯДИ

Людський капітал є основною рушійною силою довгострокового економічного зростання, продуктивності та глобальної конкурентоспроможності. В умовах економіки, що дедалі більше базується на знаннях, відмінності у темпах зростання між країнами значною мірою пояснюються не обсягом освіти, а якістю навичок і компетентностей, набутих завдяки системам освіти. Високоякісний людський капітал підвищує інноваційний потенціал, сприяє впровадженню передових технологій та зміцнює макроекономічну стійкість, тоді як постійні недоліки в результатах освіти призводять до довгострокових втрат продуктивності та поглиблення розривів у рівні розвитку.

Мета та завдання. Це дослідження має на меті оцінити макроекономічні ефекти інвестицій у людський капітал, приділяючи особливу увагу якості освіти, результатам навчання та ефективності державних видатків. У статті аналізуються міжнародні емпіричні дані та порівняльні тенденції продуктивності з метою оцінки того, як системи освіти, моделі фінансування вищої освіти та інноваційно-орієнтована політика впливають на довгострокове економічне зростання та динаміку продуктивності.

Результати. Отримані дані свідчать про те, що результати навчання мають сильний і стійкий позитивний вплив на зростання ВВП та продуктивність праці. Навіть незначне підвищення якості освіти приносить істотну довгострокову економічну віддачу, тоді як збільшення видатків без поліпшення якості дає обмежений ефект. Аналіз також висвітлює значні розбіжності в рівні продуктивності між розвиненими економіками, що значною мірою зумовлені відмінностями в обсягах інвестицій у людський капітал, наукові дослідження та інновації. Системи освіти, які недостатньо узгоджені з потребами ринку праці та інноваційними екосистемами, призводять до неефективного використання бюджетних коштів та обмежують потенціал зростання.

Висновки. У дослідженні зроблено висновок, що інвестиції в людський капітал повинні надавати пріоритет якості, ефективності системи та зв'язкам з інноваціями, а не лише розширенню. Стратегічні інвестиції в дошкільну освіту, вищу освіту та науково-дослідні установи є необхідними для забезпечення сталого довгострокового зростання та запобігання розбіжностям у продуктивності. Інтегрований

підхід до політики, що поєднує освіту, інновації та економічний розвиток, має вирішальне значення для підвищення конкурентоспроможності та забезпечення стійкої економічної стійкості.

Ключові слова: людський капітал, макроекономічне зростання, інвестиції в освіту, інновації.

JEL Classification: I25; O15; O40; E24.

Конфлікт інтересів: автор повідомляє про відсутність конфлікту інтересів.
Автор підтверджує, що при написанні наукової статті ресурс штучного інтелекту не використовувався.

Conflict of Interest: The author declares no conflict of interest.
The author confirms that no artificial intelligence resources were used in the writing of the scientific article

Стаття надійшла до редакції 01.02.2026 р.
Стаття пройшла рецензування 05.03.2026 р.
Стаття рекомендована до друку 24.03.2026 р.
Стаття опублікована 31.03.2026 р.

Received: 01 February 2026
Revised: 05 March 2026
Accepted: 24 March 2026
Published: 31 March 2026