Central European Management Journal

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The impact of education on productivity and externalities of economic development and social welfare: a systematic literature review

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Received 12 April 2024
Revised 24 August 2024
Accepted 7 April 2025

Abstract

Purpose – The factors that determine economic development, and their interrelationships and contextualization, have diachronically concerned policymakers across governments and organizations. Among these, the level of education, inequalities and other external factors strongly influence economic development and naturally lie at the epicenter of evolving scientific research. This study identifies and congregates the key articles related to education to develop a comprehensive understanding of how the internalization of externalities can boost economic development. It also prescribes the aims and means of policy-making intervention toward the reduction of educational inequalities and the permeation of externalities of education into the global economy.

Design/methodology/approach – This article will undertake a systematic review of the literature using two distinct databases, namely EBSCOhost and SCOPUS, within the realm of education. The objective is to conduct descriptive and thematic analyses of articles about global educational benefits. The focus is on understanding how education contributes to economic development, either through direct means such as enhancing skills leading to increased labor productivity or by generating positive externalities. The review aims to explore the correlation between education levels and GDP growth, emphasizing the imperative of internalizing these externalities. Additionally, the article intends to propose recommendations for future research in this area.

Findings – Education is a key driver of economic growth for both developed and developing countries, benefiting nations, firms and individuals alike. A well-educated population enhances innovation, productivity and social stability, leading to sustained economic development. At the firm level, investment in education fosters a skilled workforce essential for competitiveness. Individuals with higher education enjoy better job prospects and earning potential, contributing to overall economic health. In today's volatile social and economic climate, it is crucial for governments and companies to collaborate, internalizing the positive externalities of education to advance sustainability and economic resilience.

Originality/value – Many studies have been conducted to highlight the important role of education in different countries across the world. The purpose of this study is to find common features and establish a common ground that can be internationally applied both in developed and developing economies, to rethink and update their

Central European Management Journal
Vol. 34 No. 1, 2026
pp. 89-112
Emerald Publishing Limited
e-ISSN: 2658-2430
p-ISSN: 2658-0845
DOI 10.1108/CEMJ-04-2024-0124

policies and to adjust them appropriately so that they can synchronize and keep up with the significant global changes in economic and social conditions.

Keywords Externalities, Economic growth, Education, Inequality, Economic development, Social welfare, Government intervention, Systematic

Paper type Literature review

Introduction

Economic development has always been the predominant goal of all economies. According to economic development theories, beyond maintaining a high steady-state, countries tend to converge with the developing ones exhibiting higher growth rates and approaching developed countries to the most possible extent. However, the effort for further expansion is imperious as existing conditions and the environment are unceasingly evolving and fluctuating, physical resources are becoming gradually rare, and governments are reaching a point where they must discover different ways to upsurge production and their gross domestic product (GDP). Holistic innovation and transformation seem to be the solution to business problems and economic crises (Chatzinikolaou & Vlados, 2023).

One of these ways is the internalization of the positive externalities generated by education. If properly managed by policymakers, the increase in knowledge, the cultivation of skills and abilities, the promotion of research and development, and the reduction of educational inequalities can actively contribute to the increase in production according to past research. A higher level of education can guarantee the spread of science and technology and the promotion of scientific and technological accomplishments (Mathias, 2023), thus, leading to an increase in international cooperation (Özdoğan Özbal, 2021; OECD, 2022). According to Hanushek and Woessmann (2020), this is important for both developed and developing countries as the knowledge capital of the population strongly correlates to economic growth.

These aspects require special attention at both business and government levels to gain the desired results. Companies have to train and educate their employees in such a way as to increase productivity and achieve advanced performance levels (Jones & Jenkins, 2018). However, earlier-developed cognitive capabilities are necessary to shape a good base for this procedure. Regarding the governments, previous research suggests that educational results depend on the share of educational expenses in GDP (Barro & Lee, 2015; Awaworyi, Ugur, & Yew, 2017), thus governments should be forced to increase their investment in the educational sector. This is consistent with previous research as Cheung and Chan (2008) had already suggested that better educational levels might help countries to be competitive and sustainable in a knowledge-based international economic environment.

Education is of major importance not only in quantity but also in quality terms and the relation between the quality of education and economic growth is always of highest importance (Goczek, Witkowska, & Witkowski, 2021). Hess (2016) complements this research by suggesting that the relationship between human capital and economic growth is a crucial factor for a well-functioning strong economy. Hanushek and Woessmann (2020) confirmed the intuitive importance of high-quality education stating that the better the quality of education, the higher the expected economic growth, which is consistent with Wensley and Evans' (2020) findings.

There exist many studies conducted to highlight the important role of education in different countries across the world. The purpose of this study is to find common features and establish a common ground that can be internationally applied both in developed and developing economies, to rethink and update their policies, and to adjust them appropriately so that they can synchronize and keep up with the significant global changes in economic and social conditions. We conducted a systematic literature review to gather existing scientific articles on this specific topic, consolidate the key findings of these studies, and present proposals for all countries to leverage the field of education toward a more sustainable future for everyone. The research questions under examination were:

(1) How can education contribute to economic development and growth?

(2) How can governments internalize the positive externalities and boost economic growth?

The present systematic review applies a specific protocol, to search and critically analyze existing literature (Leonidou, Christofi, Vrontis, & Thrassou, 2020). For comprehensive coverage, we followed a procedure including six steps that are analytically presented in this article: (1) question formulation, (2) defining the review protocols, (3) descriptive analysis of the results, (4) thematic analysis of the results, (5) theoretical and practical implications, and, (6) conclusions and avenues for future research.

Question formulation and review protocols

Question formulation

A systematic review is driven by a review question, from which search strings for the scientific database searches are defined (De Menezes & Kelliher, 2011). Two different questions drove this review as defined in section 1, "How can education contribute to economic development and growth?" and "How can governments internalize the positive externalities and boost economic growth?"

Definition of the review protocols

After selecting the appropriate databases for this research (EBSCOhost and Scopus), we confined our research to only peer-reviewed articles written in English, as indicated by Carrera-Rivera, Ochoa, Larrinaga, and Lasa (2022), to study the relationship between education level and economic growth. Following that, we developed a collection of keywords for in-depth analysis that were not limited to a specific window of time, thereby including all relevant publications up to January 2024. The search string that we used in our research was (Any field contains education OR "education system" OR "educational system" OR "education inequalities" OR "inequalities in education" OR "population inequalities" AND Any field contains skills OR "labor productivity" OR "labour productivity" OR "labor market" OR "labour market" OR creativity OR competitiveness OR "human capital" OR "GDP growth" OR "Gross Domestic Product growth" OR "GDP" OR "Gross Domestic Product" OR "economic growth" OR externalities OR "social welfare" OR welfare OR "social capital").

Subsequently, we excluded articles that did not meet the criteria set by John and Lawton (2018), focusing on leading business journals. The literature review then specifically targeted journals with rankings of 4*, 4, and 3 according to the 2021 Association of Business Schools Academic Journal Quality Guide (ABS 2021), as indicated by Mabey (2012). In line with the guidelines by Christofi, Vrontis, and Cadogan (2019), we excluded articles that were not peer-reviewed, including conference proceedings and book chapters, those not in English, and those unrelated to the subject.

The initial research, using only the keywords, resulted in 2,366,051 articles and 1,723,678 articles in EBSCOhost and SCOPUS Database, respectively. After applying the inclusion and exclusion criteria, the research resulted in 24 articles from EBSCOhost and 25 articles from the SCOPUS database. Figure 1 illustrates the flow diagram.

Descriptive analysis of the results

In this section, we present an in-depth examination of the articles derived from the systematic review. The statistical information encompasses various attributes, such as their temporal distribution, article types and methodologies, journals, research field and rankings, authorship analysis, and target populations. In the subsequent thematic analysis, the reader will find these

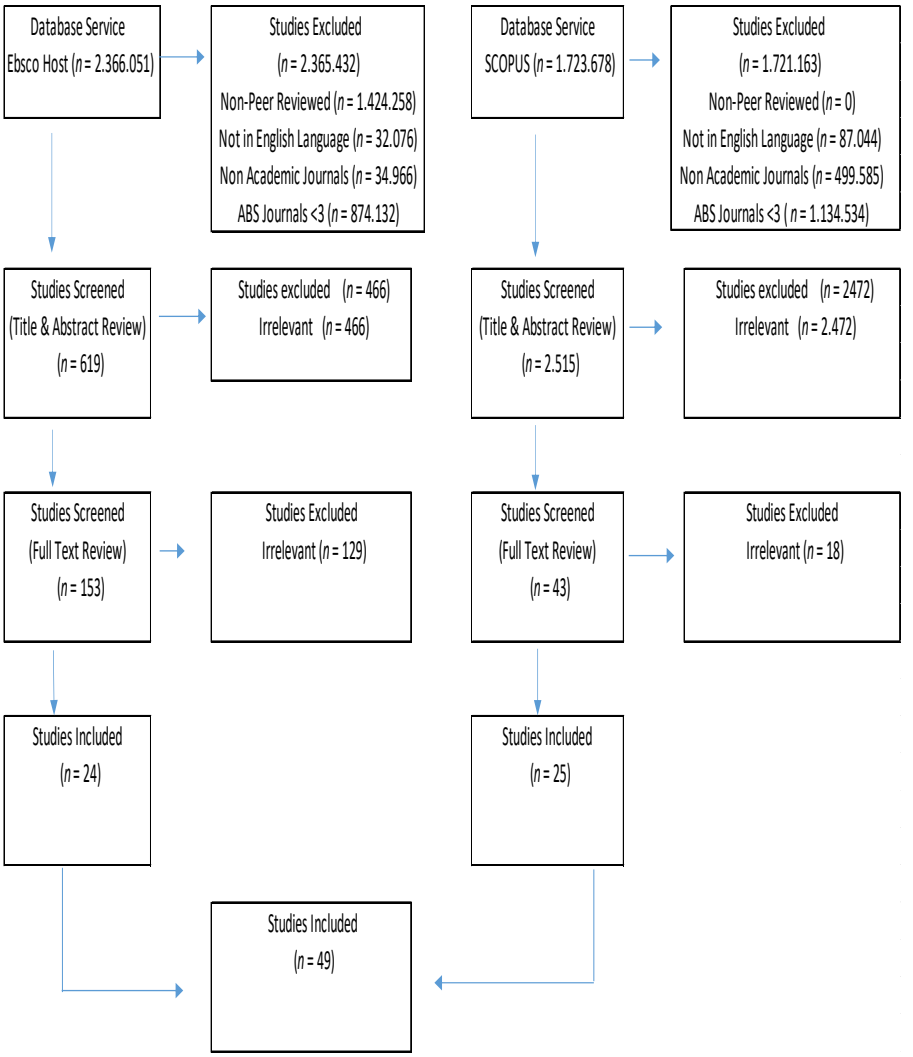

Figure 1. Flow diagram. Source: Authors' own elaboration

attributes organized into subcategories and scrutinized independently, aiming to offer a comprehensive understanding of all aspects related to the subject.

Descriptive statistics

Journal outlets. The majority of the articles seem to have been published in journals within the economic sector ($n = 26$, 53%), followed by journals that belong to the social sciences sector ($n = 16$, 33%). Five articles from the sample (10%) were from innovation journals and only two (4%) were from management development and education journals (Figure 2). The dominance of the economic nature of the journal that published the articles relates to the fact that it is already known that education is one of the determinants of economic growth, but the examination of the ways that individuals can be shifted towards higher levels of education (internalization of the externalities) is still in its infancy.

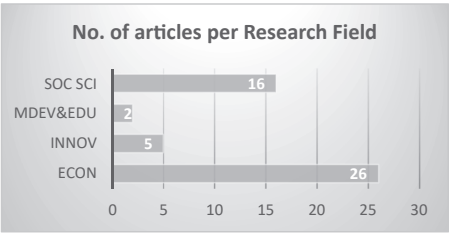

Figure 2. Research field of published articles. Source: Authors' own elaboration

In Table 1, we can see the publication years, together with the journal title. There has been an increasing shift in publications after 2010. This may relate to the global economic crisis of 2008 when the policymakers tried to figure out how to reverse the economic shrink, so the academic community focused, among others, on the major role of skills that one can acquire through education and serve in production.

To better understand the publications' effect on the broader academic community, we examined the number of citations. The five most-cited articles were those of Vidal (1998, citations: 624, economic field), Fleisher, Li, and Zhao (2010, citations: 425, economic field), Guerrero, Cunningham, and Urbano (2015, citations: 342, innovation field), Parrotta, Pozzoli, and Pytlikova (2014, citations: 337, economic field) and Dolado, Goria, and Ichino (1994, citations: 226, economic field).

Table 1. Date of publication/journal title

Date	JDE	JDS	JPE	LE	RP	SHE	TFSC	WD	Totals
1994			1						*1*
1998			2						*2*
1999			1						*1*
2000			3						*3*
2001			1						*1*
2005			1						*1*
2006		1	1						*2*
2009		1							*1*
2010	1		2	1					*4*
2011	2							2	*4*
2012			1						*1*
2013	2								*2*
2014			1		1			3	*5*
2015			1		1			1	*3*
2017	1		1					1	*3*
2018	1		1			2			*4*
2019	1				1			1	*3*
2020			1						*1*
2021	1		1					1	*3*
2023				1	1		1		*3*
2024	1								*1*
Totals	*10*	*2*	*19*	*2*	*4*	*2*	*1*	*9*	*49*

Note(s): **JDE**: *Journal of Development Economics*, **JDS**: *Journal of Development Studies*, **JPE**: *Journal of Population Economics*, **LE**: *Labor Economics*, **RP**: *Research Policy*, **SHE**: *Studies in Higher Education*, **TFSC**: *Technological Forecasting and Social Change*, **WD**: *World Development*
Source(s): Authors' own elaboration

Based on the first author's geographical location (Figure 3), there is an evident dominance of European countries ($n = 35$), followed by American countries ($n = 9$), Asia ($n = 4$), and Africa ($n = 1$). This is problematic because the research on the link between education and economic growth should be of great concern at an international level, considering the externalities that it causes, the diffusion of knowledge and skills because of migration, and the interrelationships between the economic growth of all countries.

Type of the articles and methodology. The findings of our systematic review show that the majority of the articles (36 from 49, 73%) were empirical and the remaining 27% were theoretical articles that use or augment the traditional economic models to adapt more variables such as education in primary or higher level, the education level of parents, the migration intensity, the movement from school to employment and other factors. Of the 36 empirical articles, almost all of them ($n = 34$, 94%) were quantitative, 3% ($n = 1$) were qualitative, and the rest 3% ($n = 1$) used mixed research methods (Figure 4).

Authorship analysis. Regarding the number of authors that contributed to the development of each article, most of the studies included two authors ($n = 21$, 43%), followed by studies by three authors ($n = 16$, 33%). In total, 16% of the studies ($n = 8$) had one single author, whilst 8% ($n = 4$) – three or more authors (Table 2). This is a shred of evidence that highlights the importance of the collaboration between different parties and different scientific approaches that are needed, to combine social variables (education level and motivation, education inequalities) with economic variables such as economic growth and externalities. This finding is consistent with the number of institutions that collaborated to extract research results. From Table 2, 37 papers of the sample are the result of the cooperation between authors that come from 2 or more countries (2 countries/$n = 20$, 3 countries/$n = 10$, 3 or more countries/$n = 7$).

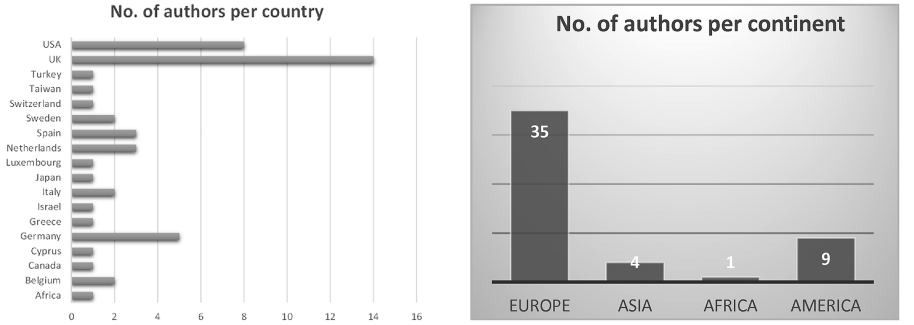

Figure 3. First author's geographical location per country/continent. Source: Authors' own elaboration

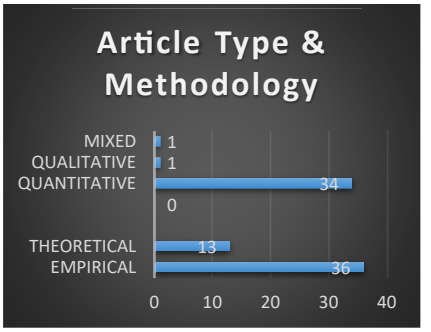

Figure 4. Article type and methodology. Source: Authors' own elaboration

Table 2. Authorship analysis

Authorship analysis Number of authors	No. of articles	Percentage (%)
1	8	16%
2	21	43%
3	16	33%
More than 3	4	8%
		100%

Number of countries	No. of articles	Percentage (%)
1	23	47%
2	20	41%
3	5	10%
More than 3	1	2%
		100%

Number of institutions	No. of articles	Percentage (%)
1	12	24%
2	20	41%
3	10	20%
More than 3	7	14%
		100%

Source(s): Authors' own elaboration

Finally, regarding the collaboration between countries, 23 out of 49 articles (47%) were deducted from one country, 20 of 49 (41%) were conducted with the cooperation of two countries, and the rest authors (12%) belong to three or more different countries.

Studied population. Although most of the articles were either global ($n = 15$, 31%) or they did not focus on specific populations ($n = 10$, 20%), 22% ($n = 11$) studied European countries, followed by the Asian population ($n = 6$, 12%), America ($n = 4$, 8%), and Africa ($n = 3$, 6%) (Figure 5). This finding may relate to the intense effort that European governments make, to find ways to endogenously boost economic growth by enhancing their education systems, motivating their populations to engage in education, to meet the United Nations' Sustainable Development Goal (SDG) 4 calls for guaranteeing quality education for all (e.g. UNESCO, 2021).

The next section will analyze the total 49 articles, after categorizing them into two separate groups, for an in-depth understanding of the topic. We will provide theoretical and practical implications as well as future directions.

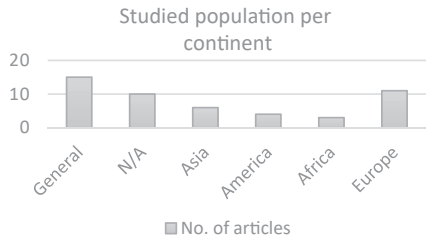

Figure 5. Studied population per continent. Source: Authors' own elaboration

Thematic analysis of the results

The first sub-category refers to the education externalities and their contribution to economic growth. In Table 3, we present the main findings of the articles that deal with externalities of education, related to other concepts, such as migration, entrepreneurship, and knowledge diffusion.

Migration and its role in human capital

The majority of the particular publications report the strong externalities of education on economic growth. A great number of articles discussed migration as a phenomenon that can boost efficiency if it is shared with high-quality skills and, under certain circumstances, that can positively influence and subsidize economic growth. According to Bove and Elia (2017), migrant skills encourage creativity and economic growth. However, a greater variety could deter social unity and economic achievement. Bove and Elia's (2017) findings show a beneficial influence on GDP per capita, particularly amongst countries that are developing, with cultural differences, birthplace fractionalization, and polarization all boosting the increase in GDP over time. Changing diversity levels is more likely to boost GDP growth among developing nations. This research is consistent with that of Beine, Docquier, and Oden-Defoort (2011), who estimated conditional convergence of human capital indexes in their study. They revealed that exceedingly skilled migration opportunities boost human capital accumulation in countries with short incomes, leading to a clear brain gain if the capable migration ratio is less than 20 or 30%. However, scholars have not identified any major incentive system in middle- or high-income countries.

Vidal (1998) explored how migration affects the formation of human capital. Moving to a country with higher skill rewards encourages human capital investment, possibly resulting in a positive association between the development of human capital and emigration opportunities. In some cases, more emigration can lift a source country out of underdevelopment. Labor emigration limitations to high-wage nations hinder low-wage countries' human capital progress. Emigration can have a detrimental impact on people who remain behind due to shifts in factor costs, a lower tax base, and public goods funding. Developed countries ought to compensate developing countries for their financial losses, according to Dustmann, Fadlon, and Weiss (2011). In contrast, employment possibilities in technologically advanced neighboring countries have a spillover effect, boosting human capital development in the exporting country (Vidal, 1998). Some countries serve as learning hubs, and returning citizens apply valuable talents learned overseas, helping their own country (Dustmann, Fadlon, & Weiss, 2011).

Dolado, Goria, and Ichino (1994) also questioned in the past the orthodox neoclassical economics view that immigration reduces per capita output and growth in the host country. Their study, which employed a Solow growth model influenced by human capital and migration, stated that the undesirable effects of migration lessen when considering the human capital carried in by immigrants. The study discovered that the more we compare immigrants' human capital to natives, the less substantial the negative impact on production and growth. While immigration leads to population expansion, it may not always have the same negative per capita effects as an unavoidable rise in the native population due to the human capital that immigrants carry with them. However, the presence of other elements that are missing by immigrants would require an extremely high level of human capital in migration inflows to compensate for the negative per capita impact of immigration on production and GDP.

As noted by Chen (2006), enabling more emigration of highly qualified workers undermines a source country's long-term economic growth, notwithstanding its immediate "brain gain." However, the influence of loosening immigration limits on low-skilled individuals on economic growth differs depending on economic circumstances. When comparing the migration consequences of private and public schooling, fertility tends to increase when education is private, making per capita income growth more sensitive to

Table 3. Externalities of education

Group 1: Externalities of education Citation	Journal	Main findings
Dolado *et al.* (1994)	*Journal of Population Economics*	The higher the content of the imported immigrants' human capital, the lower the negative output and growth effect
Steinmann *et al.* (1998)	*Journal of Population Economics*	Low birth rate, increased education investment, high per capita output, and population levels help escape the Malthusian trap
Bräuninger and Vidal (2000)	*Journal of Population Economics*	Rising public education cuts private costs, boosts skilled workforce, and fuels growth. However, it crowds out capital, hindering learning-by-doing. Marginal education subsidies may impede growth more than private education
de la Croix and Monfort (2000)	*Journal of Population Economics*	The extent to which one region benefits from another's region human capital depends on the distance between them
Chen (2006)	*Journal of Population Economics*	When people move for better opportunities, economic growth is affected more by private education. Moreover, in countries with higher taxes, public education leads to better long-term economic growth compared to private education
Trivedi (2006)	*Journal of Development Studies*	Higher secondary school enrollment positively influences steady-state per capita income levels and growth rates, applicable to both males and females
Bolt and Bezemer (2009)	*Journal of Development Studies*	In Africa, colonial education levels shape long-term economic growth. However, education's positive impact may also trigger instability, ethnic tensions, and violence
Fioroni (2010)	*Journal of Population Economics*	In a private education system, low initial income leads to a Malthusian stagnation state; high-income results in a growth path with improved education and reduced fertility. In public education, a shared education level facilitates poor families' transition from stagnation to sustained growth
Martins and Jin (2010)	*Journal of Population Economics*	Education's impact on productivity and wages is mainly within firms, highlighting significant external effects, suggesting social returns to education surpass private returns
Fleisher *et al.* (2010)	*Journal of Development Economics*	Education directly boosts production, positively impacting Total Factor Productivity (TFP) growth with both direct and indirect spillover effects
Beine *et al.* (2011)	*World Development*	Prospects of skilled migration boost human capital in low-income nations. A net brain gain is possible with a controlled emigration rate
Dustmann *et al.* (2011)	*Journal of Development Economics*	Developing countries benefit when citizens use skills where rewards are highest. Yet, without transfers, emigration can harm those left behind, affecting factor prices and local public goods financing
Fleisher *et al.* (2011)	*Journal of Development Economics*	The estimated marginal products significantly exceed wages, with a more pronounced disparity for highly educated workers
Suri *et al.* (2011)	*World Development*	Early human development upgrades drive subsequent economic growth, fostering a positive cycle of improved economic growth and enhanced human development

(*continued*)

Table 3. Continued

Group 1: Externalities of education Citation	Journal	Main findings
Parrotta *et al.* (2014)	*Journal of Population Economics*	Educated workers, with diverse experiences and knowledge, excel in problem-solving and creativity, promoting innovations in the process
Benos and Zotou (2014)	*World Development*	The inclusion of education enrollment, spending, political measures, initial output, and inflation enhances the positive impact of education on growth
Leten *et al.* (2014)	*Research Policy*	University education and scientific research positively impact neighboring firms' technological performance, benefiting from both scientific work and graduates in a province
Boccanfuso *et al.* (2015)	*World Development*	Young high-skilled workers show a nine percentage-point employment gain over older workers, with a higher likelihood of quality jobs, reducing skill mismatch
Guerrero *et al.* (2015)	*Research Policy*	Exploratory analysis reveals significant positive economic impact from teaching, research, and entrepreneurship
Bove and Elia (2017)	*World Development*	Migration brings diverse skills, fostering innovation and economic growth. However, increased heterogeneity may hinder social cohesion, creating coordination barriers and affecting development negatively
Cabus and Somers (2018)	*Studies in Higher Education*	A one-month increase in companies' workforce schooling level reduces the probability of reported skill mismatch by −3.0% points
Nabi *et al.* (2018)	*Studies in Higher Education*	Entrepreneurship education participants show increased learning and inspiration, but the change in entrepreneurial intentions is not significantly different from non-participants
Borah *et al.* (2019)	*Research Policy*	Universities prioritize industry-specific skills for broader employability, while firms aim to leverage collaborations for training students with firm-specific skills efficiently
Bucci and Prettner (2020)	*Journal of Population Economics*	Weak human capital dilution allows faster population growth to accelerate human capital accumulation, technological progress, and productivity. Advanced knowledge sustains growth despite a declining population
Cui and Martins (2021)	*World Development*	Education contributes to global development through individual benefits and increased social returns in poorer countries
Afcha *et al.* (2023)	*Technological Forecasting and Social Change*	PhD recruitment boosts firm-university collaboration and R&D service purchases. Losing PhDs affects collaboration, but not R&D acquisition
Braunerhjelm and Lappi (2023)	*Research Policy*	Entrepreneurial Human Capital's positive impact extends to various education and age groups but diminishes with the oldest cohorts
Gust *et al.* (2024)	*Journal of Development Economics*	Over two-thirds of global youth lack basic skills, varying from 24% in North America to 89% in South Asia and 94% in Sub-Saharan Africa
Vidal (1998)	*Journal of Population Economics*	Higher human capital formation in the source country increases the risk of emigration. Unexpectedly, greater emigration can push the source economy out of the stagnation trap

Source(s): Authors' own elaboration

migration probabilities in private schools. Scholars expect economic growth to be more influenced by migration probability in a private education system than in a public one. As a result, source countries with private education require careful migration strategies, whereas a higher-tax public education system is projected to drive long-term economic growth. Private and public education not only shape the migrated quality of human capital, but they also contribute to economic growth, as some articles have shown (Bräuninger and Vidal, 2000; Fioroni, 2010).

Benefits of education on government, firms, and individuals

Comparing private and public education, Bräuninger and Vidal (2000) revealed that extending public education reduces private school expenses, increases the number of skilled people, and promotes economic growth. However, this educational spending competes with physical capital and blocks learning by doing. A small increase in education subsidies by the government can hinder growth more than an entirely private education system. Following Fioroni (2010), in a private education framework, a low initial income results in a Malthusian stagnation steady state, whereas a high initial income leads to a growth pathway in which children's schooling improves and fertility falls with income. Health improvement shocks that reduce child mortality have a detrimental impact on private education expansion, resulting in higher fertility and reduced education. Conversely, a public education system minimizes the stagnation steady state, so health improvement shocks are no longer negative to growth. Government-imposed proportionate taxes pay an equivalent amount of schooling for all children, breaking the dichotomy between child quantity and quality and allowing low-income families to move from stagnation to sustainable economic growth (Fioroni, 2010). According to de la Croix and Monfort (2000), choosing an education system involves balancing the long-term growth rate versus short-term convergence. The beginning capital stock and the size of the gap in human capital between regions are the most important elements in this decision. The extent to which a particular area reaps the advantages of another's region workforce is influenced by their distance.

Externalities do not only apply to within-country economic growth but also inside enterprises that are necessary for general overall growth. In this realm, Steinmann, Prskawetz, and Feichtinger (1998) presented a demoeconomic model in which output is based on physical capital, human capital, and technology. Human capital, which is impacted by population density and education, engages actively with employment, physical capital, and technology. Escaping the Malthusian trap and attaining long-term economic growth relies on technical advancement and the beneficial relationship between technology and human capital. The model indicates that positive population growth is sufficient for escaping the Malthusian trap, and even with zero increase in population, escape is possible provided that the constant level of human capital is sufficient for starting technological advancement, and that means being well-educated. Low rates of births, greater educational investment, and higher per capita output and population levels all support escaping from the Malthusian trap of a stagnant population.

Staying within firms, and, according to Martins and Jin (2010), highly qualified workers are more likely to exchange educational talents with their low-education coworkers within a given firm, resulting in greater wage-education connections at the firm level rather than at the individual one. Their framework suggests that education has considerable external effects on wages and productivity within enterprises, meaning that social rewards outweigh private returns. This shows that education has a multiplier impact, helping both individuals who invest in their own human capital and workers who engage with educated coworkers. However, the likelihood for this multiplier impact to promote endogenous growth may be restricted because external effects depend on disparities in labor force educational attainment.

These findings are consistent with Fleisher, Hu, Li, and Kim (2011) who found significantly higher estimated marginal products than wages, particularly among well-educated employees. Their analysis shows a 30.1% rise in marginal product with an

additional year of schooling, and CEO education increases total factor productivity (TFP) in foreign-invested companies. Notably, the influence of education on productivity differs by ownership class, with foreign-invested enterprises experiencing the greatest effect. This shows that market mechanisms advance the effective usage of human capital within organizations. Moreover, Parrotta *et al.* (2014) examined the influence of employee diversity on corporate innovation from cultural, educational, and demographic viewpoints. The study specified promising effects of education, confirming the idea that exceedingly educated experts have a wider range of skills and information, which advances creative thinking and problem-solving and henceforth nurtures innovation.

After discussing the benefits in business and country level of the education externalities, we should highlight that education benefits not just enterprises and economies, but also individuals. According to Boccanfuso, Larouche, and Trandafir (2015), young, high-skilled professionals outperformed their older counterparts by nine percentage points in terms of employment growth. These junior workers are more likely to find desirable careers in the service industry or government, decreasing the gap between the demand and supply of very skilled labor. The data also show that young people have better access to positions in the services and government sectors, which are likely to have higher educational returns. The matching of qualifications with employment prospects leads to potential long-term economic growth, giving credibility to the premise that emerging economies like Senegal suffer substantial differences in the quality demanded and supplied in the high-skilled labor market.

Education inequalities

Trivedi (2006) discovered that high school attendance rates, which serve as a proxy for educational human capital, frequently increase steady-state income levels. This beneficial effect extends to both male and female education, and countries that have smaller gender gaps enjoy greater steady-state income. Even after accounting for additional metrics, controls, and variations in regional coverage, the link remains strong. The important discovery is that the accumulation of educated individuals, as indicated by secondary school engagement, greatly increases per capita income's steady-state level along with growth rates. Notably, both male and female education have a promising impact on steady-state levels, whereas gender inequalities in education diminish long-term incomes – a remarkable finding, particularly in low-income nations such as India that Trivedi's research focused on. Studying another low-income state, Bolt and Bezemer (2009) proposed and supported the hypothesis that education levels during Africa's colonial era had a substantial impact on long-term economic growth. As an effective factor, colonial education contributed to long-term growth, because education shapes organizations. While educated people are perceived to be more politically involved as well as capable of resolving problems diplomatically, their beneficial impact on economic growth may result in political instability, conflicts between ethnic groups, and persistent violence. This is an interesting and scarce finding that discusses the negative side of education and it is consistent with Benos and Zotou (2014) who noted in their literature review that when variables such as education enrollment, expenditure on education, political regulations initial production, and inflation are included, the influence of education on growth tends to be adjusted positively, accounting for publication bias. This implies a persistent pattern in empirical research on education and economic growth, with a noticeable tendency to preferentially publish findings that highlight education's favorable growth impacts.

Of course, when talking about education, we cannot only refer to higher-level education. Literature shows that early human development is critical for ultimate economic growth, implying a reciprocal connection (Suri, Boozer, Ranis, & Stewart, 2011). Long-term economic expansion without accompanied improvements in human development may not lead to stable equilibria. The paper stresses the importance of human development levels in defining growth directions, arguing that efforts to promote human development should come before or alongside growth-focused initiatives for faster and longer-lasting development. Scholars

regard establishing strategies to promote strong human development as a necessity for guiding an economy into an effective and self-reinforcing cycle.

Need for education and industry collaboration

Collaboration between industry and education is also vital for the diffusion of positive externalities. According to Leten, Landoni, and Van Looy (2014), universities have a favorable impact on the technology effectiveness of nearest enterprises through educational and research initiatives. The influence goes beyond the obvious contribution of competent human resources, highlighting the importance of local scientific activities. There are industry-specific differences, with chemical and mechanical industries benefiting mostly from the number of graduates, whereas electrical and pharmaceutical businesses profit from academic and scientific research efforts. In general, outcomes reveal that policies designed to increase universities' contributions to regional innovation systems should motivate universities to educate qualified graduates as well as participate in scientific research. Guerrero, Cunningham, and Urbano (2015) discovered a significant and beneficial economic impact from educational, academic, and entrepreneurial efforts in their exploratory investigation. Notably, the increased economic effect noticed at entrepreneurial universities in the United Kingdom, such as the Russell Group, is ascribed to the prevalence of business spin-offs. In contrast, the control group, which includes the country's other educational institutions, demonstrates that the most important economic effect is associated with knowledge transfer, specifically the accumulation of knowledge capital.

As reported by Nabi, Walmsley, Liñán, Akhtar, and Neame (2018), students in entrepreneurship education (EE) programs demonstrate higher levels of entrepreneurial knowledge and drive than those without EE experience. Nevertheless, the entire modification in entrepreneurial goals from the program's starting point to its termination is not substantially diverse between EE and non-EE partakers, revealing ambiguous results. Moreover, according to Borah, Malik, and Massini (2019), there is a disagreement between enterprises and partner Higher Education Institutions (HEIs) over the nature of skills (industry-specific vs. firm-specific) transmitted to students through teaching-focused Industry–Academia partnerships. While HEIs focus on delivering specific industry expertise to improve students' employability across sectors, businesses seek to get the most out of the money they invest in I–A cooperation by supplying students with firm-specific skill sets. Providing industry-specific education may draw students from the larger industry, causing them to join different businesses, leading to low returns for the main firm that offered the educational program.

Staying in the higher education sector, Afcha, García-Quevedo, and Mas-Verdú (2023) used data from the Spanish Technological Innovation Panel (PITEC) between 2006 and 2015. The research outcomes highlight the critical role of holders of doctoral degrees in building links between industry and academia. Recruiting PhD professionals has an advantageous result on partnerships between industries and universities, as well as on procurement of R&D services provided by universities. In contrast, the resignation of PhD specialists harms engagement with universities but not the acquisition of R&D resources.

Bucci and Prettner (2020) argued that if the human capital dilution effect is low, a sharp rise in population can result in quicker cumulative human capital growth, technical development, and greater productivity growth. In contrast, rapid population increase has a large human capital dilution impact, which delays technological breakthroughs and reduces productivity growth. The study demonstrates that when educated scientists enhance disembodied knowledge, perpetual high productivity development is possible even while population and fertility fall beneath replacement levels. Cui and Martins (2021) found that university schooling and educational dispersion generally boost spillovers, particularly in wealthy countries. These findings support further investment in education, especially higher education in developing nations, underlining the greater societal benefit of education in less economically developed countries. Education supports worldwide progress both on a

private level and through the increased social advantages it provides in economically challenged countries.

All preceding articles highlight the importance of education in driving economic expansion and development. Gust, Hanushek, and Woessmann (2024) who surveyed PISA and TIMSS results for 2018 confirmed the need to shift towards more educated and brilliant personnel in a more systematized means. Their study measured the percentage of children not accomplishing elementary skills in 159 nations, accounting for 98% of the world's population and 99% of the total GDP. According to the report, more than two-thirds of the world's youth absence important skills, with statistics fluctuating from 24% in North America to 89% in South Asia and 94% in Sub-Saharan Africa. The economic research predicts a present value loss of more than $700 trillion in global economic production over the century, equivalent to 12% of discounted GDP, stressing the importance of addressing the worldwide crisis of insufficient fundamental skills.

The wide body of research on the connection between education, economic development, and social outcomes delivers a nuanced understanding of the multifaceted dynamics at play. The second sub-category of the selected articles relates to inequalities in education and how governments can mediate firstly to narrow them down, and secondly to boost the great paybacks that education can supply. Table 4 presents the main findings of our second category of articles.

Education inequalities

Starting from the inequalities frame, Minasyan, Zenker, Klasen, and Vollmer (2019) investigated the gender factor in education's influence on economic growth. Their research indicated that, when examined independently, the correlation coefficients between economic growth and education are often stronger for women. The article emphasized the statistically significant positive relationship between gender equality in education and economic growth. We find support for this in Ahituv (2001) conclusions that narrowing the educational gender gap can reduce fertility rates while increasing economic growth. However, the ongoing existence of income inequalities despite reducing educational divides demonstrates the importance of other factors in household reproduction decisions. Dao, Dávila, and Greulich (2021) also identified technology improvements as a factor influencing fertility trends. Their findings show that technological developments reduce housekeeping, giving women more time to focus on parenting and, as a result, increased investment in the education of their daughters. This sustains a positive cycle of closing the education gender gap, increasing human capital, and speeding up technological advancement, ultimately leading to a change in fertility trends and quicker economic growth.

However, the way governments design tax systems and social insurance frameworks can help to close the gender disparity in education and increase educational levels, thereby enhancing social welfare. In Booth and Coles (2010) study, the attention moved to the effect of uneven tax treatment on choices regarding education and labor supply. The study emphasizes that taxing labor market profits while keeping household output free of taxes causes a considerable shift toward domestic manufacturing, resulting in huge deadweight losses. This adjustment relates to variations in the entire labor supply and the length of education, representing the complex connections between tax strategies and social phenomena. In particular, scholars emphasize higher taxes, particularly for second earners, as a stimulus for women to shift from the labor force into domestic production. However, the analysis suggests that selective employment supports, such as government-funded childcare, can slightly counterbalance these inconsistencies, suggesting feasible solutions applicable to a wide range of countries.

Lundborg, Nordin, and Rooth (2018) suggest that the education of parents impacts mainly skills and health. Their results highlight the different effects of paternal and maternal levels of education, with the father's education cultivating cognitive and non-cognitive skills and the

Table 4. Inequalities and public intervention

Group 2: Inequalities and public intervention Citation	Journal	Main findings
Rice (1999)	*Journal of Population Economics*	During a recession, higher localized rates of unemployment are associated with greater numbers of students enrolled in higher education
Anderberg (2000)	*Journal of Population Economics*	Education and social insurance integration in high-risk sectors may enhance welfare by transforming education policy into a national insurance complement
Ahituv (2001)	*Journal of Population Economics*	Reducing the gender disparity in schooling promotes income growth and decreases fertility, but disparities in wealth persist
Iyigun (2005)	*Journal of Population Economics*	Investments into education encourage growth in geographically favorable regions but not in less beneficial ones
Booth and Coles (2010)	*Labour Economics*	Asymmetrically taxed labor market profits boost domestic production, which influences labor supply and education
De Fraja and Valbonesi (2012)	*Journal of Public Economics*	Students desire increased salaries from university education, whereas institutions set tuition to optimize research resources. Government action must strike a balance between labor market equity and efficient production by encouraging more students and research at high-productivity universities
Yamauchi and Liu (2013)	*Journal of Development Studies*	Public investment in elementary education has a positive long-term impact on high school and college accomplishments
Cantoni and Yuchtman (2013)	*Journal of Development Economics*	Investments in various forms of human capital have an impact on development, which is influenced by political-economic procedures that establish skill incentives
Glewwe, Maïga, and Zheng (2014)	*World Development*	In Sub-Saharan Africa, education has a smaller impact on economic growth, which is most likely due to lower quality of education compared to other regions
Gruber and Kosack (2014)	*World Development*	Greater primary levels of enrollment are associated with slightly greater future inequality in developing nations
Meier and Schiopu (2015)	*Journal of Public Economics*	The best policy for deterring or promoting higher education depends on technological advancement
Amuedo-Dorantes and Antman (2017)	*Journal of Population Economics*	Despite the expectations, DACA (Deferred Action for Childhood Arrivals) has lowered school attendance for eligible young people with the necessary credentials, possibly due to higher opportunity costs
Haddad *et al.* (2017)	*Journal of Development Studies*	Public education funding (Funded) had a modest influence on human capital formation
Esposito and Villaseñor (2018)	*Journal of Development Studies*	Wealth inequalities harm school attendance, but the educational environment provides a favorable contribution. Education has long-term benefits
Lundborg *et al.* (2018)	*Journal of Population Economics*	The study emphasizes the importance of cognitive and noncognitive skills, as well as health, in comprehending generational human capital transmission
Ajefu and Abiona (2019)	*Journal of Development Studies*	NREGS (National Rural Employment Guarantee Schemes) exposure increases labor demand during positive shocks, lowering children's school attendance due to increasing informal employment opportunities
Minasyan *et al.* (2019)	*World Development*	Gender equality in education has a statistically significant beneficial effect on economic growth

(*continued*)

Table 4. Continued

Group 2: Inequalities and public intervention Citation	Journal	Main findings
Dao *et al.* (2021)	*Journal of Population Economics*	Higher spending on female education increases human capital, accelerates technological development, and creates a feedback loop that leads to a new fertility regime and economic prosperity
Fitz and League (2021)	*Journal of Development Studies*	Children who do not attend school are much more likely to work, implying that positive income shocks enhance child labor while decreasing education. Despite the short-term benefits to families, less education might lead to poorer adult earnings
Chassamboulli and Gomes (2023)	*Labour Economics*	In segmented markets, raising skilled public-sector wages has a minor positive effect on schooling but a negative impact on skilled private employment, and vice versa

Source(s): Authors' own elaboration

mother's education having a better influence on children's health. This highlights the difficulties of human capital transmission across cohorts. Fitz and League (2021) supplemented this argument by highlighting the positive association between parental education and cognitive and non-cognitive skills and health in male offspring. Their conclusions support the notion of intergenerational human capital transmission, underscoring the critical role of education in prompting beneficial results for forthcoming generations. These findings highlight the potential long-term advantages of governmental activities attentive to improving education in society.

Esposito and Villaseñor (2018) and Cantoni and Yuchtman (2013) provided insight into education's broader social implications. Esposito and Villaseñor's findings demonstrate the undesirable influence of economic inequality on attending school across numerous age groups, highlighting the long-term benefits of continual education throughout generations. Cantoni and Yuchtman underscored the importance of educational content in economic growth that spreads beyond the years consumed in school. Political economy and government initiatives influence individuals' educational curriculum choices, emphasizing education's comprehensive societal worth. In this regard, Meier and Schiopu (2015) proposed that an economy can fluctuate between over-enrollment and under-enrollment throughout growth without government involvement.

In terms of geographical benefit and economic growth, Iyigun (2005) shed light on the connection between education assets and population upsurge, mainly in geographically promising positions. Longer life expectancy in fortunate places inspires parents to dedicate resources to both old-age consumption and the quality of their children in terms of their health and education. In contrast, in unfriendly environments, survival challenges force parents to prioritize feeding and fertility over education. As a result, economies in hostile places involve low life expectancy and population growth. On the other hand, geographically ideal regions experience advanced survival rates, permitting parents to have better-educated children, supporting steady population development and constant economic growth. For example, Glewwe *et al.*'s (2014) literature review identifies the hitches in evaluating the effects of education on economic growth, especially in dissimilar environments. The study acknowledged discrepancies in educational quality, with Sub-Saharan Africa performing worse than the rest of the developing world. This means that education has a slightly lesser influence on economic growth in Sub-Saharan Africa, highlighting the requirement for attentive initiatives to increase education quality.

Government intervention

Haddad, Freguglia, and Gomes (2017) and Ajefu and Abiona (2019) presented contrasting opinions on the effect of government investment on education. While Haddad *et al.* (2017) found a slight impact on human capital construction, Ajefu and Abiona (2019) presented that exposure to specific government employment programs can yield a surplus in labor demand, resulting in reduced school engagement for young people. These varying results highlight the difficulties of the interaction between public investment, job prospects, and educational achievement. Amuedo-Dorantes and Antman's (2017) study on the DACA (Deferred Action for Childhood Arrivals) project challenged popular opinion by revealing a drop in school enrollment and full-time attendance for qualified younger people. The analysis revealed that, for DACA-eligible individuals, present labor market returns could exceed future higher education returns, emphasizing the importance of considering a variety of issues determining choices regarding education.

Yamauchi and Liu (2013) discussed the effect of targeted expenditure in early-stage education. Their research on the Third Elementary Education Project in the Philippines showed a significant upgrade in national achievement test scores, arguing that noteworthy public investments in early-stage education can significantly impact learning progress and overall educational outcomes. Gruber and Kosack (2014) issued a vital notice about the unexpected costs of mass education programs. Contrary to predictions, their findings specified that higher primary enrollment rates in developing countries are associated with future inequality. This emphasizes the significance of modifying resource allocation discrepancies, particularly the "tertiary tilt" in education spending, to avoid enhancing inequality.

In his examination of the outcome of labor market environments on educational choices, Rice (1999) found a promising relationship between local unemployment rates and engaging in higher education. During economic declines and growing unemployment, the opportunity cost of full-time education decreases, resulting in larger registration in higher education. This highlights the ever-evolving link between economic conditions and educational choices, accenting the importance of adaptable policies that can adjust to changeable conditions. Chassamboulli and Gomes (2023) explored how labor market construction affects the educational mix of the workforce. Their findings showed the disparities in the effects of public-sector wages on skilled and unskilled employees, stressing the importance of strategies that consider sectoral flexibility to harvest favorable effects on education and skilled private employment. In terms of public educational interventions, Anderberg (2000) discussed the association between education and social insurance in high-risk sectors, stating that education strategy can complement national insurance to advance social welfare. This is because the low-risk occupations are more skill-demanding and the high-skilled employees do not capture the full social benefits of their investment in education (Anderberg, 2000).

In their comprehensive analysis of the interaction and interconnection between governments and universities, De Fraja and Valbonesi (2012) examined the intricate dynamics of the university sector organization, particularly in comparison to unregulated private provision and a government-driven approach that focuses on optimizing welfare. The study uses a general equilibrium framework in which students strive to earn greater wages in the labor market through university education, while universities intentionally determine tuition prices to maximize funds for research. Government involvement aims to create a harmonious relationship between the labor market and production-side efficiency, with a bias for more productive universities. However, due to an information shortage, the government allows all teaching universities to conduct some research, which leads to inefficiencies and increased overall expenses. As a result, the government changes to decrease the overall number of universities, creating undefined effects on the number of students registered.

Finally, this systematic assessment of papers including all features of education and its influence on economic growth, social costs, and intergenerational dynamics delivers valuable insights. The results highlight the complex character of the interconnection between education and society, highlighting the importance of governmental interventions that consider the

several variables that define educational choices, as well as the broader implications for the economy and society.

Theoretical and practical implications

The previous comprehensive research has theoretical and practical implications, and it could be valuable at the academic, business, and governmental levels. Theoretically, the relationship between education and economic growth became evident, with research indicating that better-educated individuals contribute more efficiently to research and development. Within firms, educated employees can help improve output levels by improving performance. However, multiple studies show that, in addition to education, competent technology use is required. This necessitates additional study, resulting in a cycle of education–economic development–education.

There was a robust weight in the literature on the benefits and costs of migration to economic development. The studied articles show that migration benefits the host nation significantly, as long as migrants have a high-quality and qualified education. Migration can enhance human capital accumulation and drive developing countries to a brain-gain with many benefits, getting them out of the trap of underdevelopment. Regarding the internalization of externalities at the government level, it is clear that countries must accurately observe the encouraging paybacks of education in improving social welfare. Incentives that link higher education to the business sector, as well as arrangements intended to reduce inequality, could dynamically subsidize the blowout of positive externalities, providing plentiful social and economic benefits. Governments should focus on the provision of education subsidies so that public education is enhanced and accessible for less advanced citizens.

In terms of practical implications, it appears that organizations that want to positively take advantage of their workforce education and academic level should associate advanced human capital with physical capital and technology. Continuous digitalization demands rearrangement in firms' present and forthcoming working procedures, including employees' skills and abilities (Vrontis, Thrassou, Efthymiou, & Bozat, 2024). This mixture is likely to move enterprises forward, refining performance and effectiveness. Moreover, high-quality employees usually transfer their knowledge and talents to the less advantageous workers and that phenomenon could positively impact wages and productivity. In return, there are both firm and social rewards through a multiplier effect.

Finally, the articles discussed the topics of partnership between companies and universities, as well as government-university teamwork. Previous studies suggest that students pursue university education intending to enhance their potential earnings in the labor market. On the other hand, universities strategically set tuition fees with the objective of maximizing their revenue, primarily to fund research initiatives. Government intervention should be designed to foster a balanced relationship between the labor market's demand for skilled labor and the efficient production of educational services. This intervention should be particularly skewed toward supporting universities that demonstrate higher productivity levels, ensuring that the education system aligns with broader economic goals of efficiency and innovation. We should not detach education from the career market, and countries should invest in research and education in areas crucial to economic expansion, constantly in collaboration with universities and businesses, to attain the greatest level of.

Conclusions and avenues for future research

Considering the shortage of natural resources and the noteworthy population evolution, which, at an economic level, could lead to a per capita GDP lessening if production levels do not upsurge at the same time, we find it necessary to discover ways to improve productivity and influence the positive externalities of education, among other factors.

Back in 2006, Trivedi endorsed an underlying effect of education on profits and production, arguing that in the future, it will be required to look outside macroeconomic figures and estimate specific ways or policy processes in more detail. Merging inclusive research on macro relationships with a detailed examination of micro-practices appears to deliver the best option for receiving reliable deductions in this discipline. And that was correct. Future research will broaden and study both macro and micro perspectives on education's contribution to economic growth, but details will take time due to constantly changing circumstances. This is in line with Beine *et al.* (2011), who proposed a worldwide research schedule based on multi-level studies (combining national cases, and micro and macro studies) to improve the nature of educational benefits.

Boccanfuso *et al.* (2015) argued that initiatives that advance the quality of education at the university level can have great beneficial effects. As a result, there should be a great struggle to upsurge their quality. By targeting to bring into line employer skill requirements with university graduate training, governments can theoretically advance the labor market outcomes of these very high-skilled personalities in a variety of ways: better employment scenarios, higher-quality jobs, and perhaps greater incomes and job security. Moreover, governments should facilitate individuals' mobility which would benefit the sorting between occupations and promote growth (Braunerhjelm & Lappi, 2023). Because none of these modifications would come at the expense of other workers, the net outcome should be augmented by general economic growth. These propositions remain relevant.

Bove and Elia (2017) suggested that upcoming research should focus on the features of migrants, mainly their education level, reviewing Chen's (2006) report that it would be an interesting task in the future to survey the consequences of a migration model through empirical observation.

Within universities, Nabi *et al.* (2018) suggested emphasizing entrepreneurship education towards refining entrepreneurial goals in individuals who are attracted to it and testing for students' values as a prerequisite for program enrollment. In their study, the most significant variable was the student's private qualities and skills, rather than the course structure itself. Some of them respond negatively, while others answer positively to the same act. The future asks for greater research to better realize why some students respond in a dissimilar way than others. One idea here is to think about the role of values in standardizing stimulus. Students with diverse value preferences may view entrepreneurship education differently. For example, students who value stability and conformity will be horrified by the ambiguity that comes with entrepreneurial ownership, but students who value self-direction and inspiration will love it and be more driven to entrepreneurship.

Cabus and Somers (2018) remarked that it is unclear if employers are eager or reluctant to hire highly educated employees. As a result, additional research is required to determine if these results simply mirror an increasing frequency of over-education in the labor market. As a result, tying mismatch within organizations to people's decision to enroll in a given subject of study offers promising avenues for upcoming research. Future research should further investigate how the detected mismatch tendency relates to on-the-job training and the capability of school programs to adjust to shifting skill requirements. According to Chassamboulli and Gomes (2023), the effects on the educational composition of the workforce heavily depend on the labor market's structure. However, the search format may vary by country and occupation. In this regard, an empirical study on public-sector employment procedures and unemployed search behavior is required to identify which model is most appropriate for usage.

Borah *et al.* (2019) suggested that future research could use large-scale data to inspect the firm level, Higher Education Institutions-level, and institutional-level factors that influence teaching-focused Industry–Academia cooperation to provide guidance on how to establish a promising atmosphere for conducting these partnerships and evaluating their usefulness, i.e. to what extent teaching-focused Industry–Academia collaborations advance graduates' quality and their readiness for R&D jobs.

Furthermore, according to Afcha *et al.* (2023), companies also build relations with additional partners, such as competitors, vendors, and customers, where the role of highly capable R&D employees may be critical, indicating that this is a potential field of investigation. Braunerhjelm and Lappi (2023) agreed that a critical priority for future study should be to realize better how information about entrepreneurial human capital is used within organizations and through which networks. Despite widespread agreement on the importance of knowledge upgrading and accumulation in the development of competitive enterprises and growth-oriented countries, our information on how knowledge drifts inside and between people and companies, as well as the types of knowledge that matter remains restricted.

Esposito and Villaseñor (2018) projected that the coming research should emphasize higher education. They recommended extra studies on educational disparities, mainly to differentiate between the contextual costs of economic inequality (which touch one and all in an unequal society) and those produced by comparative deprivation (distressing those lagging behind more successful others). Furthermore, research should address the origins of inequity in school attendance. Education cannot be a prize for students who are privileged enough to win the lottery for their city or their parents. Furthermore, Minasyan *et al.* (2019), who examined the scope of educational inequality, recommended that the connection between gender equality in education and economic growth continues to be an open zone for future research.

If there is one secure conclusion, it is that the quality of human capital is significant in economic growth. But despite its importance, research gives fairly little attention to human factor topics at the interchange of business and management research (Rehman *et al.*, 2023). Education, whether through skill and ability expansion or by contributing to research and development, is one of the most significant foundations of national economies and long-term growth. Research on this subject is continuously growing in response to universal changes in living circumstances, inequality management, and ever-increasing production demands. States must pay attention to the problem of externalities and energetically internalize them through governing policies and substantial rearrangement. This permits the many benefits to blowout both nationally and globally.

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