

The Role of Education in the Dynamics of Economic Growth: A Literature Review

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Abstract

This article summarizes the interactions between education and economic growth, based on a comprehensive analysis of contributions from the existing theoretical literature. The review is based on a limited number of studies considered the most important, carefully selected to reflect the major contributions of research in this field. It emphasizes the function of education as a determining factor in the accumulation of human capital and the development of individual productivity (Becker, 1964; Mincer, 1974) and as an individual investment that generates social returns and drives the dynamics of growth and development at the collective level, essential for economic and social progress (Lucas, 1988; Romer, 1990; Barro, 1991). The review of studies reveals that education has a positive effect on growth, while other research fails to establish a significant link and suggests a negative impact.

However, the question of the link between education and economic growth remains open. It continues to spark extensive debate and still offers many possibilities for both theoretical and empirical research.

Keywords: Education, economic growth, human capital, endogenous growth theory, literature review.

JEL Classification: I25, O15, O41

Paper Type: Theoretical Research

Résumé

Cet article résume des interactions entre l'éducation et la croissance économique, basées sur une analyse complète des contributions de la littérature théorique existante. La revue est narrative et est basée sur un nombre limité d'études considérées comme les plus importantes, sélectionnées de manière ciblée pour refléter les contributions majeures de la recherche dans ce domaine. Il met l'accent sur la fonction de l'éducation, en tant que facteur déterminant de l'accumulation du capital humain et du développement de la productivité individuelle (Becker, 1964; Mincer, 1974) et, en tant qu'investissement individuel générateur de rendement social et moteur de la dynamique de croissance et de développement au niveau collectif, indispensable au progrès économique et social (Lucas, 1988; Romer, 1990; Barro, 1991). L'examen des études révèle que l'éducation a un effet positif de l'éducation sur la croissance, tandis que d'autres recherches ne parviennent pas à établir un lien significatif et évoquent un impact négatif.

Cependant, la question du lien entre l'éducation et la croissance économique reste ouverte. Elle continue de susciter un vaste débat et offre encore de nombreuses possibilités de recherche tant théorique qu'empirique.

Mots clés: L'éducation, croissance économique, capital humain, théorie de la croissance endogène, revue de la littérature.

JEL Classification : I25, O15, O41

Type du papier : Recherche Théorique

Introduction

For years, economic literature has focused on analyzing the factors explaining differences in growth between countries. The experience of certain industrialized Asian countries has particularly fueled this debate by demonstrating that it is possible for a country to rapidly transition to development and join the group of advanced economies. Economists have sought to understand how human capital and physical capital interact to affect economic growth. Researchers have always sought to identify and explain the factors that can stimulate and sustain economic development. Authors, from classical theorists to proponents of more recent endogenous growth models, have sought to explain the drivers of economic growth.

Indeed, Schultz (1960) and Becker (1962) observed that while per capita income continues to increase steadily in the long term, the accumulation of physical capital tends to slow down. Based on this observation, Schultz (1960) introduced the concept of human capital, which he defined as the set of knowledge, skills, and abilities possessed by an individual. This capital can be built and strengthened through various processes such as initial education, on-the-job training, and lifelong learning. And in this context, the author highlights the important role of education in economic development. Recent growth theories have emphasized the importance of education and innovation in sustainable economic development. From this perspective, one school of thought emphasizes the role of human capital accumulation, considered a fundamental lever to support the dynamics of growth (Lucas, 1988). Another school of thought emphasizes the role of knowledge accumulation in economic growth. This can result either from research and development (R&D) activities (Aghion & Howitt, 1992; Grossman & Helpman, 1991; Romer, 1990), or from learning-by-doing mechanisms (Romer, 1986). Indeed, these models offer both positive and normative implications, but often different ones, making it essential to clearly distinguish them through empirical analysis. However, some models emphasize positive externalities. In other words, beneficial effects for society as a whole that are not taken into account in individual choices. These effects can come from education or research and development (R&D). In this context, insufficient public funding limits the dynamics of growth, as neither companies nor individuals find sufficient incentives to invest in these areas, which are nonetheless essential for collective economic progress.

Currently, the question of economic growth holds an important place in both theoretical and empirical research. The literature review on the subject is characterized by a heterogeneity of cases and models throughout the world, if in developed countries with market economies we have witnessed a proliferation of theories, such as theories of endogenous growth and human capital, the literature review in developing countries still remains relevant to a good number of questions, although empirical studies are abundant.

Building on this, our research question is as follows: To what extent does education contribute to the dynamics of economic growth, and how do the main theoretical approaches explain the interactions between education and growth? To answer this question, we adopt a theoretical approach based on a review of the literature. This approach enables us to examine the foundational economic theories, particularly the endogenous growth theory, which emphasizes the mechanisms through which investment in education contributes to increased productivity and, in turn, drives economic growth.

Our methodology is therefore based on a narrative review which is a relevant approach in the context of an in-depth theoretical analysis. Unlike the systematic literature review, this review makes it possible to trace the evolution of ideas and to highlight the debate that structures a given field of research.

This method offers analytical flexibility that allowed us to conduct a critical analysis without resorting to a rigid framework of determined research.

The article is structured into three sections: the first section establishes the conceptual framework of the study, the second reviews the main theoretical foundations related to the research question, the third develops the adopted methodological approach, and presents a review of the empirical literature.

In a context marked by profound economic transitions, particularly in developing countries, a better understanding of the role of education is becoming crucial. Not only does this help to inform policy choices in terms of investment in human capital, it also suggests courses of action to strengthen the resilience and sustainability of growth trajectories.

The aim of this work is to contribute to the academic debate and to enlighten public decision-makers on the importance of designing education policies that are adapted to the contemporary challenges of economic development. By exploring the interactions between education, innovation and productivity, it contributes to a better understanding of the levers that can be mobilized to promote inclusive, sustainable and knowledge-based growth.

1. Conceptual Framework

1.1. Concept of Human Capital

Human capital is now recognized as an essential lever for development, insofar as it aims to reveal the potential of each individual. The objective is to strengthen their skills, knowledge, and creativity so that they become active participants in their own development process. This approach emphasizes individual autonomy, prioritizing the development of human capabilities rather than the mere accumulation of material goods. From this perspective, investment in education and training serves as a crucial driver of economic growth, but also as a concrete means to improve in a sustainable manner the well-being of populations. The ultimate goal is to encourage active and determined participation in the development process, while allowing everyone to define their own priorities and carry out actions that truly meet their needs.

The concept of "human capital" is used in economics by Schultz (1961) and Becker (1994). This concept emphasizes the role of the human factor in knowledge and skill-based economies.

It is very important to distinguish between the different types of capital used in economic activities, particularly physical capital and human capital. According to Schultz, human capital comprises five components: health, formal education, educational programs, lifelong learning, and geographical mobility. These dimensions contribute to shaping an individual's skills and knowledge, which play a decisive role in determining their income. Becker developed this approach by studying human behavior within an economic analysis framework, clearly distinguishing it from physical or financial capital. He believes that every individual invests in their human capital through education, vocational training, or health, and that these investments generate beneficial returns both personally and economically. In an economic approach, human capital encompasses all the resources mobilized to produce goods and services. At the center of this process, the human factor is involved at all stages of economic activity. The concept of "human capital" refers to the set of skills, knowledge, and abilities held by individuals within a country. The formation of this capital occurs through continuous learning, training, and the acquisition of professional experience. These dimensions play a fundamental role in promoting economic growth and sustainably improving the living conditions of the population.

Yesufu (2000), who emphasizes that "the essence of human resource development is to ensure that the workforce is continuously adapted and upgraded to meet the new challenges of its global environment." This human capacity can be developed through education, training, health improvement, as well as through investment in social sectors. Education holds a central place in the development of societies, as it allows individuals to acquire the knowledge and skills they need to actively participate in economic life. With the support of human capital, education becomes a lever for sustainable growth. Similarly, education contributes to poverty reduction

and the promotion of a more equitable society by enabling more people to access economic opportunities (Todaro, 1977). For (Harbison, 1973), human resources constitute the foundation of a nation's wealth. They create social, economic, and political structures to support a country's resources and development. Therefore, a country that fails to develop the skills and knowledge of its population cannot progress in other areas.

Thus, human capital appears to be an essential mechanism for economic growth. Indeed, better-trained, healthier and more skilled individuals can contribute to improved productivity and innovation. Therefore, investment in human capital is a crucial lever for growth, particularly in developing countries.

1.2. Notion of Economic Growth

Most economists agree that economic development is not limited to a simple increase in numbers. Economic development is a comprehensive process that encompasses economic and social transformations, both quantitative and qualitative. This development results in a notable improvement in living conditions, infrastructure, and the functioning of institutions, alongside sustainable and continuous growth. This human and structural dimension fundamentally distinguishes it from mere economic growth. Economic growth is reflected in a sustained increase in the production of goods and services per capita or in national income. This implies that the economy grows faster than population growth — in other words, the wealth produced must grow faster than the population so that everyone can truly benefit from it.

Economic growth refers to the sustained increase in a country's capacity to produce goods and services. This growth is concretely manifested by the increase in real gross domestic product (GDP), an indicator that measures the total value of goods and services produced over a given period. Furthermore, real GDP is used to measure a society's wealth, as it reflects not only the scale of economic activities but also the potential profitability of investments. When GDP increases, it means the economy has become more dynamic, more productive, and, in principle, more capable of improving the population's living conditions.

Furthermore, economic development is not limited to growth figures. It is about how this growth translates into real changes in people's lives: improved living conditions, poverty reduction, better access to education, and the creation of new social opportunities. In other words, an economy can experience strong growth without progressing in terms of development if the benefits of this growth do not reach the entire population. However, economic growth is not only based on the increase in GDP, but it is also linked to demographic evolution and other structural factors that have a lasting impact on a country's economy and development.

Solow (1956) and Swan (1956) show that developing countries, still far from full economic maturity, have strong growth potential.

The latter can progress more rapidly than advanced economies thanks to the catch-up phenomenon. Through investment in capital and the integration of modern technologies, these countries can maintain a dynamic growth trajectory. Thus, technological catch-up allows developing countries to improve their productivity and catch up with the most advanced economies.

2. Theoretical Framework.

Classical economists are often described as "pessimistic" due to their less than optimistic forecasts regarding economic growth. However, a careful examination of their analytical framework reveals rich and still relevant ideas that continue to illuminate contemporary economic thought. This analysis, highlighting the complexity of the developed theoretical approaches, shows a deep understanding of capitalism as an economic system, its expansion mechanisms, and the structural constraints that limit its development. However, these

reflections emerged in a historical context where the agricultural economy was predominant, technological density was low, and there was an absence of significant innovations in production methods. Classical economists tended to minimize the central role of technical progress in the continuous improvement of productivity in the agricultural and industrial sectors. Their analyses focused more on traditional factors of production, thereby neglecting the long-term impact of technological innovations on economic growth.

2.1. Classical Theories of Economic Growth

The study of economic growth held a predominant place in the reflections of classical economists such as Adam Smith (1776), Thomas Malthus (1798), and David Ricardo (1817). Their work laid the first analytical frameworks on the dynamics of production, population, and capital accumulation, thus laying the foundations for modern growth theory. These economists' interest in this subject was hampered by the economic and social changes that characterized their period, including the Industrial Revolution and the emergence of industrial capitalism. Adam Smith (1776) considered the human being to be the fundamental pillar of a nation's wealth. The author emphasizes that any investment in human capital, through education, contributes to increasing future productivity. According to him, education plays a determining role in the development of workers' skills, which leads to both an increase in their productivity and their income. Thus, Adam Smith added that the well-being of individuals and nations depended largely on the skill level of workers. The specialization of labor, meaning that each individual focuses on the work they master best, allows for more effective use of everyone's skills. The notion of the division of labor highlights the significant gains that can be achieved by improving work organization and production methods. By making the production process smoother and more precise, overall productivity is improved.

Whereas Ricardo (1817) argues in his economic theory that capital accumulation eventually leads to a fall in profit rates, which can slow long-term economic growth. This view is based on his theory of diminishing returns, illustrated in the agricultural domain. Ricardo explains that since the most fertile lands are exploited first, it will be necessary over time to turn to less fertile lands. This evolution leads to an increase in production costs and a relative decrease in profits, making it difficult to sustain growth. Thus, he does not attribute importance to education, which he considers a secondary element in economic development. The essential factor is technical capital, which plays a determining role in growth. For Thomas Malthus (1798), associating education with the "principle of population," argues that instruction is a fundamental tool for curbing demographic growth. He considers education a means to empower individuals and control birth rates more rationally.

Thus, classical economists consider education an important lever in the process of creating national wealth. According to them, investing in the training of individuals not only improves their productivity but also increases their income, thereby contributing significantly to the dynamics of economic growth.

2.2. Theoretical Models of Exogenous Growth

Economists have not neglected the role of education as a structural lever for technical progress, contributing to accelerating the production rates of material goods essential for the economic and social evolution of humanity. Although this factor has accompanied changes in production systems and has often reinforced these transformations, it remained largely confined to a distinct institutional domain. Its integration into the field of economic analysis was therefore limited for a long time.

The economist Domar (1946) emphasizes the importance of the labor force in the dynamics of economic growth. According to him, an increase in national income was inconceivable without two dynamics: an increase in the number of workers and an improvement in their productivity.

In other words, for the economy to progress, it is not enough to have a larger workforce; this population must also be better trained and more productive in their work.

From this perspective, education plays a structuring role; Domar implicitly considers that labor productivity could not improve without sustained investment in the development of individuals' skills and knowledge. He adopts a general equilibrium approach. According to him, economic stability depends on a harmonious adjustment between supply and demand; he considers that production has an effect on capital accumulation, neglecting exchanges with the outside world as well as negative impacts related to certain externalities.

As for Solow (1956), who developed a formal model of economic growth, his model is based on a production function that integrates two essential factors: capital and labor. The wealth produced in an economy depends on how the means of production (capital) and labor (work) are combined, without involving other elements in the initial equation. He also assumes that all countries use their factors of production optimally. And to build his model, Solow formulated three main predictions:

- Investment in capital improves the economic growth rate. Indeed, more capital allows workers to be more efficient and productive. And consequently, the pace of economic growth depends on the population's level of education (schooling level);
- Poor countries can experience faster economic growth than rich countries. This is reflected in the addition of capital in these countries, which leads to a greater increase in production than in already developed economies, where returns are lower;
- Due to diminishing returns of the factors of production, increasing these factors will no longer lead to an improvement in production (steady state). For Solow, economies never reach this stage of stagnation, as technical progress improves factor productivity, thereby sustaining economic growth.

In the model proposed by Solow (1956), technological progress is considered an exogenous variable, meaning it does not stem from the internal mechanisms of the economy but from external factors. Solow demonstrates that capital accumulation (in the form of equipment, infrastructure, or investments) plays an important role in economic growth, but it faces diminishing returns. From this perspective, Solow defines technological progress as the primary engine of long-term growth, a context in which each additional unit of capital generates progressively smaller gains in output. In the absence of innovation, the economy tends to reach a steady state where the growth rate slows down.

2.3. Limitations of Exogenous Growth Theory

The growth model developed by Solow and Swan in 1956 aims to explain the factors that determine long-term economic growth when an economy reaches a steady state. Beyond defining a stable growth rate, this model also helps to better understand why some countries are more developed than others. However, when confronted with empirical evidence, the Solow-Swan model shows its limitations. This is not due to its explanatory framework for growth, but rather to the restrictive assumptions on which it is based.

In this regard, we note the following limitations:

The various growth theories we have briefly presented highlight the complexity of this phenomenon and its high sensitivity to endogenous or exogenous factors of production.

Integrating technological progress into growth models is generally not a fully satisfactory explanation, as it often relies on simplifying assumptions or an exogenous approach that limits the scope of the analysis;

It ignores all aspects related to economic policy, even though such policy is defined by public authorities who set priorities and objectives for national economies. Yet, the pace of growth and the development of technological progress depend significantly, if not systematically, on the strategic directions adopted by policymakers;

If all economies benefit from the same rate of exogenous growth through technological progress, they will experience the same growth in the long term. However, countries that continuously invest in education possess greater human capital and can therefore maintain higher levels of output than countries that devote fewer resources to this area.

2.4. Endogenous Growth Theories

Endogenous growth theory posits that long-term economic growth stems primarily from the internal dynamics of the economy, particularly from mechanisms that foster technological innovation, such as those encouraging investment in research, education, or human capital. Thus, endogenous growth theory argues that technological progress arises essentially from innovation. This includes the creation of new products, the offering of novel services, or the opening of new markets; these advances are generally the result of economic activities within the system. Furthermore, economic policy choices, such as those in education, can play an important role in the pace of innovation. These policies, which affect the costs and benefits of investments in research and development, directly influence the motivation of actors to innovate.

2.4.1. Theoretical foundations in endogenous growth models

Endogenous growth theory views capital as a tool for improving productivity and living standards, and assigns a special role to human capital as a fundamental driver of economic growth. However, some authors hold different views regarding the relationship between education and economic growth. Gary S. Becker (1964) argues that inequalities in human capital largely explain wage disparities. According to him, these pay gaps reflect differences in productivity among workers, which are directly linked to their education, skills, or experience. For Becker, access to education and the development of professional skills allow an individual to become a highly sought-after candidate by employers, thereby paving the way to the highest positions in the professional hierarchy.

Paul Romer (1986) examines the foundations of economic growth and seeks effective tools to combat recession and unemployment. He finds that classical economic models, focused on the combination of capital and labor (both in quantity and quality), inevitably lead to stagnation. To overcome this impasse, he highlights an important but often neglected factor: innovation. Romer places innovation at the heart of the process of sustainable growth. In 1992, he further developed the concept of endogenous growth by emphasizing the central role of technological progress, or more precisely, innovation. According to him, the capacity for innovation is the main driver of economic growth. He argues that technological progress improves the quality of goods and services provided to economic agents, thereby increasing their productivity. From this perspective, Romer stresses the fundamental importance of education not only as a means of disseminating knowledge but also as a crucial lever for technology transfer and adoption. Furthermore, Romer (1994) and Benhabib and Spiegel (1994) emphasize that, in the framework of the new growth theory, education occupies a central role, as it is considered one of the key determinants of the long-term growth rate.

Lucas (1988) states that the accumulation of human capital through education is the fundamental pillar of economic growth, enabling individuals to enhance their productivity. He identifies two main pathways through which human capital can be strengthened: the first is formal education, and the second is experiential learning, which develops progressively through practice and professional activity.

Barro (1991) emphasized that state intervention, when misdirected or excessive, can hinder economic growth. According to him, the guarantee and protection of property rights is a fundamental element for encouraging investment and ensuring sustainable economic development. Furthermore, based on his statistical analyses, he highlights that certain public investments—particularly in transport and communication infrastructure, as well as in education and health—play a decisive role in improving the productivity of factors of

production and supporting sustainable growth. Conversely, he emphasizes that other, more socially-oriented measures, such as environmental protection or reducing income inequalities, do not have a significant impact on growth.

Endogenous growth models place education at the center of the economic development process and recognize its crucial role in a country's growth dynamics. These models argue that the accumulation of human capital, combined with technological progress, constitutes the main pillar of this growth. However, they also emphasize that the pace of economic development generally depends on a country's initial conditions, such as its level of development, resources, or initial infrastructure endowments.

2.4.2. Limitations of Endogenous Growth Theories

Endogenous growth approaches face certain obstacles that limit their scope and their ability to reflect real-world economic dynamics.

The analysis of growth drivers faces significant methodological and statistical obstacles. Accurately measuring concepts such as technological progress or human capital remains highly challenging, which makes empirical verification of the results presented by endogenous growth theory particularly difficult.

The main limitation of the studies by Lucas (1988), Barro (1991), and Mankiw, Romer, and Weil (1992) lies in their assumption that education has the same effect on all individuals, as with physical capital. Similarly, the marginal return of education is assumed to remain positive for the entire population.

Marc Gurgand (2004) points out another limitation: education is not entirely independent of other development factors. Indeed, when comparing different countries at a given point in time, one observes structural differences—whether institutional, political, or economic—and these differences alone can explain disparities in growth, or even differences in the level of human capital accumulation.

It can be said that the endogenous growth model is based on rigid assumptions, due to the failure to account for technological dynamics and the quality of innovations.

3. Review of Empirical Literature

3.1. Research Methodology

This work adopts a theoretical approach, primarily based on a review of empirical literature. This methodological choice is motivated by our desire to gather, compare, and understand the key studies, whether theoretical or empirical, that address the link between education and economic growth.

Our narrative literature review was rich in information and insights. To conduct this analysis effectively, we selectively distinguished between convergent studies demonstrating a positive effect of human capital and divergent studies that provide critiques and specify the conditions under which this positive effect occurs. This thematic was structured to develop research hypotheses and the proposal of a conceptual model.

3.2. Thematic of empirical findings

Theme 1: the direct contribution of Human capital to economic growth

The accumulation of human capital is now considered one of the fundamental pillars of economic growth and development. Theoretical and empirical research agree on this point: no country has ever achieved sustainable development without investing heavily in education, skills, and the expertise of its population.

Today, the accumulation of human capital is considered a fundamental pillar of growth and economic development. Theoretical and empirical research has concluded that without investment in education, training, skills, and know-how of its population, a country cannot achieve sustainable development. Empirical studies have shown a close link between education and economic growth, highlighting the positive impact of investment in education (Touré, 2020).

According to Barro and Sala-i-Martin (1995), human capital and physical capital have a complementary relationship. Highly skilled individuals possess the knowledge and skills necessary to generate new ideas within the production process. The level of education and expertise of individuals significantly affects productivity and, consequently, a country's economic prosperity, as shown by the research of Lucas (1988), Mankiw et al. (1992), and others.

This leads us to formulate the following hypothesis:

Hypothesis 1: *Human capital accumulation has a positive and significant effect on economic growth*

Theme 2: threshold effects, diminishing returns and structural nuances:

According to studies by Barro (1991) analyzing the impact of human capital on economic growth, higher enrollment rates are positively correlated with productivity. Barro also discussed the link between human capital formation and the catch-up stages of developing countries. Similarly, the stock of human capital has a positive effect on both short- and long-term growth, according to Gemmell (1996). Additionally, basic education (primary and secondary) significantly influences economic growth in low- and middle-income countries, whereas higher (post-secondary) education plays a more decisive role in economic dynamism.

Aghion et al. (2006), in an analysis of 19 OECD member countries, demonstrate that higher education plays a strategic role in technologically advanced economies. They also demonstrate that the contribution of human capital to economic growth is more significant in these technologically advanced countries.

Dauda (2010) shows that education is a pillar for reducing poverty and a tool for strengthening human capital, which is a necessary condition for sustaining economic growth.

This leads us to formulate the following hypothesis:

Hypothesis 2: *the effect of education on economic growth varies depending on a country's stage of development and the level of schooling considered.*

Theme 3 — Human Capital, Total Factor Productivity, and Technology Diffusion

Some studies nuance the impact of human capital on growth. Lindahl and Krueger (2001), for instance, consider years spent in school as an indicator of human capital but question the widespread assumption that its link to economic growth is entirely linear. Their analyses reveal a non-linear relationship: the positive effect on growth peaks after approximately 7.5 years of schooling. Since the average for OECD countries was already 8.4 years in 1990, they conclude that these countries have surpassed the optimal point, entering a phase where the returns of education on growth decline. This study indicates that education significantly stimulates economic growth only in countries with relatively low education levels. To better understand these dynamics, various studies differentiate the effects of education at different levels—primary, middle, and high school—and show that these effects vary according to economic development. Thus, in poor and developing economies, skills acquired in primary and secondary education drive growth, whereas in OECD countries, skills gained through higher education are decisive.

Empirical criticisms also come from Benhabib and Spiegel (1994), who showed that integrating human capital as a simple factor of production in a Cobb-Douglas-type function has only a negligible effect on per capita GDP growth. Consequently, when examining the role of human

capital through its impact on total factor productivity, its importance becomes clear. Two mechanisms stand out: on the one hand, as emphasized by Romer (1990), human capital accelerates internal innovation; on the other hand, according to Nelson and Phelps (1966), it facilitates the diffusion and adoption of new technologies.

Human capital stock is typically measured by the number of years of schooling of adults (Barro and Lee, 1994). Using census and enrollment data, they developed indicators measuring the average years of schooling among adults aged 25 and older, differentiating by education level (primary, secondary, and higher) and gender.

This leads us to formulate the following hypothesis:

Hypothesis 3 (H3): *Human capital positively influences economic growth through its impact on total factor productivity, notably via innovation and technology diffusion.*

Theme 4 — Education Quality and Cognitive Skills

Barro and Lee (1994) obtained mixed results. Their study shows a positive and significant correlation between individuals' secondary education levels and economic growth. However, they find a negative and significant correlation between women's secondary education and the same growth. Furthermore, Pritchett (2001) analyzed the relationship between GDP growth per worker and human capital accumulation measured by years of schooling. His results indicate that increasing the education level per worker does not have a major impact on economic growth, challenging the idea that investment in education is a fundamental pillar of economic growth. Another point raised by Hanushek and Woessmann (2015) is the positive effect of education quality on economic growth. Their analyses focus on individuals' cognitive skills, that is, the knowledge acquired and assessed through international academic performance tests since the 1960s. These authors show that incorporating this data helps explain growth disparities between countries. Hanushek and Woessmann (2015) conducted an econometric analysis on a sample of 50 countries between 1960 and 2000, which revealed a correlation between the level of cognitive skills and economic growth.

Finally, the technology diffusion theory of Nelson and Phelps (1966) suggests that developing countries can stimulate economic growth by leveraging existing technologies. This strategy is effective only if these countries have a skilled workforce.

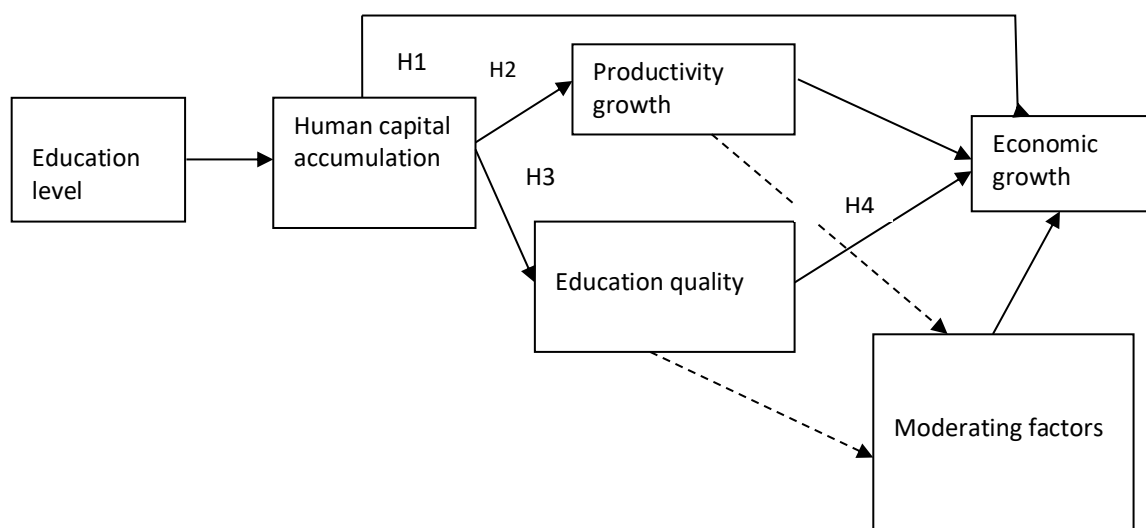
This leads us to formulate the following hypothesis:

Hypothesis 4 (H4): *Education quality and cognitive skills have a stronger impact on economic growth than schooling duration alone.*

3.3. Proposed Conceptual Model

Based on the theoretical and empirical literature review that we have carried out in order to explain the impact of education on economic growth; we propose the following model:

Figure 1: the conceptual model



Source: by authors

4. Conclusion

The relationship between education and economic growth remains an open question. Theoretical and empirical avenues continue to be explored. The economic literature has examined this relationship; however, the diversity of approaches and models used makes comparing results challenging. The cause-and-effect relationship between education and economic growth is still debated, and no clear consensus has yet been reached. This opens avenues for research on both theoretical and empirical levels.

Economic development theorists acknowledge that the quality of human capital (education) plays an essential role in the dynamics of economic growth. Moreover, while the role of human capital (education) as a key driver of growth and development has sparked much debate in economic literature, its importance as a central component of the production function is rarely questioned.

This article seeks to clarify the relationship between education and economic growth through a number of empirical studies while highlighting the evolution of this literature over time. The literature review serves as an essential resource for designing and implementing relevant economic policies that can address immediate and long-term challenges.

Although this research raises interesting points, it has certain limitations. It does not provide an in-depth analysis of recent empirical studies on education and does not account for some important factors that may influence this relationship, such as regional or institutional differences. For future research, it would be worthwhile to conduct more rigorous empirical studies based on precise indicators of education quality while incorporating technological developments and institutional dynamics.

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