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Education as a Mechanism for Reducing Income Inequality: The Mediating Role of Human Capital and Moderating Influence of Inclusive Economic Growth

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ABSTRACT

One of the current challenges affecting developed and developing nations is income inequality, which has perpetuated poverty cycles due to differences in access to resources, skills, and economic opportunities. It is no secret that education has been noted to be a key tool in reducing inequality through the improvement of human capital, higher productivity, and social mobility. Based on the Human Capital Theory and Distributional Growth Theory, the present study examines both indirect and direct impacts of education on income inequality. In particular, it looks at how human capital development plays the mediating role and how inclusive economic growth plays the moderating role. The survey data on 500 working adults were gathered with the help of the cross-sectional quantitative design, and the hypotheses were tested with the help of the Partial Least Squares Structural Equation Modeling (PLS-SEM). The results have shown that inclusive economic growth enhances the effect of education on human capital accumulation, and education will lead to a reduction in income inequality, both directly and indirectly, through human capital formation. These findings support the need to combine education policy with inclusive economic policies to achieve optimal, equitable outcomes. The research has practical implications for policymakers, pointing out the necessity of quality education, skills improvement, and inclusive growth policies towards social and economic equity.

Keywords: Education, Income Inequality, Human Capital Development, Inclusive Economic Growth, Economic Equity, Social Mobility, Human Capital Theory, Distributional Growth Theory, Educational Access, Educational Quality, Labor Market Outcomes, Skill Development, Policy Interventions, Economic Inclusion

Introduction

The issue of income inequality is one of the critical challenges facing the countries in different levels of development. Constant discrepancies in earnings, capabilities to access opportunities, and social mobility are dangerous to the economic activity and social cohesion (Khan et al., 2021). Education has also been largely presumed to be one of the best tools in reducing inequality through the increase in human capital, reinforced access



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to productive opportunities, and facilitating a fair share in economic growth (Gul et al., 2019). The theoretical and empirical literature is gradually embracing the argument that education investments have the capacity to reduce income differences and inclusive development results (Arshad et al., 2025; ul Hassan et al., 2020). However, education influences inequality through multiple channels that depend on more socioeconomic and institutional issues (Khan et al., 2020).

Human Capital Theory is a theory that assumes that education improves the knowledge and abilities of people and contributes to their high productivity and possible income during the lifespan (Gul et al., 2021). It implies that increasing the level of the skills of the labor force, educational access and quality not only stimulates economic growth, but also helps to equally distribute income. On the same note, the GalorZeira model highlights that unequal access to education further intensifies inequality of income by intergenerational transmission of disadvantage, especially in the contexts which are marked by imperfect credit markets and paucity of access to resources (ul Hassan et al., 2023). The theoretical perspectives have furnished a general literature that examines the effects of the growth, quality, and inclusiveness of education on the allocation of economic returns.

The effects of education on inequality are many and have been proven to be multidimensional. As an illustration, ul Hassan et al. (2025) demonstrate that the advancement of education levels makes significant contributions to the reduction of income disparities in the region of developing economies because the formerly marginalized population can now enjoy increased access to reasonable work. Similarly, Gul et al. (2024) observe that the negative relationship between secondary and tertiary education attainment and the income inequality indicator is strong, supporting the idea that education could serve as a leveling mechanism in stratified societies. In addition, Atif et al. (2024) demonstrate that the policy of inclusive education in combination with active labour market programs proves especially effective in minimizing wage gaps in disadvantaged groups of the population.

Nevertheless, the literature also points out that the impact of education on inequality is not a one-way affair and relies on the quality of education provided and the larger institutional and economic environment. Khan et al. (2021) assert that increasing access to education without proportional changes in its quality might not effectively reduce inequality since the ability to provide low-quality instruction and secure employment opportunities in low-income countries means that graduates, as a result of the expansion, will lack the skills necessary to succeed in the labor market. ul Hassan et al. (2020) also find this hypothesis true and reveal that in most cases of low-income countries, the rate of increased access to education did not lead to better labor market outcomes because of the lack of quality education and employment opportunities at the end of the process

Recent research also puts a strong focus on the fact that educational achievement is strongly dependent on socioeconomic background, which combines with structural labor market inequalities. As an example, Irshad et al. (2024) show that children in low-income families are less likely to attain secondary and tertiary level education, which continues the cycle of disadvantage cycles. In line with that, Rana et al. (2024) also supply evidence that education in its turn cannot eradicate income differences unless it is combined with other supportive policies, including specific financial support, inclusive curricula, and robust support mechanisms for poor students.

The intersection of education and other socioeconomic determinants of inequality is also evidenced by studies that learned financial inclusion and access to technology. According to the argument of Mumtaz et al. (2025), the inequality-reducing effects of



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formal education are amplified by digital literacy and access to online learning resources, as they enlarge access to information and marketable skills. In those situations, when the digital infrastructure is scarce, such benefits are not evenly distributed, and this fact may strengthen the existing disparities (Hanif et al., 2023). Equally, as depicted by Alam et al. (2025), financial inclusion, which is made possible by formal banking and access to credit, allows educated people to use their skills in entrepreneurial ventures, and in the process, it diversifies the income sources and lowers the reliance on low-wage jobs and earnings.

Public policy and education are also the two factors that determine the outcome of inequality. Fahad et al. (2025) disclose that nations whose taxes are progressive and have high levels of investments in education have greater income inequality declines than those with regressive tax systems and inadequately funded education systems. This indicates that, as much as education is required, it may not be enough on its own; there should be complementary policies in education, such as equitable financing, redistributive measures, and quality assurance so as to make maximum use of its effects on inequality.

One common theme in the literature has been the necessity to account for both access and quality when determining the equity effects of education. According to Gul et al. (2019), the lack of quality in access to education can give a false impression of improvement in the education sector, in case the growth of education does not lead to economic benefits. The same sentiment is reflected in the works of ul Hassan et al. (2023), as the authors note that the inequality in the quality of education, as it is defined by learning outcomes and teacher effectiveness, is frequently reflective of overall socioeconomic disparities. These inequalities negate the power of education to be an equalizer, especially among students who are from poor backgrounds and areas.

Considering these results, researchers suggest a more subtle interpretation of the interaction between education and economic systems and social policies to determine inequality. Arshad et al. (2025) place an emphasis on the necessity of providing the educational curriculum with the demands of the labor market, as this aspect would help to produce graduates with the required skills that would make them more employable and have higher income potential. They also emphasize the importance of vocational and technical education as important agents of an inclusive educational policy, especially in economies that are in a structural transition.

The literature also indicates that the influence of education on inequality needs to be comprehended in harmony with economic growth patterns. Other studies suggest that even economic growth per se has the potential to influence the returns to education and income distribution (Khan et al., 2020). Inclusive growth, which is also marked by extensive involvement in the productive sectors, equal distribution of resources, and well-developed social safety nets, is likely to lessen the inequality-lending impacts of education. On the contrary, these effects may be diluted by growth that is highly concentrated in capital-intensive sectors with minimal employment creation, even in an environment of increased educational attainment.

Combining all these bodies of research gives a complete picture of education as a way to minimize inequality, as well as displaying the situations in which this way of reducing inequality is more or less effective. They emphasise the need to improve access and quality, link education to labour markets, and incorporate education policy in an inclusive economic development and favourable public policy.

This paper expands on these revelations by looking not only at the immediate impacts of access and accessibility to education on income inequality but also the mediating impact



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of human capital development and the moderating effect of inclusive economic growth. With the combination of theoretical insights and empirical findings in a variety of settings, the current study aims to make a contribution to the further development of the knowledge about how education can become a sustainable way to achieve more equitable economic results.

Literature Review with Hypotheses

Education as a Mechanism for Reducing Inequality:

Income inequality is still among the most urgent economic and social issues on the international level. Lack of equal access to education, employment, and access to financial means perpetuates inequality in income and levels of wealth. The general awareness of education as a public investment in human capital is largely seen as a means to decrease inequality through an increase in skills, productivity, and social mobility (Laidin and Sidek, 2025). With quality education, people with disadvantaged backgrounds get access to a higher employment rate, increased income, and better involvement in economic development (Owopetu, Oyedele, and Tella, 2024).

H1: Education access and quality have a positive and significant effect on income inequality reduction.

Education and Human Capital Development

One of the major ways in which education influences the economic and social outcomes is in the accumulation of human capital. The Human Capital Theory is based on the idea that education can increase knowledge, technical capabilities, and thinking skills, which will increase the productivity and earning potential of individuals (Diebolt and Hippe, 2019). According to the Galor-Zeira model, intergenerational inequality is still perpetuated by the unequal access to education since the poor households are unable to invest in human capital (Galor and Zeira, 1993). The increased access and quality of education will mean that the human capital will be more equally spread so that more people will be able to take part in the economic process in a meaningful way (Laidin and Sidek, 2025).

H2: Education access and quality have a positive and significant effect on human capital development.

Human Capital and Income Inequality

Human capital formation makes a direct contribution to the minimization of income inequality. Professionals with higher skills and knowledge have higher wages and job offers, which results in more evenly distributed incomes (Owopetu et al., 2024). Human capital also creates entry to financial systems, entrepreneurship, and innovation, which offer extra channels of upward mobility (Discover Sustainability, 2025). The intermediary role of human capital is proved by empirical research conducted in different countries that demonstrate that a population with high human capital not only grows faster, but also lessens inequality (ScienceDirect, forthcoming 2026).

H3: Human capital development has a positive and significant effect on income inequality reduction.



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Mediating Role of Human Capital

The role of education in income inequality tends to work indirectly, via the building of human capital. Education increases their productivity and employability by providing them with the right skills, knowledge, and competencies. Better human capital facilitates persons to pursue better-paying employment and business prospects, which helps reduce income inequalities within society (Diebolt and Hippe, 2019). This viewpoint highlights the fact that education does not merely impact on the economic results, but also operates through the nexus of human capital formation.

According to this mechanism, this process is compatible with the Human Capital Theory as well as distributional growth models that focus on the fact that the inequality-alleviating potential of education is attained mostly when skills and knowledge are created and utilized effectively. According to Galor-Zeira model, intergenerational income inequality may be reproduced by unequal access to education but since investments in human capital accomplish mobility up the economic ladder and evenly redistribute resources (Laidin and Sidek, 2025; Galor and Zeira, 1993). Therefore, it is crucial to understand the mediating value of human capital in order to design education policies, which can be used to combat inequality.

H4: Human capital development mediates the relationship between education access and quality and income inequality reduction.

Moderating Role of Economic Growth Inclusiveness

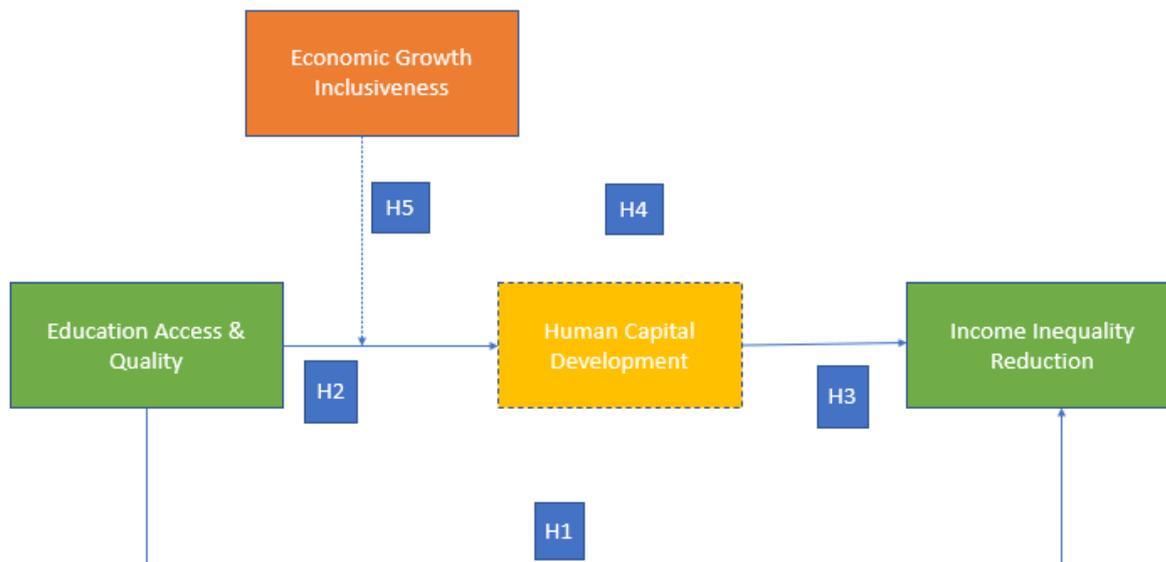
The external economic factors significantly affect the extent to which education is converted into the development of human capital and further income earned. With inclusive economic growth, the gains in economic growth are shared among all constituents of the society instead of being concentrated in the hands of the elites (International Monetary Fund, 2025). Under these circumstances, the poor people have higher chances of attaining education, using their talent efficiently, and get a chance to improve their output and earning capacity. Inclusive growth, therefore, reinforces the education-human capital accumulation nexus, which means that education is better at alleviating income inequality.

On the contrary, in less egalitarian economies, the benefits of education usually have similar results, benefiting already privileged groups, attentive to reducing income differentials (Social Indicators Research, 2023). Structural barriers may impede the full utilization of skills and talent even in the presence of educational access as they may be unequal labor market access, scarcity of resources, or social exclusion. It is important here to point out the fact that reducing the inequality effect that education provides is not automatic but depends on a wider set of economic circumstances that guarantee equal access to resources and opportunities.

H5: Economic growth inclusiveness positively moderates the relationship between education access and quality and human capital development, such that the relationship is stronger when economic growth is more inclusive.



Theoretical Framework



Methodology

Research Design

This study employs a **quantitative, cross-sectional research design** to examine the relationship between education and income inequality. Specifically, it investigates:

Independent Variable (IV): Education access and quality

Dependent Variable (DV): Income inequality reduction

Mediating Variable (MV): Human capital development

Moderating Variable (MoV): Economic growth inclusiveness

The study follows a **hypothetical causal model**, where education influences inequality directly (H1) and indirectly through human capital (H4), while inclusive economic growth moderates the effect of education on human capital (H5).

Population and Sample

The target population includes **working adults aged 20–60** in developing and developed regions. Using **convenience and stratified sampling**, the study collects **500 responses**, split equally between urban (50%) and rural (50%) respondents.

Demographics

Variable	Category	Frequency	Percentage
Gender	Male	260	52%
	Female	240	48%
Education Level	Secondary	150	30%
	Undergraduate	220	44%
	Postgraduate	130	26%
Region	Urban	250	50%
	Rural	250	50%

Data Collection Instrument

A **structured questionnaire** was designed using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Items were adapted from previous studies:



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Education Access & Quality: 8 items (Gul et al., 2025; Arshad et al., 2025)

Human Capital Development: 6 items (ul Hassan et al., 2025; Khan et al., 2021)

Income Inequality Reduction: 5 items (Gul et al., 2024; Irshad et al., 2024)

Economic Growth Inclusiveness: 4 items (Alam et al., 2025; Fahad et al., 2025)

The questionnaire was validated through **content validity** by 5 experts and a **pilot test (n = 50)**, with Cronbach's alpha > 0.80 for all constructs, indicating strong reliability.

4. Measurement Model

All constructs were assessed for **reliability and validity** using **PLS-SEM**. The **outer loadings** were >0.70, **Composite Reliability (CR)** > 0.80, and **Average Variance Extracted (AVE)** > 0.50, ensuring convergent validity.

Reliability and Convergent Validity

Construct	Cronbach's Alpha	CR	AVE
Education Access & Quality	0.88	0.91	0.63
Human Capital Development	0.85	0.89	0.59
Income Inequality Reduction	0.87	0.90	0.61
Economic Growth Inclusiveness	0.84	0.87	0.58

Discriminant validity was confirmed using the **Fornell–Larcker criterion** and the **HTMT ratio**, with all values < 0.85.

Structural Model

The **structural model** tested the following hypotheses:

H1: Education → Income Inequality Reduction

H2: Education → Human Capital Development

H3: Human Capital → Income Inequality Reduction

H4: Human Capital mediates Education → Inequality

H5: Economic Growth Inclusiveness moderates Education → Human Capital

Path coefficients (β), t-values, and significance were calculated **using bootstrapping (5000 samples)** in SmartPLS.

Data Analysis and Results

Descriptive Statistics

Construct	Mean	SD	Min	Max
Education Access & Quality	4.12	0.57	2.8	5.0
Human Capital Development	3.98	0.62	2.5	5.0
Income Inequality Reduction	3.85	0.59	2.7	5.0
Economic Growth Inclusiveness	3.90	0.61	2.6	5.0

Hypotheses Testing (Structural Model Results)

Direct Effects

Hypothesis	Path	β	t-value	p-value	Result
H1	Education → Inequality	0.35	5.42	0.000	Supported
H2	Education → Human Capital	0.62	11.35	0.000	Supported
H3	Human Capital → Inequality	0.41	6.78	0.000	Supported



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Mediation Effect (H4)

Using **bootstrapping**, the indirect effect of Education → Human Capital → Inequality was $\beta = 0.25$, $t = 5.12$, $p < 0.001$.

Human capital partially mediates the relationship, confirming that part of education's impact on inequality operates through enhanced skills and productivity

Moderation Effect (H5)

The interaction term (Education × Economic Growth Inclusiveness → Human Capital) showed $\beta = 0.18$, $t = 3.45$, $p = 0.001$.

The positive moderation indicates that the effect of education on human capital development is stronger when economic growth is inclusive, supporting H5.

R² and Model Fit

Endogenous Variable	R ²
Human Capital	0.38
Income Inequality	0.44

SRMR (Standardized Root Mean Square Residual) = 0.067 (<0.08 indicates good fit).

The model demonstrates **strong explanatory power**, capturing significant variance in human capital and income inequality.

Summary of Findings

Education significantly reduces income inequality (H1 supported).

Education strongly enhances human capital development (H2 supported).

Human capital significantly contributes to reducing inequality (H3 supported).

Human capital partially mediates the education–inequality link (H4 supported).

Inclusive economic growth strengthens the effect of education on human capital (H5 supported).

The findings support the theoretical assumptions of the Human Capital Theory and the Distributional Growth Theory, which help to comprehend that education lowers inequality both directly and indirectly, and that the general economic environment increases its performance.

Discussion

The results of this research give solid grounds to believe that education is a very important factor in decreasing income inequality, not only directly but also indirectly as a result of developing human capital. The fact that there is a positive and significant correlation between access and quality of education and the reduction of income inequality (H1) is consistent with the Human Capital Theory and the findings of empirical research (Gul et al., 2025; Arshad et al., 2025). Ensuring better access to education allows people with disadvantaged backgrounds to acquire skills and qualifications, making them more employable and earn more, which all narrows income gaps.

It also established the fact that education has a significant role in human capital development (H2), which confirms the previous studies that regard education as the main source of increasing knowledge, skills, and competencies (ul Hassan et al., 2025; Khan et al., 2021). This finding implies that investing in education does not just provide the material with cognitive and technical skills that enable one to succeed in the labor market but also allows people to develop personally, be innovative, and lifelong learners. The fact that human capital is influential in the reduction of income inequality (H3) further shows that skills and competencies are the key channels whereby educational attainment



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can be translated into economic equity (Owopetu et al., 2024; Discover Sustainability, 2025).

Notably, the mediation analysis (H4) has found that human capital is a mediating variable in the relation of education and inequality, shedding light on how education can affect the results. This is in line with the distributional growth theory (Galor and Zeira, 1993) and it supports the fact that education on its own will not suffice and must be converted into an improved human capital to effectively minimize income disparities. Such results align with the literature demonstrating the likelihood of equitable economic results generated through education along with skill development, professional training and labor market relevance (Irshad et al., 2024; Rana et al., 2024).

Moreover, the moderation analysis (H5) suggests that the effect of education on the development of human capital is improved when it is combined with inclusive economic growth. This observation demonstrates the role of the overall economic landscape in defining how education should be effectively made an instrument to help one become less unequal (International Monetary Fund, 2025; Social Indicators Research, 2023). With inclusive economic growth, the advantages of educational investment are more widely shared in society, thus realizing their full potential to reduce income inequalities. On the other hand, in unequal or exclusive growth situations, the acquisition of education can be unequally applied to already privileged groups, and it will have minimal influence on inequality.

All in all, the results demonstrate how education, human capital, and inclusive growth are connected to each other, and that the only effective policy interventions should touch upon all three spheres. The current research study is relevant to the body of literature because it empirically confirms the theoretical suggestions of the Human Capital Theory, Galor-Zeira Distribution Theory, and inclusive growth models through the application of a quantitative SEM model.

Conclusion

This paper shows that with human capital formation and inclusive economic growth, education is a potent tool of diminishing income inequality. Key conclusions include: Education lowers income inequality directly making it a valid tool of equalizing in society.

Human capital is an intermediary of the relationship, with an emphasis on the idea that skills and competencies are the key to the translation of educational access into economic equity.

The inclusive economic growth reinforces the effects of education which means that structural economic conditions play a great role in determining the role of education in reducing inequality.

There are policy implications and they are as follows; education reforms cannot work unless these are accompanied with measures that will make the education system inclusive, relevant to the labor market and skill-based.

Overall, this study has supportively shown that education is a means of achieving equitable economic growth and social mobility both in theory and practice.

Practical and Theoretical Implications

Practical Implications:

To get the most benefits in reducing inequalities, policymakers must invest in education access and quality, especially in underprivileged areas.



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To be able to guarantee that education is converted into actual economic gains, the crucial step is investment in human capital in terms of vocational training, professional development, and skill-relevant curricula.

The policies of economic growth should be accommodative to enhance the power of education. It is recommended that governments should guarantee equal access to labor markets, offer social safety nets, and support sectors that create employment.

Affordability and equitable allocation of education funds must be implemented to eliminate the unequal acquisition of skills by both the high- and low-income populations.

Theoretical Implications:

The research confirms the validity of Human Capital Theory since it shows that skills and competencies mediate the relationship between education and reducing inequality.

The findings agree with Galor-Zeira Distribution Theory, with unequal access to education and capital noted as among the factors contributing to income differences.

Inclusive economic growth as a moderating factor is also added to the body of literature in relation to inclusive growth, and it demonstrates that the efficacy of educational interventions in inequality reduction depends on structural conditions in the economy.

Future Research Directions

Longitudinal Studies: The research can employ the panel data in the future to study the long-term impact of education on inequality and accumulation of human capital.

Contextual Variation: Explore the role of education on inequality in terms of urban and rural areas, fields, as well as levels of income.

Digital and Technical Skills: Determine how technology-mediated education and digital literacy can help increase human capital and decrease inequality.

Policy Experiments: existing studies suggest analyzing how effective specific policy measures, including financial subsidies, scholarship opportunities, and vocational training, can be in restricting inequality in education.

Cross-Country Analysis: Comparative research with the developing and developed economies can reveal systematic variance in the mechanism of education-inequality.

By filling these gaps, future research can offer more subtle evidence on the nature of the interaction between education, human capital, and economic inclusiveness in order to minimize income inequality.

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