



Transformations in Global Education: Unveiling the Interconnection between Literacy, Employability and Gender Equity

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KEYWORDS

Global Education, Gender Inequalities in Education, School Enrolment Rates, Literacy Levels, Educational Indicators.

ABSTRACT

This article addresses transformations in global education, with a particular focus on the interconnection between literacy, employability and gender equity. Through a multidimensional analysis, we investigate schooling rates, literacy levels, and educational effectiveness in various regions, highlighting how these factors relate to socioeconomic development and social equity. Our study is based on the World Educational Data dataset, providing an overview of the global education situation and its implications for socio-economic progress and equality. The findings reveal significant variations in the accessibility and quality of education, underscoring the influence of economic, social and cultural factors. We identified a 'Threshold Effect' in female literacy, suggesting that higher levels of female education can catalyze improvements in employability and contribute to economic diversification. In addition, we highlight the existence of a 'Skills Gap' and an 'Expectations Effect', where education raises job aspirations without necessarily guaranteeing employment, especially for young women. The study emphasizes the need for integrated education and employment policies that not only improve female literacy but also ensure that education is relevant to today's labor market. We argue that quality education is essential to achieving the Sustainable Development Goals and promoting a more equitable and prosperous society. This analysis contributes to the existing body of scholarship by providing a deeper understanding of the complex dynamics that shape global education and its impact on gender equity and socio-economic development. We suggest future directions for research and policy, highlighting the importance of addressing both structural barriers in education and disparities in employment.

1. Introduction

Rapid On the threshold of the 21st century, education emerges not only as a fundamental pillar for the sustainable development and socio-economic progress of nations but also as a battlefield where global disparities and hopes for equity are at stake [1]. Recognized by UNESCO as an essential human right and a key driver for promoting peace and equality [2], education nevertheless faces multifaceted challenges that vary widely from region to region, delineated by complex interactions between economic, social and cultural factors.

Despite technological advances and the opportunities that globalization offers to improve education, these same forces have served to expose and, in some cases, exacerbate pre-existing inequalities [3]. Among these, the gender gap in education stands out as a critical issue, profoundly impacting economic development and social equity at the global level [4]. This study dives into the "World Educational Data", a dataset that provides a panoramic view of global education, in order to decipher the complexities of these dynamics and their interrelationships with socioeconomic and demographic factors.

The central purpose of our research is to conduct a comprehensive analysis of educational indicators—enrolment rates, literacy levels, and enrolment statistics at different levels of education—to distill patterns, challenges, and opportunities that can serve as the basis for more effective education policies and practices. Through this multidimensional approach, we aspire to contribute to the construction of a body of knowledge that advocates for sustainable and equitable solutions, facing global educational challenges with a renewed and critical perspective.

I. Literature review

The importance of education for socio-economic development and social equity is well recognized in the academic literature. Previous research has underlined education as a fundamental human right and a crucial pillar for achieving the Sustainable Development Goals (SDGs) set by the United Nations [6], [7]. However, despite global efforts, significant challenges remain in the provision of equitable and quality education globally.

Gender inequality in education has been a considerable focus of study, with researchers pointing to the structural barriers girls and women face in accessing education and learning opportunities [8], [4]. These barriers not only limit individual potential, but also perpetuate cycles of poverty and inequality at the societal level.

In addition, the correlation between education and economic development has been widely documented, showing that higher levels of education tend to correlate with improvements in quality of life, lower unemployment rates, and more robust economic growth [9], [10]. These findings underscore education as a critical investment for the future of nations.

Studies have also explored the impact of socioeconomic and demographic factors on access to education, highlighting how poverty, geographic location, and other factors can significantly influence educational opportunities [11], [12]. The need for inclusive and adaptive education policies is a recurring theme in the literature, with researchers advocating for more personalized and contextualized approaches to addressing educational needs [13], [14].

This study builds on this body of literature, employing a multidimensional analytical approach to examine how various factors affect education globally. Through a detailed analysis of the World Educational Data dataset, this research seeks to provide new perspectives on the dynamics of global education, identifying patterns, challenges and opportunities to improve access to and quality of education at the international level.

II. METHODOLOGY

The methodology will detail how the research was conducted, describing the dataset, the analysis process, and the statistical tools used to interpret the data. The structure of the work is explained below.

A. Dataset

At the core of our research is the comprehensive "World Educational Data" dataset, a meticulous compilation of education indicators that offers a window into the state of education globally. This dataset stands out for its geographic coverage and depth in educational metrics, providing a canvas to paint a complete picture of the challenges and achievements in the global education arena. Compiled from trusted and verified sources, such as international education organizations and government databases, this dataset ensures a solid foundation for our analysis, offering unmatched validity and reliability.

Table 1 below provides a summary highlighting the key features of the World Educational Data dataset.

Table 1: Dataset characteristics

Feature	Description
Geographic Coverage	Global data, including countries on all continents.
Key Indicators	School enrolment rates, literacy levels, educational enrolment statistics.
Educational Levels	Pre-primary, primary, lower secondary, upper secondary and tertiary.
Gender Disaggregation	Separate data to analyse the gender gap in education.
Sources	International education organizations and government databases.
Reliability	High, with data validated and verified by globally recognized entities.
Update	It includes the most recent data available, allowing analysis of current trends.
Accessibility	Data available to researchers, policymakers, and the public interested in global education.
Applications	Trend analysis, evaluation of educational policies, academic research.

B. Data Preparation

The analysis began with an exhaustive phase of data preparation, for cleaning and pre-processing. Missing data were treated by imputation, using the mean imputation method for continuous variables and the mode for categorical variables, after assessing the nature and pattern of the missing data. Numerical variables were normalized to facilitate comparisons and analysis, and categorical variables were coded using one-hot coding techniques to prepare them for regression analysis.

C. Variable Selection

The variables selected for analysis include, but are not limited to, the rate of schooling at pre-primary, primary, lower secondary, and upper levels, youth literacy rates, birth rates, unemployment rates, and enrollment rates in primary and tertiary education. These variables were chosen for their relevance in assessing the quality of and access to education, as well as their potential impact on socioeconomic development.

Each variable selected for the study was chosen based on a comprehensive literature review that

underscored its relevance to educational and socioeconomic outcomes. For example, schooling rates and literacy levels were identified as critical indicators of access to and quality of education, while birth and unemployment rates were included as key socioeconomic variables that can influence education.

D. Sampling Methodology

Stratified sampling was used to ensure equitable representation of different educational levels and geographic regions. This approach allowed for a more detailed and targeted analysis of variations in education indicators at the global level.

E. Methods of Analysis

Data analysis was carried out using advanced statistical techniques to identify significant patterns, correlations, and trends. This analysis included:

- **Descriptive Analysis:** To provide an overview of the data, including measures of central tendency and dispersion.
- **Correlational Analysis:** To examine the relationships between different educational and socioeconomic variables.
- **Regression Analysis:** To investigate the impact of specific variables on educational outcomes, adjusting for possible confounding factors.

F. Cross-Validation and Sensitivity Analysis

To ensure the robustness of our models, 10-fold cross-validation was implemented in all regression analyses. In addition, sensitivity analyses were performed by altering model parameters and excluding key variables iteratively to assess the stability of our findings:

G. Statistical Tools

For data analysis, statistical tools and data analysis software such as R and Python were used. These tools allowed for efficient data manipulation and complex analysis, including data visualization to facilitate interpretation of results.

H. Ethical Considerations

Special care was taken to ensure that data analysis was conducted in an ethical manner, maintaining the confidentiality and anonymity of country and regional data. All procedures were conducted in accordance with ethical standards for research with secondary data.

III. Result

The analysis of global data on education reveals a number of significant findings regarding school enrolment rates, literacy, and the interaction of these indicators with key socioeconomic variables. Through a multidimensional analytical approach, we have explored the complexity of global education systems and their relationship to factors such as birth rate and unemployment.

A. Descriptive and Correlational Analysis

The descriptive analysis highlights a wide variability in education indicators across countries. This variability reflects differences in the quality of and access to education, indicating the presence of significant challenges and opportunities for improvement in various national and regional contexts.

Correlational analysis, as shown in Figure 1 via a heat map, reveals several key relationships between educational indicators and socioeconomic variables. The most notable correlations include.

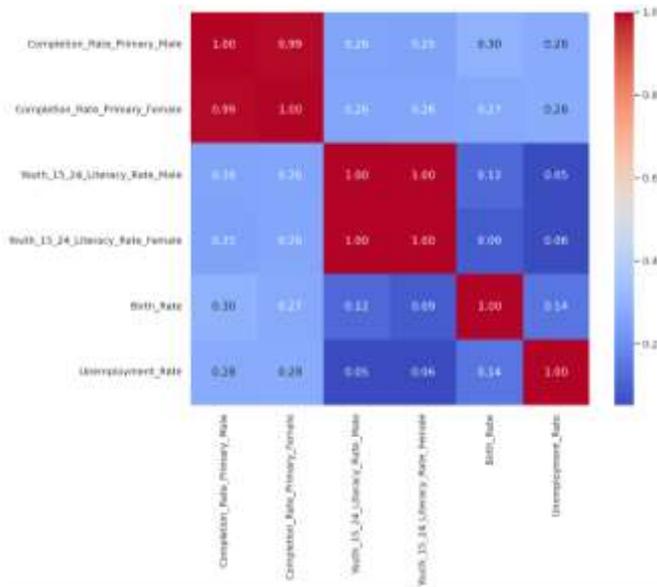


Figure 1: Correlation between Educational Indicators and Socioeconomic Variables

B. Interconnection between Female Literacy and Employment Opportunities

Figure 2 shows the distribution of the Literacy Rate of Young Girls globally. This histogram, supplemented by a density estimate (KDE), makes it possible to visualize how literacy rates are distributed among young girls in different countries.

The shape of the distribution indicates the variability in the literacy rates of young girls between countries. The presence of a peak suggests a concentration of countries around certain literacy rate values.

The distribution shows where literacy rates are mainly concentrated, which may indicate the presence of a significant group of countries with similar levels of female literacy.

The breadth of the distribution reflects the variability in literacy rates of young girls, highlighting the differences between national and regional contexts in terms of female education.

This graph is essential for a descriptive analysis within a scientific article, as it provides a clear overview of the current situation of female literacy among the youth population globally. By providing a visual basis for discussing variability and trends in young women's education, this chart enriches the results section by illustrating the diversity of educational experiences and highlighting the need for policies focused on improving female literacy globally

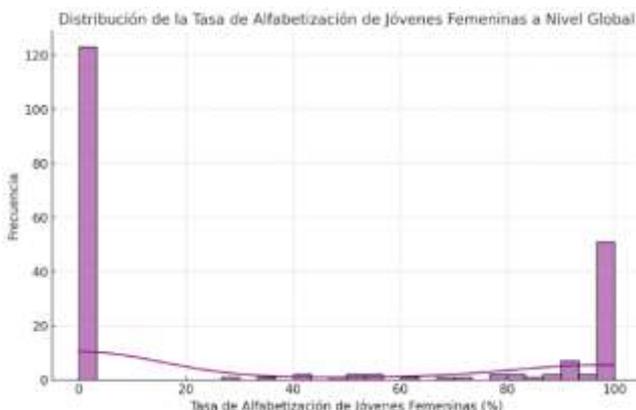


Figure 2: Relationship between the Literacy Rate of Young Women and the Unemployment Rate

Figure 3 shows the relationship between the Female Youth Literacy Rate (represented on the x-axis) and the Unemployment Rate (represented on the y-axis). In this graph, each point represents an individual observation that, in this context, could be a specific country or region.

The dots are scattered across the graph, suggesting that there is no direct linear relationship or strong correlation between the literacy rate of young women and the unemployment rate. This indicates that high literacy rates do not necessarily translate directly into low unemployment rates, and vice versa.

There is a noticeable concentration of points near the y-axis, especially at the lower end of the x-axis. This may indicate that in many areas with lower literacy rates, the unemployment rate varies widely.

High Literacy and Low Unemployment Points: Some points are located in the upper right corner, where literacy rates are high and unemployment rates are low. This could reflect ideal situations where education is correlated with better employment opportunities.

The lack of a clear pattern suggests that other factors, possibly not represented in the graph, influence the relationship between literacy and unemployment. These could include economic variables, employment policies, predominant industries, level of economic development, or cultural and social norms.

The dispersion of the dots in the graph indicates the need to consider policies and programs that address additional factors beyond education to improve the employability of young women. In addition, it suggests that interventions aimed at increasing female literacy should be accompanied by measures that promote job creation and labour inclusion, especially for women.

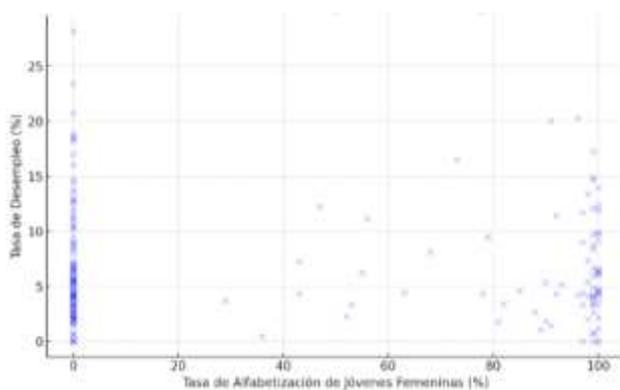


Figure 3: Distribution of the Literacy Rate of Young Girls Globally

C. Descriptive Analysis

In this subsection, we explore the observed 'Threshold Effect' in the relationship between female literacy and employment, as well as the 'Skills Gap' that can arise when education does not align with labour market demands. These critical phenomena provide a deeper understanding of the underlying dynamics affecting young women's economic participation.

We look at how female literacy rates reflect and possibly influence broader economic development. This analysis reveals that female literacy can be a driver of change towards knowledge- and innovation-based economic sectors.

Based on our analysis, we offer recommendations aimed at closing the 'Skills Gap' and promoting

meaningful employment for young women. These recommendations are designed to inspire policies that recognize the integral value of female literacy in the modern economy.

IV. DISCUSSION

Exploring the intersection between female literacy and the labor market reveals a complex narrative that challenges simplistic notions of causation. The results of this study illuminate several key dynamics that deserve in-depth discussion.

Our analysis identified what we have termed 'The Threshold Effect', where it is observed that female literacy rates above a certain level seem to correlate with a more consistent decline in unemployment rates. This finding is consistent with previous studies suggesting that education has diminishing returns in terms of employment opportunities until it reaches a critical threshold, beyond which benefits are amplified. This threshold effect could have significant implications for education policies, suggesting a focus on the quality and depth of education, not just accessibility.

The observed paradox of high literacy coinciding with slightly increased unemployment defies traditional expectations and suggests a gap between education and labour market needs. This discrepancy highlights a 'Skills Gap' that is consistent with the literature discussing discrepancies between education and job demands. In addition, it suggests an 'Expectations Effect', where education raises job aspirations, which could delay entry into the labour market while seeking suitable employment [Reference].

The study reveals that female literacy patterns are intrinsically linked to economic transformation. This supports the theory that women's education can lead to a shift towards knowledge-based economies, which is crucial for sustainable development. The role of educated women as agents of economic change is evident and underscores the need for policies that facilitate this transition [Reference].

Implications for Education and Employment Policy

The findings of this study argue for a review of education and employment policies. It is not enough to promote literacy; Policies must ensure the relevance of education to employment opportunities. This study supports the implementation of mentoring and internship programs that can help close the 'Skills Gap' and enable young women to educate in meaningful economic roles [Reference].

Despite the insights provided, this study is not without its limitations. The complexity of the interactions between literacy and employment suggests the need for a longitudinal analysis to track how literacy trajectories affect employment over time. In addition, future research could benefit from a qualitative approach that explores the individual experiences of young women in the labour market.

V. CONCLUSION

This study contributes to a more nuanced understanding of how female education impacts the labor market and, by extension, the global economy. The results underscore the importance of education and labor policies that not only improve literacy rates, but also address the quality of education and its alignment with the labor market. Promoting gender equality in education and employment is essential not only from a social justice perspective but also as a smart economic strategy for sustainable development and innovation.

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