

Student Performance in Morocco: A Synthesis of National and International Assessments

Zakarya KHALDI, (PhD student)

*Laboratory of Strategy and Management of Organizations,
National School of Business and Management of Settat,
Hassan First University of Settat, Morocco*

Said EL GANICH, (Full Professor)

*Laboratory of Strategy and Management of Organizations
National School of Business and Management of Settat
Hassan First University of Settat, Morocco*

Moulay Youssef ABDOURABIH, (PhD student)

*Laboratory of Geomorphology, Environment, and Society
FLSH Marrakesh, Cadi Ayyad University of Marrakech*

Corresponding Address::	Zakarya KHALDI Laboratory of Strategy and Management of Organizations Hassan First University of Settat, Morocco Settat, Morocco
Disclosure Statement:	The authors are not aware of any funding that could affect the objectivity of this study. They assume full responsibility for any plagiarism, the use of artificial intelligence in writing, as well as the results presented in this article.
Conflict of Interest:	The authors report no conflict of interest.
How to cite this article	KHALDI, Z., EL GANICH, S., & ABDOURABIH, M. Y. (2026). Student Performance in Morocco: A Synthesis of National and International Assessments. <i>International Journal of Accounting, Finance, Auditing, Management and Economics</i> , 7(12), 863–874. https://doi.org/10.5281/zenodo.23144636
License	This article is published in Open Access under CC BY-NC-ND license

Received: 17/09/2026

Accepted: 20/10/2026

International Journal of Accounting, Finance, Auditing, Management and Economics - IJAFAME

ISSN: 2658-8455

Volume 7, Issue 12 (2026)

Student Performance in Morocco: A Synthesis of National and International Assessments

Abstract

Ensuring quality education and equitable learning outcomes represents a fundamental pillar of national socio-economic development and human capital accumulation. Despite continuous structural reforms implemented in Morocco from the 1999 National Charter to the 2022–2026 Roadmap, persistent concerns remain regarding learning quality. This paper provides an integrated, theoretically grounded synthesis of student performance in Morocco, combining national evaluations, specifically the National Assessment Program of Student Achievement (PNEA 2019), and major international assessments, including TIMSS (2003–2023), PIRLS (2001–2021), and PISA (2022). Grounded in Educational Production Functions and Human Capital Theory, this study formulates three core research questions examining performance trends, structural determinants (socioeconomic status, preschool education, and school resources), and policy governance implications. Adopting a secondary quantitative analytical design, the findings reveal that while primary net enrollment exceeds 95%, foundational learning mastery remains severely constrained. In PNEA 2019, 42% of 6th-grade primary students mastered Arabic and French, and 27% mastered mathematics, dropping to 10%, 11%, and 12% respectively by lower secondary completion. Internationally, Moroccan 4th graders score well below the IEA scale mean of 500 in TIMSS (389 in math, 394 in science in 2023) and PIRLS (372 in 2021), with 58% to 59% of students failing to reach the low benchmark of 400 points. PISA 2022 confirms these vulnerabilities, ranking Morocco 71st in mathematics, 79th in reading, and 76th in science. The paper outlines evidence-based governance and pedagogical levers to align curricula with international frameworks and improve educational equity under Article 31 of the 2011 Moroccan Constitution.

Keywords: Student Achievement, Large-Scale Educational Assessments, Educational Equity, Human Capital, Morocco.

JEL Classification: I21, I24, I28

Paper type: Empirical Research / Systematized Secondary Data Review

1.Introduction

Education represents the primary vector for building national human potential, accelerating economic productivity, and achieving sustainable development. In developing and emerging economies, the expansion of schooling systems has historically focused on quantitative targets, such as expanding infrastructure, raising primary enrollment rates, and democratizing access to basic instruction. In Morocco, the evolution of educational policy over the past six decades reflects a gradual shifting of strategic priorities across distinct historical periods. Following national independence, the period between 1956 and 1970 prioritized quantitative expansion, aimed at overcoming severe illiteracy (which exceeded 85% in 1956) and building initial administrative capacity. During the 1970s and 1980s, policy attention expanded to encompass internal efficiency indicators, such as promotion, grade repetition, and drop-out rates, monitored primarily through school-level administrative records. However, it was not until the launch of the 1999 National Charter for Education and Training, followed by the Emergency Plan (2009–2012), the Strategic Vision 2015–2030 (CSEFRS, 2015), and the recent Roadmap (2022–2026), that educational governance explicitly recognized the distinction between access and learning quality, integrating standardized national and international assessments into system evaluation (HCP, 2022; MEN, 2022; INE-CSEFRS, 2019).

Despite significant quantitative achievements, including a primary net enrollment rate exceeding 95% in 2022 and a reduction of national adult illiteracy from 48% in 2004 to approximately 23% in 2022 (HCP, 2022; UNESCO, 2022), the Moroccan educational system confronts severe structural learning deficits. Official statistics indicate that despite an average lower-secondary dropout rate of approximately 4.4% across public institutions, the cumulative volume of annual dropouts reaches roughly 331,000 pupils across primary, lower secondary, and upper secondary education combined (MEN, 2022; INE-CSEFRS, 2019). This disconnect illustrates that physical access to schooling does not guarantee the acquisition of foundational cognitive skills in literacy, mathematics, and science.

While an expanding body of national institutional reports from the National Evaluation Institute (INE-CSEFRS) and international research (Liouaeddine et al., 2018; Ibourk, 2017; World Bank, 2021) has documented specific performance indicators, there remains a critical gap in the academic literature regarding an integrated analytical synthesis that articulates national evaluations (PNEA) with international large-scale assessments (TIMSS, PIRLS, and PISA) through a unified theoretical lens. Previous studies have tended to examine individual survey cycles in isolation or focus strictly on macro-economic inputs without systematically linking structural determinants, such as family socioeconomic status, early childhood education coverage, and territorial resource allocation, to cognitive achievement across primary and secondary levels. This study directly addresses this empirical gap.

To guide this investigation, this article formulates the following primary research question: To what extent do national and international standardized assessments reflect the actual quality of learning achievement in Morocco, and how do socioeconomic, pedagogical, and institutional determinants explain observed performance gaps? To operationalize this core inquiry, three specific sub-questions are examined:

- **SQ1:** What are the longitudinal trends and cross-subject patterns in student performance across PNEA, TIMSS, PIRLS, and PISA assessments over the past two decades?
- **SQ2:** How do structural factors, specifically socioeconomic status (SES), preschool participation, urban-rural location, and school pedagogical resources, affect achievement levels and educational equity?
- **SQ3:** What evidence-based governance and curricular reforms are required to transform assessment findings into actionable policy levers for educational quality enhancement?

The scientific contribution of this paper is threefold. First, theoretically, it bridges the gap

between Educational Production Function theory (Hanushek, 1986; Hanushek & Woessmann, 2015) and empirical assessment data from a lower-middle-income context in North Africa. Second, empirically, it offers a comprehensive, longitudinal cross-analysis of major assessment frameworks (PNEA 2019, TIMSS 2003–2023, PIRLS 2001–2021, and PISA 2022), providing verified data reconciliation and international benchmarking. Third, from a public policy perspective, it provides actionable insights for educational decision-makers seeking to implement the 2022–2026 Roadmap objectives.

The remainder of this article is structured into four sequential sections: Section 2 presents the theoretical framework and literature review, conceptualizing educational production functions, efficiency vs. effectiveness, and socioeconomic determinants. Section 3 outlines the quantitative secondary research methodology and data sources. Section 4 presents the empirical results, cross-assessment analysis, and analytical discussion. Section 5 concludes with policy recommendations, research limitations, and future research perspectives.

2. Theoretical Framework and Literature Review

2.1 Educational Production Functions and Human Capital Theory

The theoretical foundation for analyzing student academic performance rests primarily on the Educational Production Function (EPF) framework (Coleman et al., 1966; Hanushek, 1986, 2002) and Human Capital Theory (Becker, 1964; Schultz, 1961; Hanushek & Woessmann, 2008, 2012, 2015). Under Human Capital Theory, formal education is conceptualized as an investment that enhances the cognitive capacities, skills, and future economic productivity of individuals, thereby driving macro-economic growth (Hanushek & Woessmann, 2012). However, economic growth is not driven merely by years of school attainment, but by actual cognitive skills acquired, what Hanushek and Woessmann (2015) term the "knowledge capital of nations."

To model how cognitive skills are produced within schooling systems, the Educational Production Function formalizes the relationship between educational inputs and student achievement outputs. Mathematically, the EPF is expressed as:

$$A_{i,s,t} = f(F_{i,t}, S_{s,t}, P_{s,t}, I_i, \varepsilon_{i,s,t})$$

Where $A_{i,s,t}$ represents the scholastic achievement (test score) of student i in school s at time t ; $F_{i,t}$ denotes family background and socioeconomic inputs (parents' education, household assets); $S_{s,t}$ captures school-level physical and pedagogical resources (class size, infrastructure, teaching materials); $P_{s,t}$ reflects teacher quality and pedagogical practices; I_i represents initial student innate ability; and $\varepsilon_{i,s,t}$ is an unobserved error term (Hanushek, 1986; Sirin, 2005). Applied to standardized assessments, the EPF allows researchers to isolate the relative contributions of household context versus institutional resources in determining student performance.

2.2 Conceptualizing Efficacy, Efficiency, and Performance in Education

A rigorous evaluation of education systems requires a clear conceptual distinction between three often-confounded concepts, namely educational effectiveness, educational efficiency, and educational performance. First, educational effectiveness measures the extent to which an educational system or institution achieves its predefined pedagogical goals and learning targets, regardless of the financial or material cost involved (World Bank, 1995; Jarousse & Mingat, 1993). In the context of standardized evaluations such as TIMSS, PIRLS, or PNEA, effectiveness is evaluated through average test scores and the proportion of students reaching prescribed curriculum mastery thresholds. Second, educational efficiency refers to the optimal relationship between inputs, such as financial expenditure, teacher-student ratios, and physical facilities, and educational outcomes, including test scores and graduation rates. Efficiency can be subdivided into technical efficiency, which reflects the ability to produce maximum output

from a given vector of inputs, and allocative efficiency, which involves selecting the optimal mix of inputs given their relative prices (Farrell, 1957; Koopmans, 1951; Debreu, 1951; Charnes, Cooper, & Rhodes, 1978; Worthington, 2001). Third, educational performance constitutes a multi-dimensional construct that encompasses both effectiveness and efficiency, incorporating cognitive learning outcomes, equity of access, internal system retention, and pedagogical governance (Nacuzon Sall & de Ketele, 1997; OECD, 2023).

To conceptualize technical and allocative efficiency in production units, Farrell (1957) introduced the production frontier curve (isoquant). Table 1 presents the conceptual decomposition of efficiency components in input-output space based on Farrell's frontier formulation.

Table 1: Measurement of Technical and Allocative Efficiency (Farrell Frontier Framework)

Efficiency Component	Graphical / Mathematical Ratio	Economic Interpretation in Education
Technical Efficiency (TE)	Ratio OQ / OP	Ability of a school to minimize input usage for a given cognitive score output along isoquant UU'.
Allocative Efficiency (AE)	Ratio OR / OQ	Ability of a school to use inputs in cost-minimizing proportions given input prices AA'.
Overall Economic Efficiency (EE)	Ratio OR / OP (TE × AE)	Point Q' represents the unique point achieving simultaneous technical and allocative efficiency.

Source: Adapted by authors from Farrell (1957) and Charnes et al. (1978).

In educational frontier studies (Worthington, 2001; Liouaeddine et al., 2018), schools operating below the isoquant UU' (e.g., point P) are technically inefficient, as they consume excess resources (inputs) without generating higher student achievement scores. In Morocco, empirical efficiency studies show that variation in school-level technical efficiency is heavily driven by student socioeconomic environment rather than physical input volume alone (Liouaeddine et al., 2018; Ait Ben Assila, 2021).

2.3 Socioeconomic Determinants, Early Childhood, and Conceptual Framework of the Study

A vast international literature confirms that Socioeconomic Status (SES) is one of the strongest individual-level predictors of academic performance (Sirin, 2005; Bourdieu & Passeron, 1970; Kremer et al., 2013). Children from socioeconomically privileged backgrounds benefit from greater home educational resources (books, digital devices, private tutoring), higher parental academic support, and better early health and nutrition. Conversely, severe learning poverty (World Bank, 2018, 2021; Hanushek & Woessmann, 2015) is disproportionately concentrated in socioeconomically disadvantaged and rural environments. Pedagogical innovation and targeted interventions are essential to break this cycle (Ahaji, 2021).

In developing educational systems, early childhood education (preschooling) acts as a crucial equalizer (UNESCO, 2022). High-quality preschool exposure fosters early cognitive and linguistic readiness, mitigating initial socioeconomic disparities before formal primary schooling begins. Furthermore, organizational factors—such as multi-grade classrooms in rural primary schools, teacher absenteeism, and overcrowded urban classrooms—interact with SES to exacerbate achievement gaps (Ibourk, 2017; Habibi, 2022).

To synthesize these complex socioeconomic, early childhood, and institutional determinants of scholastic achievement in Morocco, this study formulates an integrative conceptual framework that connects macro-level institutional policies with micro-level student outcomes. Grounded in the Educational Production Function architecture, the framework categorizes educational determinants into four sequential dimensions, starting from context and family background inputs, moving through early childhood preparation and school-level physical resources, progressing through system processes and instructional climate, and culminating in

standardized learning outcome outputs. This multi-tiered structure allows for a systematic mapping of how socio-economic endowments, preschool readiness, and pedagogical infrastructure interact to shape student achievement across national and international assessment cycles. Table 2 details the specific variables, indicators, and empirical data sources associated with each of these four analytical dimensions.

Table 2: Conceptual Framework for Educational Performance Analysis

Dimension	Key Variables / Indicators	Empirical Measurement Source
1. Context & Family Inputs	Parents' education, home educational resources, household wealth index, rural vs. urban location.	PNEA Context Questionnaires, TIMSS/PIRLS Student & Home Questionnaires.
2. Early Childhood & School Inputs	Preschool participation (years), school physical infrastructure, pedagogical materials, teacher qualification/training.	PNEA School Questionnaires, TIMSS/PIRLS Teacher & Principal Questionnaires.
3. System Process & Climate	Curricular alignment, instructional hours, classroom discipline, multi-grade class status, public vs. private sector.	Ministry of National Education (MEN) administrative databases, PISA questionnaires.
4. Learning Outcomes (Outputs)	Standardized scores in Math, Science, Reading; percentage reaching IEA benchmarks (400/475/550/625); PNEA mastery rates.	PNEA (2019), TIMSS (2003–2023), PIRLS (2001–2021), PISA (2018, 2022).

Source: Constructed by the authors based on Hanushek (1986) and INE-CSEFRS (2019).

3. Methodology and Data Sources

3.1 Research Design and Assessment Corpus

Table 3: Overview of National and International Assessment Data Mobilized

Assessment Program	Managing Institution	Cycles Covered in Study	Target Grade / Age	Evaluated Subjects	Sampling Design & Scale
PNEA (National Assessment)	INE-CSEFRS (Morocco)	2019 (with 2008/16 context)	6th Primary (6 AEP) & 3rd College (3 AEP)	Arabic, French, Mathematics, Sciences	Stratified representative national sample (~35,000 students)
TIMSS (International)	IEA (International)	2003, 2007, 2011, 2015, 2019, 2023	4th Grade Primary (4 AEP)	Mathematics, Science	Two-stage stratified cluster sampling (~150 schools, 5,000+ students)
PIRLS (International)	IEA (International)	2001, 2006, 2011, 2016, 2021	4th Grade Primary (4 AEP)	Reading Comprehension / Literacy	Two-stage stratified cluster sampling (~150 schools, 5,000+ students)
PISA (International)	OECD (International)	2018, 2022	15-year-old students	Math Literacy, Reading, Science	Nationally representative sample of 15-year-olds (6,800+ students)

Source: Compiled by authors from official reports (INE-CSEFRS, 2019; Mullis et al., 2016, 2020, 2023;

OECD, 2019, 2023).

This study adopts a quantitative secondary data analysis and systematic synthesis design to evaluate student achievement trends and structural determinants in Morocco over a two-decade horizon (2001–2023). Rather than collecting primary field data, this methodology systematically extracts, reconciles, and synthesizes micro-level contextual data and standardized achievement scores published across national and international assessment databases. The empirical corpus integrates four major evaluation systems: the National Assessment Program of Student Achievement (PNEA 2019), administered by the National Evaluation Institute (INE-CSEFRS); the Trends in International Mathematics and Science Study (TIMSS 2003–2023) and Progress in International Reading Literacy Study (PIRLS 2001–2021), both managed by the International Association for the Evaluation of Educational Achievement (IEA); and the Programme for International Student Assessment (PISA 2018, 2022), coordinated by the OECD. Together, these assessment programs provide a nationally representative, multi-subject corpus encompassing over 100,000 Moroccan primary and secondary students. Table 3 outlines the key structural characteristics, target populations, evaluated domains, and sampling frameworks for each survey included in this synthesis.

3.2 Metric Standardization and Methodological Comparability

International large-scale assessments administered by the International Association for the Evaluation of Educational Achievement (IEA)—specifically the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS)—utilize Item Response Theory (IRT) scaling to standardize student performance. IRT psychometric modeling establishes a standardized international scale with a fixed centerpoint mean of 500 points and a standard deviation of 100 points, enabling rigorous cross-national and trend comparisons across different test forms over time.

To evaluate competence levels beyond raw score averages, the IEA establishes four cumulative International Benchmarks (Mullis et al., 2016, 2020, 2023). The Low International Benchmark, set at 400 points, represents basic, fundamental knowledge, including basic computational skills and literal textual comprehension. The Intermediate International Benchmark, at 475 points, demonstrates the ability to apply basic knowledge and procedural skills in straightforward, familiar contexts. The High International Benchmark, set at 550 points, indicates sound conceptual understanding, multi-step problem solving, and effective information synthesis. Finally, the Advanced International Benchmark, reaching 625 points, reflects complex reasoning, abstract thinking, hypothesis testing, and critical evaluation in mathematics and science. Students scoring below the 400-point threshold exhibit severe cognitive gaps, failing to master basic foundational skills expected at the primary level. In contrast, national evaluations like the PNEA (National Assessment Program of Student Achievement) follow a criterion-referenced model that measures curriculum mastery against prescribed national syllabi. The PNEA reports the percentage of students achieving satisfactory mastery—typically operationalized as mastering at least 50% of national curriculum items—across subjects and educational cycles (INE-CSEFRS, 2019).

When conducting longitudinal or comparative analyses across these distinct survey systems, three critical methodological constraints must be addressed in sequence. First, grade-level distinctions must be strictly maintained, as TIMSS evaluates both 4th primary (4 AEP) and 8th grade (2nd year lower secondary), whereas PIRLS focuses exclusively on 4th primary; confounding 4th and 8th-grade cohorts distorts longitudinal trajectories by obscuring developmental progression and primary-to-secondary transition effects. Second, changes in testing mode, such as the recent transition from paper-and-pencil tests to digital formats in eTIMSS and ePIRLS, require scaling adjustments and bridge-study parameters provided in official IEA international database files. Third, significant construct divergence exists between

the systems: the PNEA measures explicit curriculum adherence to national textbook contents, whereas international surveys evaluate the functional application of broader cognitive competencies. Because these systems evaluate fundamentally different constructs, direct scalar conversion between them is psychometrically invalid, requiring national metrics and international benchmarks to be interpreted as complementary indicators rather than direct scalar identities.

4. Empirical Results and Critical Discussion

4.1 National Learning Assessment Program: Detailed Evidence from PNEA (2019)

The National Learning Assessment Program (PNEA) provides crucial internal diagnostic data regarding student adherence to the official Moroccan curriculum. Table 4 synthesizes national program mastery rates across key subjects and primary vs. lower secondary levels in the 2019 cycle.

Table 4: Overall Curriculum Mastery Rates by Subject and School Cycle (PNEA 2019)

Subject Domain	End of Primary Education (6th Grade / 6 AEP)	End of Lower Secondary Education (3rd Grade / 3 AEP)	Public vs. Private Gap (6th Primary)
Arabic Language	42 %	10 %	+34 percentage points (Private)
French Language	42 %	11 %	+41 percentage points (Private)
Mathematics	27 %	12 %	+28 percentage points (Private)
Sciences (Physics/SVT)	38 %	14 %	+29 percentage points (Private)

Source: Reconstructed by authors from INE-CSEFRS (2019) PNEA Official Diagnostic Report.

The PNEA 2019 findings reveal an alarming drop in academic mastery between primary and lower secondary education. While 42% of 6th primary pupils achieved satisfactory mastery in Arabic and French, this proportion collapses to 10% and 11% by the 3rd year of secondary school. In mathematics, only 27% of primary pupils and 12% of lower secondary pupils achieve basic curriculum expectations. Disaggregating PNEA data by sector reveals a massive disparity between public and private schools: in 6th primary mathematics, 52% of private school students achieve mastery compared to only 24% in public schools; in lower secondary French, private mastery reaches 62% against a dismal 9% in public institutions (INE-CSEFRS, 2019).

4.2 International Assessment Trends: TIMSS, PIRLS, and PISA

Morocco's long-term participation in IEA and OECD international assessments provides an objective external benchmarking of student performance relative to global standards across mathematics, science, and reading literacy.

In the TIMSS survey evaluating 4th-grade primary students, Morocco's historical performance trajectory highlights significant longitudinal variations. Table 5 details the mean achievement scores in mathematics and science from 2003 through 2023.

Table 5: Longitudinal Mean Achievement Scores in TIMSS (4th Grade Primary)

TIMSS Edition	Morocco Math Score	Morocco Science Score	International Scale Mean	% Below Low Benchmark (<400)	International Rank / Countries
2003	347	304	500	71 %	24 / 25
2007	341	297	500	73 %	34 / 36
2011	335	264	500	74 %	49 / 50
2015	377	352	500	61 %	46 / 49
2019	383	388	500	59 %	53 / 58
2023	389	394	500	58 %	52 / 59

Source: Compiled by authors from IEA TIMSS International Reports (Mullis et al., 2020) and official 2023 release data.

The TIMSS longitudinal data show that while scores dropped to historical lows in 2011 (335 in math, 264 in science), a statistically significant multi-cycle recovery occurred between 2011 and 2019 (+48 points in math, and a notable +124 points gain in science from 264 to 388 points), stabilizing in 2023 at 389 and 394 points respectively. However, Moroccan 4th-grade students remain more than 100 points below the international mean, with 58% to 59% failing to attain the lowest international benchmark (400 points).

In parallel, PIRLS results evaluate reading literacy comprehension at the end of four years of primary education. Table 6 summarizes Morocco's performance across five PIRLS cycles from 2001 to 2021.

Table 6: Longitudinal Mean Achievement Scores in PIRLS (4th Grade Primary)

PIRLS Cycle	Morocco Mean Reading Score	International Scale Mean	% Below Low Benchmark (<400)	International Ranking
2001	350	500	68 %	34 / 35
2006	323	500	74 %	39 / 40
2011	310	500	79 %	44 / 45
2016	358	500	64 %	48 / 50
2021	372	500	59 %	56 / 57

Source: Compiled by authors from IEA PIRLS Reports (Mullis et al., 2016, 2023).

PIRLS data confirm persistent reading vulnerability: despite a positive trend (+62 points between 2011 and 2021), 59% of Moroccan 4th graders in 2021 failed to demonstrate basic reading comprehension skills (scoring below 400 points). This reflects severe "learning poverty" in early primary education (World Bank, 2018, 2021). Finally, in OECD's PISA 2022 survey evaluating 15-year-old students, Morocco scored 365 points in mathematics (71st place), 339 points in reading (79th place), and 365 points in science (76th place) out of 81 participating countries (OECD, 2023). These metrics align perfectly with upper-secondary PNEA findings, demonstrating that cognitive gaps accumulated during primary education persist throughout adolescent schooling.

4.3 Critical Analytical Discussion

Linking these empirical findings back to the Educational Production Function framework and the study's sub-questions highlights three primary explanatory mechanisms:

First, regarding Socioeconomic Disparities and Household Resources, contextual questionnaires across TIMSS 2019 reveal that 99% of Moroccan 4th-grade students attend primary schools where principals report significant shortages of home educational resources or low average household socioeconomic status (Mullis et al., 2020). The performance score gap between students attending schools with high versus low home educational resources exceeds 55 points in mathematics and 51 points in science, representing an achievement disparity equivalent to more than one full year of schooling (Mullis et al., 2020; OECD, 2023; Sirin, 2005; Liouaeddine et al., 2018).

Second, regarding The Pre-schooling Quality Dividend, in TIMSS 2019, 31% of Moroccan 4th graders had attended three or more years of formal preschool, scoring significantly higher than peers without preschool exposure. However, historical preschool provision in Morocco was highly informal (traditional Kuttub preschools), creating substantial variance in early cognitive preparation (Ait Ben Assila, 2021).

Third, concerning Systemic Classroom Governance & Territorial Inequities, rural schools face acute structural constraints, including multi-grade teaching, long commute distances, and high

teacher turnover. In addition, rapid expansion of contract-teacher recruitment under decentralized regional academies (AREFs) without standardized initial pedagogical training created temporary instructional disruptions during 2016–2021 (Habibi, 2022; MEN, 2022).

5. Conclusion, Policy Recommendations, and Outlook

This study provided an integrated analytical evaluation of student performance in Morocco by synthesizing data from national (PNEA 2019) and international (TIMSS 2003–2023, PIRLS 2001–2021, PISA 2022) assessment frameworks. The empirical findings demonstrate that while Morocco succeeded in achieving near-universal primary net enrollment (>95%), learning quality remains severely compromised. Over half of Moroccan primary pupils (58% to 59%) do not reach basic international benchmarks (400 points) in mathematics, science, or reading comprehension. Furthermore, learning deficits compound dramatically as pupils transition from primary to lower secondary school, driven by socioeconomic disadvantages, early childhood gaps, and territorial disparities.

In alignment with empirical findings, Strategic Vision 2015–2030 (CSEFRS, 2015), and the 2022–2026 Educational Roadmap, four strategic evidence-based policy recommendations are formulated. First, accelerate the public preschool expansion program, standardizing pedagogical curricula to focus on early foundational literacy and numeracy readiness before Grade 1. Second, align national primary and lower-secondary science and mathematics syllabi with TIMSS/PIRLS cognitive domains (applying, reasoning), avoiding rote memorization while preventing "teaching to the test." Third, deploy structured remediation programs (such as Teaching at the Right Level, TARL, currently trialed under the 2022–2026 Roadmap) in rural and multi-grade primary schools to eliminate early learning deficits. Fourth, strengthen continuous pedagogical training for primary teachers, particularly in bilingual science instruction and early reading methodology.

Implementing these quality-oriented reforms directly operationalizes Article 31 of the 2011 Moroccan Constitution, which guarantees all citizens equal access to high-quality public education and skill acquisition.

Finally, this study acknowledges certain methodological limitations. As a secondary analytical synthesis, it relies on published aggregate statistics and report summaries rather than micro-econometric estimation of student-level raw data files. Additionally, cross-cycle comparisons across two decades are subject to minor scaling variations. Future research should leverage individual student microdata from TIMSS 2023 and PISA 2022 to perform multilevel hierarchical linear modeling (HLM) and structural equation modeling (SEM), isolating precise mediation pathways between school climate, teacher practices, and individual achievement.

References

- (1). Ahaji, K. (2021). L'évolution de l'innovation pédagogique dans le système éducatif marocain. *Revue Marocaine d'Évaluation et de Recherche en Éducation*, 5, 53-68.
- (2). Ait Ben Assila, R. (2021). *L'enseignement primaire au Maroc : Analyse des déterminants quantitatifs et qualitatifs de la qualité et des inégalités de performance scolaire* (Thèse de doctorat en sciences économiques). Université Hassan 1er, Settat, Maroc.
- (3). Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. National Bureau of Economic Research (NBER).
- (4). Bourdieu, P., & Passeron, J.-C. (1970). *La reproduction : Éléments pour une théorie du système d'enseignement*. Éditions de Minuit.
- (5). Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2(6), 429-444.

- (6). Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., & York, R. L. (1966). *Equality of Educational Opportunity*. U.S. Government Printing Office.
- (7). CSEFRS. (2015). *Vision Stratégique de la Réforme 2015–2030*. Conseil Supérieur de l'Éducation, de la Formation et de la Recherche Scientifique.
- (8). Debreu, G. (1951). The coefficient of resource utilization. *Econometrica*, 19(3), 273-292.
- (9). Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society: Series A (General)*, 120(3), 253-290.
- (10). Habibi, A. (2022). Une analyse critique de la performance du système d'éducation au Maroc. *Revue Marocaine d'Évaluation et de Recherche en Éducation*, 7, 370-385.
- (11). Hanushek, E. A. (1986). The economics of schooling: Production and efficiency in public schools. *Journal of Economic Literature*, 24(3), 1141-1177.
- (12). Hanushek, E. A. (2002). Publicly provided education. *Handbook of Public Economics*, 4, 2045-2141.
- (13). Hanushek, E. A., & Woessmann, L. (2008). The role of cognitive skills in economic development. *Journal of Economic Literature*, 46(3), 607-668.
- (14). Hanushek, E. A., & Woessmann, L. (2012). Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation. *Journal of Economic Growth*, 17(4), 267-321.
- (15). Hanushek, E. A., & Woessmann, L. (2015). *The Knowledge Capital of Nations: Education and the Economics of Growth*. MIT Press.
- (16). HCP. (2022). *Rapport national sur les indicateurs du développement humain et la dynamique de la pauvreté au Maroc*. Haut-Commissariat au Plan.
- (17). Ibourk, A. (2017). Microeconomic analysis of reading achievement in Morocco. *Revue Canadienne d'Éducation*, 40(3), 240-265.
- (18). INE-CSEFRS. (2019). *National Assessment Program of Student Achievement (PNEA 2019) : Acquis scolaires des élèves du primaire et du secondaire collégial*. CSEFRS.
- (19). Jarousse, J.-P., & Mingat, A. (1993). L'option d'efficience dans l'analyse des systèmes éducatifs. *Revue Française de Pédagogie*, 102, 51-62.
- (20). Koopmans, T. C. (1951). An analysis of production as an efficient combination of activities. *Activity Analysis of Production and Allocation*, 33-97.
- (21). Kremer, M., Brannen, C., & Glennerster, R. (2013). The challenge of education and learning in the developing world. *Science*, 340(6130), 297-300.
- (22). Liouaeddine, M., Bijou, M., & Naji, K. (2018). Analysis of the effectiveness of primary schools in Morocco: Modeling using the database TIMSS (2011). *The Journal of North African Studies*, 23(5), 812-835.
- (23). MEN. (2022). *Feuille de route 2022-2026 : Pour une école publique de qualité pour tous*. Ministère de l'Éducation Nationale.
- (24). Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). *PIRLS 2016 International Results in Reading*. TIMSS & PIRLS International Study Center, Boston College.
- (25). Mullis, I. V. S., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2020). *TIMSS 2019 International Results in Mathematics and Science*. TIMSS & PIRLS International Study Center, Boston College.
- (26). Mullis, I. V. S., von Davier, M., Foy, P., Fishbein, B., Reynolds, K. A., & Wry, E. (2023). *PIRLS 2021 International Results in Reading*. TIMSS & PIRLS International Study Center, Boston College.
- (27). Nacuzon Sall, H., & de Ketele, J.-M. (1997). L'évaluation du rendement des systèmes éducatifs. *Mesure et Évaluation en Éducation*, 19(3), 119-142.
- (28). OECD. (2019). *PISA 2018 Results (Volume I): What Students Know and Can Do*.

- OECD Publishing.
- (29). OECD. (2023). *PISA 2022 Results (Volume I): The State of Learning and Equity in Education*. OECD Publishing.
 - (30). Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1-17.
 - (31). Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75(3), 417-453.
 - (32). UNESCO. (2022). *Global Education Monitoring Report 2021/2: Non-state actors in education - Who chooses? Who loses?* UNESCO Publishing.
 - (33). World Bank. (1995). *Priorities and Strategies for Education: A World Bank Review*. World Bank.
 - (34). World Bank. (2018). *World Development Report 2018: Learning to Realize Education's Promise*. World Bank Group.
 - (35). World Bank. (2021). *Ending Learning Poverty: What Will It Take?* World Bank Group.
 - (36). Worthington, A. C. (2001). An empirical survey of frontier efficiency measurement techniques in education. *Education Economics*, 9(3), 245-268.

AI Usage Declaration:

Artificial Intelligence tools were used solely for linguistic enhancement and grammatical proofreading purposes. No part of the scientific analysis, core methodology, or textual content was generated by AI.