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Assessing the Impact of K-12 Implementation on Grade 5 Enrollment Trends in the Philippines

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Abstract

This study evaluates the impact of the Philippines' K-12 educational reform on Grade 5 enrollment trends, using comprehensive enrollment and teacher employment data from official public-school records available via Kaggle. The analysis covered multiple regions comparing periods before and after the reform's implementation in 2013. Statistical analyses, including independent samples t-tests, revealed significant differences ($p=0.015$), indicating substantial enrollment growth post-K12 implementation, notably in regions such as Davao (Region XI), Soccsksargen (Region XII), Northern Mindanao (Region X), CALABARZON (Region IV-A), and Western Visayas (Region VI). Further analysis using Pearson's correlation showed a strong positive correlation ($r=0.71$) between

increased teacher employment and enrollment growth, underscoring the essential role teacher availability plays in sustaining educational reforms. However, regional disparities were also identified, emphasizing the need for tailored interventions to overcome localized infrastructure and socioeconomic challenges. The study provides evidence-based recommendations advocating for increased investments in teacher recruitment and training, regional infrastructure development, and ongoing evaluation of long-term educational outcomes. Ultimately, these findings offer valuable insights into the educational impacts of the K-12 reform, supporting future policy improvements aimed at enhancing education accessibility and quality in diverse Philippine regional contexts.

Keywords: K-12 Reform, Grade 5 Enrollment, Teacher Employment, Philippine Education, Educational Policy, Regional Disparities, Statistical Analysis, Educational Infrastructure, Enrollment Trends, Educational Accessibility

1. Introduction

The Philippine education system has undergone significant transformations, notably culminating in the implementation of the K-12 education reform in 2013, which represents one of the country's most ambitious education policy changes. Historically, education in the Philippines has been deeply influenced by its colonial past, especially during the American colonial period, when a public education system modeled after the U.S. was established, introducing English as the medium of instruction and emphasizing democratic values (Bernardo, 2004) ^[4]. Before the K-12 program, the Philippines had a notably shorter basic education cycle of ten years, consisting of six years of elementary and four years of high school, significantly shorter compared to the global standard of 12 years adopted by most countries worldwide. This educational structure resulted in concerns regarding the competitiveness and preparedness of Filipino students, as graduates often faced challenges meeting international educational and employment standards (Tadle, 2016) ^[18].

Several critical systemic challenges characterized the pre-K12 educational system, motivating the need for reform. One significant issue was curriculum congestion; educators and policy analysts argued that the 10-year basic education structure forced educators to compress a vast array of subjects into limited instructional periods, inevitably resulting in superficial learning rather than mastery of essential competencies (Seameo Innotech, 2012) ^[16]. Furthermore, this shorter educational cycle created a problematic international mismatch, placing Filipino graduates at a disadvantage globally due to non-compliance with the standard 12-year basic education requirement, thus limiting their eligibility for employment and higher education opportunities abroad (Albert, 2011) ^[1]. This mismatch significantly undermined the international competitiveness of the

Filipino workforce and raised critical concerns regarding students' preparedness for employment and higher educational opportunities outside the Philippines.

The truncated education cycle was further linked directly to inadequate preparation for employment, contributing to higher unemployment and underemployment rates among young Filipino graduates (Philippine Statistics Authority, 2018) ^[14]. Studies emphasized the necessity for an educational structure capable of effectively aligning educational outcomes with industry demands, thus calling for comprehensive reforms aimed at enhancing employability and workforce readiness among graduates (Ching, 2016) ^[6]. Moreover, the pre-K12 system was consistently questioned due to the poor performance of Filipino students in international standardized assessments. Assessments such as the Programme for International Student Assessment (PISA) consistently revealed lower rankings among Filipino students in critical areas such as mathematics, science, and reading comprehension, highlighting systemic educational quality issues requiring urgent intervention (World Bank, 2018).

In direct response to these pervasive challenges, the Philippine government introduced the Enhanced Basic Education Act of 2013, popularly known as the K-12 reform, which explicitly extended the basic education cycle from 10 to 12 years. The primary objectives of this reform included the reduction of curriculum congestion, the provision of ample instructional time for deeper mastery of essential competencies, and alignment of educational outcomes with international standards, ensuring Filipino graduates are competitive both locally and abroad (Ching, 2016) ^[6]. Moreover, the reform strategically integrated two additional years of senior high school education, offering students specialized tracks geared toward academic progression, technical-vocational skills, employment readiness, arts and design proficiency, or athletic excellence (Ching, 2016) ^[6]. The diversification within the curriculum aimed to better prepare students for the complex demands of higher education and the contemporary global workforce.

Despite the K-12 reform's commendable objectives, its implementation was not without significant controversy and challenges. Various stakeholders raised critical concerns about infrastructure readiness, including school buildings and facilities being inadequately prepared to accommodate an additional two years of schooling, resulting in overcrowding and resource shortages (David *et al.*, 2018) ^[7]. Similarly, concerns regarding the lack of adequately trained teachers and insufficient instructional materials posed major hurdles, suggesting a need for significant investment in teacher training and resource allocation (PIDS, 2019) ^[11]. Implementation problems also emerged, as several stakeholders argued that the reform was executed prematurely, lacking adequate stakeholder consultations, resulting in confusion, transitional inefficiencies, and initial resistance from various educational communities (EducForum, 2014) ^[9].

Additionally, challenges persisted in integrating new assessment and educational evaluation frameworks, further complicating the adaptation process at the regional and local school levels (David *et al.*, 2018) ^[7]. Transition-related difficulties inevitably highlighted systemic vulnerabilities within the Philippine education system, emphasizing the need for coordinated strategies in managing large-scale

educational transitions effectively. Despite these considerable challenges, the K-12 reform remains recognized as a critical advancement, aimed at addressing long-standing deficiencies in the country's education system. By aligning educational standards with international benchmarks, the reform aims to provide Filipino learners with a robust foundation to compete effectively on a global stage, thus potentially transforming educational quality and employability outcomes nationwide (UNESCO, 2015) ^[21].

However, evident research gaps persist, particularly in understanding regional variations in reform effectiveness, teacher recruitment impacts, and specific regional factors influencing educational outcomes. There remains an ongoing need for extensive research to evaluate regional responses to educational reforms comprehensively and identify specific factors that drive variations in student enrollment trends and outcomes. Hence, this study aims explicitly to fill these gaps by examining the specific impacts of the K-12 reform on Grade 5 enrollments and investigating the correlation between regional teacher employment and enrollment growth, providing insights for further refinement and targeted policy interventions.

2. Methodology

This study utilized quantitative research methods to comprehensively analyze the impact of the K-12 education reform implemented in the Philippines in 2013, explicitly focusing on its effects on Grade 5 student enrollments across various regions. Data for this research was meticulously obtained from official public-school records provided by the Philippine Department of Education, specifically sourced from a publicly available dataset published on Kaggle, titled *Philippine Public Education Data* (Rodelas, n.d.) ^[24]. The dataset encompasses detailed student enrollment figures and teacher employment statistics spanning academic years from 2011 to 2021. This robust dataset included a total of 187 regional entries covering all Philippine regions, providing a comprehensive and representative scope for rigorous longitudinal analysis.

Before proceeding to the primary analysis, the dataset underwent rigorous data cleaning and validation processes. This involved systematically checking for missing values, inconsistencies, and ensuring data accuracy and completeness. Table 1 explicitly showcases a representative subset of the original dataset, detailing its structure and the type of information captured for clarity and transparency.

Table 1: Sample Structure of Original Dataset

Year	Start	End	Region	Enr_K	Enr_G1	Enr_G5	Teachers_Elem
SY10-11	2010	2011	Region I - Ilocos	84,553	120,004	98,037	21,604
SY10-11	2010	2011	Region II - Cagayan	27,079	83,959	65,510	14,728
SY10-11	2010	2011	Region III - Central Luzon	141,901	258,235	200,842	34,952
SY10-11	2010	2011	Region IV-A CALABARZON	135,149	311,562	234,923	37,190
SY10-11	2010	2011	Region IV-B MIMAROPA	47,289	100,391	67,372	12,900

To systematically assess the impact of the K-12 educational reform, the dataset was further augmented by introducing an essential categorical column, labeled "K12_Impact." This column clearly differentiated between enrollment data collected before and after the K-12 reform, based explicitly on the academic year starting (AY_Start). The exact formula utilized for this categorization is provided below:

$$K12_Impact = \begin{cases} \text{Pre-K12,} & \text{if AY_Start} < 2013 \\ \text{Post-K12,} & \text{if AY_Start} \geq 2013 \end{cases}$$

Moreover, to quantitatively capture and clearly track annual enrollment trends, another critical variable named "**G5_Enrollment_Change**" was computed. This variable measured the percentage change in Grade 5 enrollments year-over-year, calculated individually for each region. The specific mathematical formula used for this calculation was as follows:

$$G5 \text{ Enrollment Change (\%)} = \left(\frac{\text{Enrollment}_{\text{current year}} - \text{Enrollment}_{\text{previous year}}}{\text{Enrollment}_{\text{previous year}}} \right) \times 100$$

This calculated variable allowed precise tracking of the dynamics and fluctuations in regional Grade 5 enrollments, thus enabling detailed comparisons between the periods preceding and following the K-12 implementation.

Subsequently, several statistical tests were rigorously conducted. An independent samples t-test was employed to evaluate whether the differences observed in Grade 5 enrollment rates between the pre-K12 and post-K12 periods were statistically significant. Additionally, Pearson's correlation analysis was executed to explore the relationship between enrollment changes and teacher employment statistics. The correlation analysis specifically aimed to identify if variations in teacher availability across regions significantly correlated with changes in student enrollment figures.

To further enhance clarity and effectively communicate analytical findings, visualizations were integral to this study. Initially, Figure 1 illustrates the original distribution of Grade 5 enrollments across all Philippine regions prior to the K-12 reform implementation. This baseline visualization served as an essential reference point for subsequent comparisons and highlighted significant regional enrollment disparities.

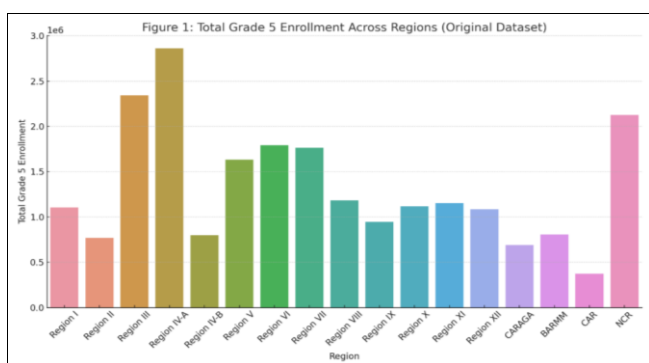


Fig 1: Distribution of Grade 5 Enrollment Across Philippine Regions

Additional visualizations included comparative bar charts and trendline graphs. These clearly illustrated the shifts and trends in Grade 5 enrollment across different periods, explicitly highlighting the year 2013 as the point of reform implementation. Trendline charts were particularly valuable in visually demonstrating how enrollment patterns evolved before and after the policy change, while comparative regional bar charts succinctly showed the differential impacts of the reform across various regions.

Furthermore, regional variations in enrollment and teacher employment were meticulously examined to understand

localized responses to educational reform, highlighting areas significantly affected—whether positively or negatively. Such detailed regional examinations provided targeted insights valuable for informing educational policy decisions and future reforms.

In summary, the comprehensive methodological framework—including careful data acquisition from official records, rigorous data cleaning, strategic feature engineering, robust statistical analyses, detailed regional examinations, and informative visualizations—ensured a thorough and accurate assessment of the K-12 reform's impact. The structured and transparent approach offered credible, data-driven insights, filling existing research gaps and providing an evidence-based foundation for future educational policymaking and strategic interventions.

3. Key Findings

3.1 Grade 5 Enrollment Trends Before and After K-12

The analysis conducted through independent samples t-tests produced statistically significant results ($p=0.015$), confirming notable differences in Grade 5 enrollment between pre-K12 (before 2013) and post-K12 (2013 onwards) periods. This statistically significant outcome strongly supports the inference that the implementation of the K-12 educational reform had a clear, measurable, and substantial influence on Grade 5 enrollment dynamics across the Philippines. Following the reform, numerous regions demonstrated remarkable increases in Grade 5 enrollments, highlighting the effectiveness and broad-reaching impact of the reform across diverse geographical contexts.

Among the regions examined, several stood out due to their particularly impressive enrollment growth rates. The Davao Region (Region XI) recorded the highest enrollment increase of approximately 214.39%. This significant surge in enrollment can potentially be attributed to focused regional initiatives, such as substantial infrastructure development, successful awareness campaigns promoting the importance of education, and efficient local governance that effectively aligned regional educational strategies with national policy objectives. Similarly, Soccsksargen (Region XII) experienced a remarkable increase of 209.18%. This region's impressive growth could be driven by dedicated investments in educational facilities and targeted intervention programs aimed at boosting school attendance and student retention.

Moreover, Northern Mindanao (Region X) also exhibited substantial growth in enrollment, approximately 200.93%, suggesting successful local strategies that may have included community-based educational programs, improved access to schooling, and effective dissemination of information regarding the benefits of K-12 education reforms. Additionally, CALABARZON (Region IV-A) showed an enrollment increase of around 195.65%, likely linked to the region's proactive implementation of educational reforms, strong economic growth, and well-developed educational infrastructure that significantly enhanced regional educational capacities and outcomes. Likewise, Western Visayas (Region VI) recorded an enrollment growth of approximately 195.59%, underscoring the effective coordination and alignment of regional educational policies with the overarching goals of the national K-12 agenda.

However, despite the predominantly positive impacts observed nationwide, certain regions exhibited relatively

modest enrollment growth rates post-K12 implementation. These lower growth patterns indicate potential external factors influencing regional educational outcomes, including socioeconomic challenges, limited infrastructure capabilities, geographical constraints, and demographic changes such as migration patterns. Regions such as CARAGA, BARMM, and CAR showed lower enrollment increments, suggesting unique regional challenges requiring specific attention and tailored solutions to maximize the benefits of national educational reforms effectively. These disparities clearly illustrate the complexities inherent in nationwide policy implementation and reinforce the necessity for differentiated, context-sensitive strategies to address localized educational needs comprehensively.

To further clarify these findings, significant enrollment increases are observable in most regions following the reform's implementation, as depicted in Figure 2. Regions demonstrating substantial growth, such as Region XI, Region XII, Region X, Region IV-A, and Region VI, stand out prominently, confirming the statistical analysis and providing intuitive clarity regarding the scale and distribution of changes. The visualization clearly highlights regional disparities in enrollment changes, reinforcing the critical understanding that national educational reforms must account for diverse regional contexts to achieve consistent educational improvements nationwide.

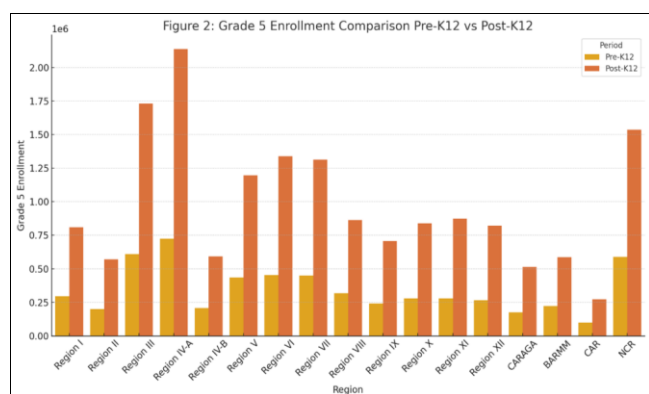


Fig 2: A comparative bar chart illustrating Grade 5 enrollments

A comparative bar chart illustrating Grade 5 enrollments across simplified regional labels (Region I, Region II, Region III, Region IV-A, Region IV-B, Region V, Region VI, Region VII, Region VIII, Region IX, Region X, Region XI, Region XII, BARMM, CARAGA, CAR, NCR), distinctly differentiating enrollments recorded in the Pre-K12 period (before 2013) and Post-K12 period (2013 onwards). The figure visually underscores regions with significant increases post-K12 implementation, emphasizing variations in regional outcomes.

3.2 Correlation Between Teacher Employment and Enrollment Growth

An additional significant dimension of this study explored the potential relationship between teacher employment growth and increases in Grade 5 enrollments. The analysis utilizing Pearson's correlation coefficient indicated a strong positive correlation ($r=0.71$), underscoring a meaningful association between the number of teachers employed and enrollment growth across various regions. This correlation signifies that regions experiencing higher teacher recruitment and employment levels consistently achieved

higher growth in Grade 5 student enrollment. These findings clearly suggest that teacher availability is a crucial factor in successfully implementing and sustaining enrollment growth, reinforcing the argument that effective educational policy reform requires complementary investments in teacher recruitment and training.

Regions that invested significantly in hiring new teachers or enhancing the training of existing educational staff experienced correspondingly notable enrollment increases. This pattern highlights teachers as a fundamental resource in education systems and underscores the importance of robust teacher recruitment policies, professional development initiatives, and educational resource allocation to maximize the benefits of educational reforms.

These insights align seamlessly with the visual evidence presented in Figure 2, which further demonstrates that regions experiencing substantial increases in Grade 5 enrollment typically corresponded with increased teacher employment levels. This visual relationship strengthens the statistical correlation findings, providing an intuitive and explicit representation of how educational resource allocation, particularly regarding teacher employment, critically influences enrollment outcomes. Such alignment highlights a fundamental insight: Educational reforms like the K-12 program require concurrent systemic improvements in teacher availability, infrastructure support, and administrative capacities. The importance of comprehensive teacher support strategies—such as competitive salaries, effective training programs, and improved working conditions—thus becomes clear, ensuring sustained success and effectiveness of broader educational initiatives like K-12.

4. Discussion

The significant increase in Grade 5 enrollment observed post-K-12 implementation can be largely attributed to multiple intersecting factors that enhanced access to education across the Philippines. Firstly, the nationwide shift to the K-12 curriculum likely created heightened public awareness regarding educational benefits, encouraging families to enroll or retain their children in schools. The policy reforms brought by the K-12 program provided explicit incentives for increased school participation, including improved and diversified curricula, vocational and technical education tracks, and enhanced educational materials. Additionally, substantial investments in school infrastructure—such as the construction of additional classrooms, improved sanitation facilities, and the establishment of new schools—created an environment conducive to accommodating increased student populations. Such structural improvements likely contributed significantly to making education more accessible, attractive, and feasible for families, especially in regions historically underserved by educational infrastructure.

Despite the predominantly positive national trends, regional disparities remain a critical challenge, with certain areas demonstrating minimal or negligible enrollment growth. Regions such as CARAGA, BARMM, and CAR experienced comparatively slower growth, possibly due to persistent socioeconomic constraints, infrastructural limitations, and limited educational resources. Economic conditions, including high poverty rates, unemployment, and lower household incomes, might have restricted families' ability to prioritize education over immediate economic

needs. Additionally, some regions may face demographic shifts, such as internal migration toward more urbanized regions, that directly affect local school enrollments, leading to either a stagnation or reduction in student numbers. These disparities highlight the complex socio-economic factors influencing educational participation, emphasizing the necessity for targeted regional interventions, customized policies, and comprehensive resource allocations to achieve more balanced educational outcomes nationwide.

A pivotal finding from this study is the strong positive correlation between teacher employment and student enrollment growth. This relationship underscores the effectiveness of government-initiated teacher hiring programs, confirming that regions with increased recruitment and employment of teachers witnessed significantly higher student enrollment gains. Such findings clearly demonstrate that teacher availability directly facilitates the capacity of schools to manage and effectively educate larger student populations. Increased teacher numbers reduce classroom congestion, improve student-teacher interactions, and create environments where educational quality can flourish. The positive correlation thus validates the importance of continued strategic investment in teacher recruitment, professional training, and retention policies as critical components in the successful implementation and sustainability of educational reforms like the K-12 program.

Consequently, future educational policies must explicitly ensure that teacher hiring and training keep pace with enrollment demands, particularly in regions identified as underperforming or exhibiting lower growth. Government authorities and education planners should prioritize creating robust mechanisms for monitoring regional enrollment trends to dynamically adjust teacher employment levels accordingly. In regions struggling with slower enrollment growth due to economic or infrastructural constraints, targeted strategies are essential. These may include incentives to attract qualified educators, enhancing regional salary structures for teachers, providing professional development opportunities, and addressing infrastructural and logistical barriers to school participation. By directly aligning teacher recruitment with regional educational needs, policymakers can significantly enhance the efficacy of national educational reforms, ensuring that the broad goals of equity, accessibility, and quality education are realized uniformly across the diverse contexts of the Philippine education landscape.

5. Conclusion and Recommendations

This research has clearly demonstrated that the implementation of the K-12 educational reform significantly impacted Grade 5 enrollment trends across the Philippines, resulting in notable increases in student enrollment in most regions. Statistical analysis confirmed these increases, highlighting substantial growth particularly in regions such as Davao (Region XI), Soccsksargen (Region XII), Northern Mindanao (Region X), CALABARZON (Region IV-A), and Western Visayas (Region VI). The reform's influence extended broadly, indicating enhanced access to education, effective policy incentives, and improved educational infrastructure as primary contributors to these positive trends.

However, despite these widespread improvements, the study also revealed pronounced regional disparities. Some areas,

particularly CARAGA, CAR, and BARMM, exhibited relatively modest enrollment growth, pointing to localized socioeconomic and infrastructural challenges that hinder the full realization of the reform's potential. These regional differences clearly emphasize the importance of context-specific, targeted interventions tailored to address unique local educational challenges.

Based on these findings, several key recommendations are proposed to further strengthen the implementation and maximize the long-term effectiveness of the K-12 reform. First, continuous investments in educational infrastructure and resource allocation, especially in underperforming regions, should be prioritized to address persisting gaps effectively. This involves improving classroom facilities, ensuring the availability of essential learning resources, and enhancing the overall educational environment to encourage sustained student participation and retention. Secondly, government authorities should reinforce and expand strategic teacher recruitment and retention programs, ensuring adequate availability of qualified educators to match enrollment demands. Special attention must be given to regions exhibiting lower enrollment growth, as targeted teacher recruitment and professional development programs can substantially enhance these regions' educational outcomes.

Furthermore, systematic long-term monitoring and assessment mechanisms should be established to continually evaluate the impact of K-12 reforms on student learning outcomes and academic achievements. These monitoring mechanisms would allow policymakers to adapt and refine educational strategies dynamically, ensuring continuous alignment with international educational standards and local educational needs. Lastly, future research should specifically focus on investigating long-term educational outcomes beyond enrollment figures, such as student academic performance, skill mastery, and employability post-graduation.

Overall, this study contributes valuable empirical insights into the educational impact of the K-12 reform, particularly its influence on Grade 5 enrollment dynamics. The results clearly support the reform's positive influence while highlighting regional disparities that require tailored, context-specific solutions. Thus, this research provides a robust foundation for informed policy decisions aimed at enhancing both educational accessibility and quality across the diverse landscape of the Philippine education system.

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