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Curriculum Reform amid Indonesia's Educational Decentralization: Policy, Practice, and Outcomes

Susy Alestriani Sibagariang¹, Osco Parmonangan Sijabat^{1*}

¹Department of Teacher and Educational Sciences, HKBP Nommensen Pematang Siantar University,
Indonesia*

*Corresponding author: osco.sijabat@uhnp.ac.id

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Abstract: This paper evaluates the impact of Indonesia's 2021 curriculum overhaul on secondary-school learning outcomes within the country's long-running decentralization agenda. Although greater fiscal and administrative autonomy for provinces and districts is expected to raise school quality and efficiency, robust evidence on student achievement remains scarce. Drawing on nationally representative data and employing propensity-score matching to mitigate selection bias, we find no statistically significant gains in mathematics or reading scores attributable to the new curriculum. The analysis nevertheless uncovers two robust patterns: students who attended education programmes consistently outperform their peers, and pronounced inter-regional achievement gaps persist almost two decades after decentralization commenced. Taken together, the results suggest that curriculum change alone is insufficient to boost learning and that early-childhood provision and territorially-targeted policies should be integral to Indonesia's future education strategy.

Keywords: curriculum reform; educational decentralization; learning outcomes; propensity-score matching; Indonesia.



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印尼教育去中心化背景下的课程改革：政策、实践与成效

摘要：本文评估了印尼在其长期推进的教育去中心化进程中，于2021年启动的课程全面改革对中学学习成效的影响。尽管赋予省级和地区政府更大的财政与行政自主权被寄予提升学校质量与效率的厚望，但有关学生学业成就的有力证据仍然稀缺。基于全国代表性数据，并采用倾向得分匹配方法以减轻选择偏差，研究发现，新课程并未显著提高学生的数学或阅读成绩。然而，分析进一步确认了两项规律：其一，接受学前教育的学生整体表现优于同龄人；其二，在去中心化改革启动近二十年后，地区间的学习成就差距依然显著。综合来看，结果表明，仅靠课程变革不足以显著提升学习水平，学前教育供给与区域定向政策应成为印尼未来教育战略的关键组成部分。

关键词：课程改革；教育去中心化；学习成效；倾向得分匹配；印尼

1. Introduction

Education decentralization has emerged as one of the most consequential public sector reforms of the past three decades and remains a focal point of contemporary research and policy discourse. Defined broadly as the reallocation of decision-making authority and fiscal responsibility from central to sub-national levels of government, decentralization is often pursued in tandem with broader democratization agendas [1,2].

Indonesia provides a compelling case study. In the aftermath of the 1997 Asian Financial Crisis and the 1998 collapse of the Suharto regime, the country entered the Reformasi era, rapidly devolving an unprecedented range of administrative, political and fiscal functions — including those related to education — to districts and municipalities [3,4,5,6]. Although multilateral institutions such as the World Bank and the International Monetary Fund encouraged these reforms, domestic political imperatives — most notably the demand for popular participation — were decisive [7].

Decentralization in education is inherently multidimensional, encompassing political, administrative and fiscal components [2]. Within Indonesia, decentralization has manifested in two principal forms: (i) the transfer of authority to local governments and (ii) school-based management (SBM), which empowers principals, teachers, parents and community members in matters of administration, pedagogy and resource allocation [1].

Proponents argue that shifting key educational decisions to actors closer to schools can enhance allocative efficiency, stimulate competition among providers and strengthen accountability through stakeholder participation [1,2]. Since 2001, responsibility for the financing and management of

early-childhood, primary and secondary education has resided primarily with district governments. SBM is the cornerstone of Indonesia's education-decentralization strategy: principals and school committees are expected to exercise greater autonomy while being held to higher standards of performance [8].

From the perspective of the economics of education, inputs that are amenable to government policy remain critical determinants of learning outcomes [9]. Indonesian reforms have therefore channeled substantial resources into teacher certification, school-operational grants, competency testing and professional development [10]. While teachers have benefited through higher salaries and expanded training opportunities, rigorous evaluations have detected only modest — if any — gains in student achievement [5].

Curriculum reform has been another pillar of decentralization. The 2006 School-Based Curriculum (KTSP) granted teachers latitude to adapt content and pedagogy to local conditions [8], [11], and the 2013 Competency- and Character-Based Curriculum (K-13) further emphasized higher-order skills and values formation. Table 1 summarizes the interplay between successive curricula and Indonesia's evolving national assessment regime.

Table 1. Evolution of National Curricula and Examinations in Indonesia

Curriculum	Active Years	National-Level Assessment
1947 Curriculum	1947–1968	State Examination (1950–1964)
1968 Curriculum	1968–1975	State Examination (1965–1971)
1975 Curriculum	1975–	School Examination (1972–

	1986	1979)
1986 Curriculum	1986–1994	National Final Learning Evaluation (1980–2002)
1994 Curriculum	1994–2004	National Final Examination (2003–2004)
2004 Curriculum	2004–2006	National Examination (2005–2020)
2006 School-Based Curriculum	2006–2013	—
2013 Curriculum	2013–present	Abolition of National Examination (2021–...)

Source: [12]

Against this backdrop, the present study investigates whether the 2006 curriculum reform improved lower- and upper-secondary students' performance, drawing on nationally representative data from the Indonesian Family Life Survey Wave 5 (IFLS-5, 2014–2015). The guiding research question is straightforward: **Did the post-2006 curriculum reform materially influence students' examination outcomes?** By answering this question, the article contributes to the broader empirical literature on education policy in decentralizing, middle-income countries.

Research Methodology

The analysis relies on IFLS-5, a longitudinal data set that spans community, household and individual modules [13]. The survey's baseline (IFLS-1, 1993–1994) covered roughly 83 % of Indonesia's population, with follow-ups in 1997/1998, 2000, 2007/2008 and 2014/2015. For the purposes of this article, the sample is restricted to individuals who completed junior or senior secondary school between 1988 and 2015 and for whom national examination scores are available.

Because Indonesian students sit national examinations that align with the curriculum in force when they *enter* a school level, a lag of at least one year exists between curriculum introduction and examination year.

The 2006 School-Based Curriculum therefore first affected cohorts taking Grade 9 or Grade 12 examinations in 2009. Students examined prior to 2009 constitute the control group; those examined from 2009 onward form the treatment group.

Table 2 lists the variables extracted from IFLS-5 Book 3A (Adult Information Part 1).

Table 2. Variable Definitions and Measurement

Construct	Indicator	Coding / Units
Student Characteristics	Sex	1 = female, 0 = male
	Kindergarten attendance	1 = yes, 0 = no
	Reads another language	1 = yes, 0 = no
	Writes another	1 = yes, 0 = no

	language	
	Owns a mobile phone	1 = yes, 0 = no
	Household internet access	1 = yes, 0 = no
School Characteristics	School type	1 = public, 0 = private/other
	Average hours per day	Continuous
	Class size	Continuous
	Provincial HDI	1 = low, 2 = medium, 3 = high
Outcomes	National examination score	Mean of subject-level z-scores
	Bahasa Indonesia	0–10
	Mathematics	0–10
	English	0–10
Treatment	Curriculum reform	0 = exam ≤ 2008, 1 = exam ≥ 2009

Source: [13]

Given the observational nature of IFLS-5, the study deploys **propensity-score methods** to approximate the counterfactual achievement of students had they remained under the pre-2006 curriculum [14]. Propensity scores — the conditional probability of treatment (exposure to the 2006 School-Based Curriculum) given a set of observed covariates—are first estimated via logistic regression.

Two complementary estimators are then constructed:

- **Nearest-neighbour propensity-score matching (PSM):** Each treated observation is paired with its closest control counterpart(s) on the logit of the propensity score, thereby attenuating observable selection bias [15].
- **Inverse-probability-of-treatment weighting (IPTW):** All observations are weighted by the inverse of their treatment probability, generating a pseudo-population in which covariates are independent of treatment status [16,17].

Before causal estimation we conduct complete-case deletion and run balance diagnostics across twelve baseline covariates (Table 3). Both PSM and IPTW eliminate statistically significant pre-treatment differences between groups [18], [19], [20].

Outcome estimation proceeds in three stages:

1. **Ordinary Least Squares (OLS):** baseline associations, with and without covariate adjustment.
2. **PSM regressions:** OLS on the matched sample to yield bias-corrected estimates.
3. **IPTW regressions:** weighted OLS on the re-weighted sample to obtain the Average Treatment Effect (ATE), the Average Treatment Effect on the Treated (ATT) and on the Controls (ATC).

Adjusted R^2 statistics indicate that the IPTW specification offers the best explanatory power. Accordingly, subsequent analyses disaggregate the treatment effect by subject domain (Table 5) and by examination cohort (Table 6), providing a nuanced view of how the reform's impact has evolved over time.

3. Results

Descriptive statistics (Table 3) indicate that, across 6 081 observations, mean total examination performance is 7.03 on a 0–10 scale. Bahasa Indonesia yields the highest average (7.23), whereas English lags slightly (6.88). Approximately 54 % of students are female, and two-thirds attended public schools with an average instructional day of 6.2 hours. Notably, 81 % of the sample belongs to cohorts exposed to the post-2006 curriculum, necessitating careful balance diagnostics.

Table 3. Descriptive Statistics

Variables	N	Mean	S.D.	Min	Max
Bahasa score	6,081	7.229	1.239	.000	9.998
English score	6,081	6.878	1.476	.000	10.000
Math score	6,081	6.980	1.764	.000	10.000
National examination score	6,081	7.029	1.204	.000	9.998
Curriculum reform	6,058	.814	.389	.000	1.000
Kindergarten	6,081	.535	.499	.000	1.000
Female	6,081	.537	.499	.000	1.000
Public school	5,559	.682	.465	.000	1.000
Reading in other language	6,081	.893	.310	.000	1.000
Writing in other language	6,081	.862	.345	.000	1.000
Phone	6,081	.951	.216	.000	1.000
Internet	6,081	.862	.345	.000	1.000
Class size	5,904	33.747	11.970	3.000	401.000
Average hours	6,002	6.207	1.281	1.000	11.000
Region HDI	623	1.878	.650	1.000	3.000

The main research question of this study is answered through several causal inference models, as shown in Table 4. After balancing the observation numbers between the treatment and control groups, Table 4 shows that the robust model that can explain the data analysis better is the propensity score weighting. Regarding causal inference, curriculum reform has significantly negative effects on students' performance. However, the variable curriculum reform is only divided into two categories of students: who took examinations in 2019 (and before) and 2020 (and after). further appraisals are needed to present more detailed pictures of this result, as the analysis is exercised through the division of reform on a yearly basis (see Table 6).

Table 4 summarizes the principal causal estimates.

Table 4. Curriculum reform and national examination scores: alternative estimators

Variable	OLS (1)	PSM (2)	ATE (3)	ATT (4)	ATC (5)
Curriculum reform	0.010 (0.357)	-0.278 (0.304)	-0.333* (0.109)	-0.334* (0.107)	0.019 (2.690)
Kindergarten	0.235 (0.112)	0.468 (0.192)	0.429* (0.125)	0.384* (0.115)	0.311 (0.145)
Female	0.122 (0.103)	-0.144 (0.174)	-0.294 (0.116)	-0.244 (0.106)	0.144 (0.118)
Public school	-0.006 (0.010)	-0.012 (0.010)	0.005 (0.017)	-0.009 (0.012)	0.141 (0.120)
Reads other language	0.639* (0.239)	0.376 (0.313)	—	0.351 (0.283)	—
Writes other language	-0.296 (0.210)	0.029 (0.289)	0.253 (0.273)	0.046 (0.236)	-0.157 (0.277)
Phone	-0.143 (0.280)	-0.065 (0.267)	—	-0.237 (0.343)	—
Internet	0.092 (0.235)	-0.104 (0.264)	—	-0.054 (0.289)	—
Class size	0.007 (0.005)	—	0.000 (0.005)	0.001 (0.005)	0.021* (0.007)
Average hours	0.137* (0.047)	—	0.061 (0.054)	0.101 (0.049)	0.141 (0.055)
Region HDI	0.033 (0.082)	-0.452 (0.186)	-0.433* (0.093)	-0.358* (0.086)	-0.011 (0.089)
Constant	5.409* (0.628)	7.755* (0.657)	7.476* (0.540)	7.213* (0.617)	5.324 (2.737)
Observations	611	621	505	611	504
Adjusted R ²	0.047	0.127	0.182	0.162	0.050

*Notes: Coefficients with robust standard errors in parentheses. — = variable excluded from model. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. The IPTW specification outperforms alternatives and suggests that curriculum reform exerted a negative and statistically significant effect on overall examination scores (ATE = -0.33 , $p < 0.01$).

Kindergarten attendance associates positively with achievement, corroborating evidence on the long-run returns to early-childhood education [21]. Female students under-perform male counterparts, and pupils in low-HDI provinces score systematically lower, reflecting persistent regional disparities [22].

Subject-specific analysis (Table 5) reveals that the adverse effect of the reform is concentrated in mathematics ($\beta = -0.85$, $p < 0.01$), whereas Bahasa Indonesia shows a modest positive coefficient.

Table 5. Curriculum reform and national examination scores by subject

Variable	Overall	Mathematics	Bahasa Indonesia	English
Curriculum reform	-0.333* (0.109)	-0.852* (0.169)	0.195 (0.107)	-0.343* (0.131)
Kindergarten	0.429* (0.125)	0.704* (0.194)	0.054 (0.122)	0.530* (0.150)
Female	-0.294 (0.116)	0.070 (0.179)	-0.385* (0.113)	-0.568* (0.139)
Public school	0.005 (0.017)	0.011 (0.026)	-0.009 (0.017)	0.012 (0.020)
Writes other language	0.253 (0.273)	0.757 (0.422)	0.014 (0.266)	-0.011 (0.327)
Class size	0.000 (0.006)	0.002 (0.008)	-0.006 (0.005)	0.006 (0.006)
Average hours	0.061 (0.054)	-0.091 (0.083)	-0.025 (0.052)	0.298* (0.064)
Region HDI	-0.433* (0.093)	-0.556* (0.144)	-0.451* (0.091)	-0.293* (0.111)
Constant	7.476* (—)	8.061* (—)	8.748* (—)	5.620* (—)

*Notes: Robust standard errors in parentheses. — = standard error not reported. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Disaggregating treatment by examination year (Table 6) uncovers heterogeneous impacts: no significant differences appear for the 2009–2012 cohorts, whereas sharp score declines emerge in 2013 and 2014, coinciding with documented disruptions to the administration of national examinations [23].

These findings align with prior mixed evidence on Indonesia's decentralization and underscore three interrelated challenges. First, frequent policy oscillation — driven more by political cycles than by pedagogical considerations — undermines implementation fidelity [23]. Second, effective curriculum reform presupposes well-prepared teachers; yet professional development has lagged behind elevated expectations [8]. Third, decentralization has amplified, rather than mitigated, sub-national inequities, partly owing to uneven fiscal capacity and governance quality [22].

Table 6. Treatment effects of curriculum reform (IPTW estimates, 2009–2015)

Variable	2009	2010	2011	2012	2013	2014	2015
Curriculum reform	0.204 (0.416)	0.210 (0.294)	0.197 (0.362)	0.174 (0.217)	-1.064* (0.197)	-0.649* (0.192)	0.210 (0.600)
Kindergarten	0.458 (0.531)	-0.023 (0.380)	0.453 (0.436)	0.166 (0.261)	0.500 (0.233)	0.484 (0.216)	0.318 (0.784)
Female	0.594 (0.539)	-0.465 (0.334)	-0.338 (0.456)	-0.417 (0.230)	-0.244 (0.216)	-0.217 (0.205)	0.254 (0.726)
Public school	-0.163 (0.579)	0.161 (0.379)	-0.037 (0.446)	0.037 (0.246)	0.016 (0.017)	0.373 (0.211)	0.019 (0.875)
Writes other language	1.287 (0.692)	1.728 (0.845)	0.363 (0.527)	0.329 (0.634)	-0.186 (0.402)	0.923 (1.004)	—
Class size	-0.017 (0.045)	-0.001 (0.032)	0.003 (0.008)	-0.006 (0.016)	-0.030 (0.014)	-0.026 (0.014)	-0.100 (0.048)
Average hours	0.236 (0.222)	-0.124 (0.136)	0.018 (0.194)	0.050 (0.115)	0.101 (0.099)	0.114 (0.093)	0.120 (0.445)
Region HDI	-0.568 (0.439)	-0.867 (0.344)	-0.242 (0.351)	-0.252 (0.194)	-0.374 (0.170)	-0.487* (0.153)	-1.230 (0.824)
Constant	6.925 (2.631)	8.900* (1.670)	5.824* (1.720)	7.602* (1.257)	8.078* (1.128)	8.391* (1.040)	11.020 (5.154)
Observations	32	46	47	120	151	156	17
Adjusted R ²	0.246	0.338	0.238	0.107	0.269	0.196	0.731
IPTW weights	✓	✓	✓	✓	✓	✓	✓

*Notes: Robust standard errors in parentheses. — = data not reported. ✓ = weights applied. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

4. Discussion

The origin of decentralization in Indonesia could be traced far before the so called ‘Bing Bang’ decentralization took place in Indonesia due to the significant economic and political transition during the beginning of the new millennia [24], [25]. The concept of ‘regional autonomy’ was included in the Constitution Law in 1945, and the recognition of extensive autonomy in different tiers of government was also introduced in Government Law No. 1/1957, but finally, the system needed to be centralized again due to many political unrests. Even during the New Order regime, where the government was heavily centralized and authoritarian in nature, local autonomy was once again passed into the legal base under the People’s Consultative Assembly in 1974. Law No. 5/1974, even in practice, the exercise of decentralization was introduced in 1995 [24], [26]. The fall of the New Order regime in as the aftermath of the Asian Financial Crisis in 1997 resulted in a major breakthrough in the governance system in Indonesia.

The structural adjustment requirement from international agencies added to the extreme transformation of Indonesia from one of the most centralized systems to one of the most decentralized systems [25].

In the education sector, decentralization began after the enactment of the Law on Decentralization in 2001, marked by the transfer of administrative and fiscal power and responsibility for health and public education to district governments, where teacher salaries, general school operational costs, and management are handled at the district level [27]. In 2003, the Constitution Law No. 20 was enacted, and it stated that the reform of the education system should be based on democratic, decentralized, and socially just principles [28]. The school-based management policy has designed autonomous school governance, where principals have primary responsibilities to work and collaborate with other school stakeholders, such as teachers, parents, and local communities, under the establishment of a school committee [27]. In ensuring a better and more heterogeneous education delivery to diverse students across the country, the curriculum based on competency occurred in

2004, and finally, the School-Based Curriculum was legalized in 2006 with features of a decentralized curriculum emphasizing the development of a localized curriculum with more autonomy given to teachers in doing so [6], [28], [29].

Due to the pros and cons of the mandatory national examination as the main instrument of quality education assessment, for example, after the Supreme Court Decision in 2020, there have been fundamental changes in the graduation criteria and the percentage of national examination scores that are being counted as passing criteria [12]. In 2023, the government also made several changes to the national examination to reduce leaking, cheating, and score manipulation [12]. In 2021, Computer-Based Testing was introduced to enhance the efficiency and effectiveness of national examinations to ensure fairness and reduce malpractice of the examination [22]. Following the new government administration in 2021, the appointed Minister of Education and Culture has finally decided to abolish the national examination in Indonesia starting from 2021 to ensure the rights of continuing education for all students and change the evaluation through competence assessment and character survey. However, in response towards Covid-19 disruption, the government decided that in 2020 the national examination for primary and secondary levels would be cancelled [30]. Regardless of heavy investments and decentralization efforts in making better access to quality education, the returns on that investment are argued to be the main problems that need to be addressed. The lack of local democracy, unclear legislative guidelines, and lack of local capacity building are mentioned as the unpreparedness for decentralization policy that has resulted in the failure of policy implementation [31]. Furthermore, corruption has also been proven to diminish the effectiveness of public spending on education in Indonesia [32]. In the case of effects of decentralization policies towards students’ learning, many empirical inquiries have shown very limited, almost zero evidences of how such policies could improve Indonesian students’ performances in national and international level assessments [5], [22], [27], [32], [33], [34], [35], [36].

This study aimed to provide a robust analysis of the effect estimation of curriculum reform under a decentralization policy on students' learning outcomes in Indonesia. In policy level, there are different instruments that government can exercise to achieve the goal of decentralization efforts, and curriculum reform is one of the significant features [31]. Curriculum reform reflects the expectation of educational changes, which would affect teacher education, teaching content and practices, school leadership, infrastructure, and most importantly, educational outcomes [29]. The change in curriculum, with the aim of improving learning, certainly has a complex mechanism that connects them; therefore, there is no simple direct correlation of one aspect under the change.

However, in the context of decentralization, the autonomy of schools and teachers is central to curriculum reform. By granting autonomy to schools in varying curricula depending on their students' needs and local context, students' performance in the end should be improved. Some evidences can be seen in the case of curriculum reform with school autonomy playing an important role in learning performances in England and East Asian countries [37].

From these research findings, we can see some important points that need to be addressed. First, there has been very dynamic development in terms of curriculum reform and national examination in Indonesian education over for the past 20 years. However, reforms and changing policies have gaps between intention and implementation. Some argue that policy initiatives have been changing depending on who the policy makers are rather than serving the main purpose of creating a better education system in the country [23]. These policies have been politicized and unsustainable; therefore, the roots of low-quality education have not yet been resolved. For example, as discussed in the findings section, the issue of chaotic conduct of national examinations in 2013 and 2014 was one impression of poor management in the Indonesian education system during that period [38].

Second, while there is evidence that curriculum reform under decentralization has

positive effects on students' outcomes [28], [37], the underlying condition is adequate understanding and quality of teachers as the main educational resources to implement policy direction. Teachers' professionalism and capacity development to follow the reform should be highlighted; however, from the evidence of school-based management and decentralized curriculum in Indonesia, lack of socialization and sufficient support have hindered the accomplishment of curriculum reform [28], [39]. The issues of teachers' quality and ability to adapt to the reform are mentioned as challenges to improving students' learning outcomes in Indonesia [28]. With higher expectations and burdens for teachers in adjusting the needs of their students to fulfill the targets set by the government, making the reform effective and achieving its goals is not an easy task.

Third, the results also present an important aspect of early childhood education as an investment in school readiness, which will be beneficial for students' learning performance in later years. This could be an example of a fruitful policy implementation on increasing early childhood education access as part of Indonesian government priorities over the last decade [21]. However, it should be noted that the issue of inequality in access and quality education among different groups remains a crucial challenge to be addressed. The gap between students from higher and lower quintiles, and also from urban and rural areas, still hampers the achievement of development goals in education in Indonesia. The significant results on students' outcomes differ based on the regions where the schools are located, which resonates with the evidence from previous studies on the impact of decentralization on education quality in Indonesia and the issue of inequality among regions in Indonesia [40], [41].

5. Conclusion

Indonesia has experienced a tremendous increase in investment in public education over the past two decades, together with the decentralization of its governance. While positive appraisals were given to the country in presenting a 'quite good' case study in developing economies of decentralization reform, the empirical evidence

of return on investment in increasing quality education is still being questioned. This study reveals that, similar to other decentralization policy interventions in Indonesia, curriculum reform has not produced a substantial return in terms of improved learning outcomes. Furthermore, this study discusses the issue of unsustainable policy direction and teachers' ability to perform curriculum design and objectives, and future studies might explore other dimensions from different perspectives. Curriculum implementation under decentralized education expects schools and teachers to develop approaches that fit the needs of their students. It also expects students to develop their competencies while improving their learning outcomes. Therefore, it is crucial to address the issues of teachers' quality and their ability to conduct curriculum reform. Sufficient support from the national and institutional levels should be prioritized; therefore, teachers would not be further burdened by heavy administrative concerns, but could focus on cultivating their professional skills and judgment to carry out the reform successfully. As also argued in other decentralization studies, the accountability measurement of any intervention should be added and taken seriously, so the investment could have resulted in enhancement of students' performance and overall quality of education.

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