

Education in Indonesia: A White Elephant?



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December 2019

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Authors: Sandra Kurniawati, Daniel Suryadarma, Luhur Bima, and Asri Yusrina

Editor: Christopher Stewart

Cover photo: SMERU doc.

The SMERU Research Institute Cataloging-in-Publication Data

Sandra Kurniawati

SMERU WORKING PAPER: Education in Indonesia: A White Elephant?./ Written by oleh Sandra Kurniawati, Daniel Suryadarma, Luhur Bima, and Asri Yusrina.

--Jakarta: Smeru Research Institute, 2019.

--lv; 15p.; 29 cm.

ISBN 978-623-7492-21-4 (PDF)

ISBN 978-623-7492-20-7

1. Education
 2. Learning outcomes
- I. Title

379.598 –ddc 23

Published by:

The SMERU Research Institute

Jl. Cikini Raya No.10A

Jakarta 10330

Indonesia

First published in December 2019



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ABSTRACT

Education in Indonesia: A White Elephant?

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After successfully improving access to education in the early 1990s, with virtually universal primary school completion and similarly positive trends in senior secondary-level schooling, Indonesia began investing to improve learning outcomes in 2005. In the ten-year period to 2018, the country has been spending about one-fifth of its national budget on education. The bulk of the additional education budget allocations over this period have been expended on two initiatives: significant salary increases for teachers through the certification program and school operational assistance (BOS). In this paper, we provide a long-term overview of numeracy and literacy standards and trends among 15-year-old Indonesians using an international test, spanning 2003–2015. We find that improvements in learning levels are too small to justify the significant investments that the country has undertaken. We also show that the government’s major education policies have not produced expected results. We argue that, without adding accountability measures that focus on learning outcomes, there is little prospect that the investments will provide returns in the form of significantly improved learning outcomes.

Keywords: Education, learning outcomes, policy, Indonesia

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TABLE OF CONTENTS

ABSTRACT	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iii
LIST OF FIGURES	iii
LIST OF ABBREVIATIONS	iv
I. INTRODUCTION	1
II. THE INDONESIAN PRIMARY AND SECONDARY EDUCATION SYSTEM: A BRIEF OVERVIEW	2
III. NUMERACY AND LITERACY IN INDONESIA	4
IV. EDUCATION POLICIES AND THEIR IMPACTS ON LEARNING OUTCOMES	7
4.1 A Brief Review of the Correlates of Student Learning Outcomes	7
4.2 Major Education Policies in Indonesia Since 2004	9
V. CONCLUSION	13
LIST OF REFERENCES	14

LIST OF TABLES

Table 1. Years Needed for Indonesia to Reach the 75 th Percentile in PISA	6
Table 2. Improvement Needed to Reach 75 th Percentile, Various Targets	6
Table 3. Summary of Central Government Education Policies in Indonesia	12

LIST OF FIGURES

Figure 1. Education spending in Indonesia, 2001–2014	3
Figure 2. PISA mathematics, 2003–2015	4
Figure 3. PISA reading, 2003–2015	5

LIST OF ABBREVIATIONS

BSM	Bantuan Siswa Miskin	Cash Transfers for Poor Students
BOS	Bantuan Operasional Sekolah	School Operational Assistance
CBT		Computer-based Testing
KIP	Kartu Indonesia Pintar	Indonesia Smart Card
KKG	kelompok kerja guru	teachers' working group
LPTK	lembaga pendidikan tenaga kependidikan	teacher training institute
MGMP	musyawarah guru mata pelajaran	school subjects teachers' working group
OECD		Organisation for Economic Co-operation and Development
PISA		Programme for International Student Assessment
PKB	Program Keprofesian Berkelanjutan	In-service Teacher Professional Development Program
PKH	Program Keluarga Harapan	Family of Hope Program
PNPM Generasi	Program Nasional Pemberdayaan Masyarakat- Generasi Sehat dan Cerdas	National Program for Community Empowerment-Healthy and Smart Generation
PPG	Pendidikan Profesi Guru	Teacher Professional Education
UKG	Uji Kompetensi Guru	Teacher Competence Test

I. INTRODUCTION

In January 2018, President Joko Widodo stated that his government would start to focus on improving the country's human resources (Ihsanuddin, 2018). He added that improving the quality of human resources is a necessary precondition to taking full advantage of Indonesia's demographic dividends and being globally competitive.

The president's focus is supported by evidence. Hanushek and Woessmann (2008) found that cognitive skills have large and causal relationships with earnings, distribution of income, and economic growth. In addition, Hanushek et al. (2017) found that returns to these skills are larger in faster growing economies. Since strong economic growth is usually a sign of a dynamic and rapidly changing economy, the authors state that their finding is consistent with the hypothesis that highly skilled individuals are better at adapting to, and taking advantage of, change.

The policy implication of the findings in the previous paragraph is straightforward: countries must ensure that their labor markets are highly skilled. From a policymaker's perspective, it means that increasing the educational attainment of their population is a necessity. The global evidence is that countries have largely succeeded (Pritchett, 2001). The World Bank's Edstats show that the average educational attainment of adults globally increased from 6.4 years in 1990 to 8.3 years only two decades later.

The problem, however, is that learning levels remain low for many countries. Pritchett (2013) states that, in India, over one-quarter of fifth graders could not read a simple sentence, while only slightly more than one-half could do subtraction. Mullis et al. (2012) found that only 43% of Indonesian eighth grade students have some knowledge of whole numbers and decimals, operations, and basic graphs. In contrast, 99% of Singaporean eighth grade students have this knowledge. The amount of learning produced by Indonesian and Singaporean education systems in the eight years of schooling is, therefore, vastly different. In addition, there has been very little improvement among the weak performers. As an example, Suryahadi and Sambodho (2013) showed that Indonesia's performance in eighth grade mathematics according to the Trends in International Mathematics and Science Study (TIMSS) has declined between 2003 and 2011. Hanushek and Woessmann (2008) concluded that merely increasing educational attainment, without focusing on the amount of learning actually accrued by students, has no correlation with economic growth.

In this article, we examine numeracy and literacy levels among 15-year-olds in Indonesia and put them in a global perspective. We then conduct simple simulations on what it would mean for Indonesia to be globally competitive, as President Widodo wishes in his recent statement. We then describe several major education policies that President Widodo and his predecessor, President Yudhoyono, have enacted. We also discuss the effects of these policies in terms of improving the skills of Indonesians, and whether they have the potential to make Indonesia globally competitive. This article focuses on primary and secondary education, and leaves early childhood, vocational, and tertiary education issues for other studies.

It is important to note that education is a slow moving sector, where the returns to investing in an education system and the impacts of policies will only be apparent after the beneficiaries complete their education and join the labor market. In addition, as we discuss below, many education policies enacted by President Yudhoyono are still in place, albeit some in different names. Comparing the success of President Widodo with President Yudhoyono in the education sector is in some sense, therefore, too early and virtually impossible.

The next section provides a brief overview of the Indonesian primary and secondary education system, including the amount of public funds allocated to the sector. Section III discusses the level of numeracy and literacy in Indonesia and undertakes some simulations. Section IV describes the current education policies in Indonesia and their impacts. Section V concludes.

II. THE INDONESIAN PRIMARY AND SECONDARY EDUCATION SYSTEM: A BRIEF OVERVIEW

As one of the five most populous countries in the world, Indonesia has an equally large education system. The primary and secondary education sector, covering grades 1 to 12, has more than 266,000 schools, where 45 million students are taught by 2.7 million teachers. Around 85% of the students are enrolled in regular schools, which could be in the form of public, private non-religious, and private religious schools. The rest are in madrasas: Islamic schools that are largely privately operated.

Primary education is overwhelmingly public, where 87% of students go to public schools. The ratio of public to private is more balanced at the secondary level. Overall, 75% of junior secondary and 58% of senior secondary students are enrolled in public schools. Newhouse and Beegle (2006) found that, at the junior secondary level, public schools benefit from positive selection—public school enrollment is positively correlated with household wealth and primary school test score. It seems that public schools are, therefore, preferred over private schools or madrasas. At the senior secondary level, Newhouse and Suryadarma (2011) found the same phenomenon: students with a higher junior secondary test score and better educated parents appear to choose public schools.

Since 2001, the delivery of early childhood, primary and secondary education has been devolved to subnational governments. Provincial governments are in charge of senior secondary-level schooling (grades 10–12), consisting of general and vocational schools. The *kabupaten* (district) governments are in charge of early childhood education, and also primary and junior secondary level (grades 1–9).

According to data from the Ministry of Education and Culture, net enrollment rates in Indonesia are practically universal at the primary level at 93%, around 81% at the junior secondary level, and 60% at the senior secondary level (Ministry of Education and Culture, 2016). Education transitions between levels have also continued to increase over time, and there are few gender differences (Suharti, 2013). Suharti (2013) also notes that the gap in educational attainment between children from poor and rich households is nonexistent at the primary level and continues to narrow at the secondary levels. While increasing access to senior secondary education should, therefore, remain a priority, the government is increasingly turning to improving the quality of primary and junior secondary levels.

Figure 1 shows the amount of public spending on education from 2001 to 2014, classified by source—central, provincial, or *kabupaten* government. It is important to note, however, that the vast majority of provincial and *kabupaten* government spending on education comes from central government transfers.

As a proportion of total public spending, the government spent between 10% and 15% of its budget on education between 2001 and 2008. In 2005, the parliament amended the Constitution, requiring the government to spend 20% of its budget on education. This was achieved for the first time in 2009, and the rate has remained around 20% since.

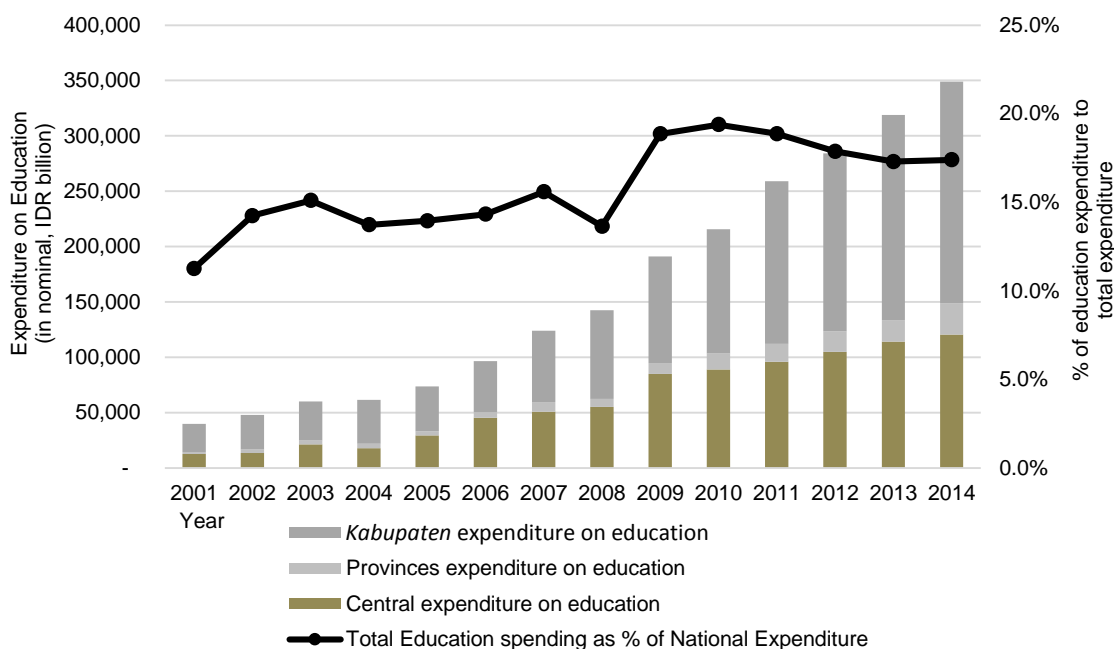


Figure 1. Education spending in Indonesia, 2001–2014

Source: Yusrina et al. (2017).

Where has the money gone? Figure 1 shows that in 2014, 60% of education spending was done by *kabupaten* and provincial governments, mainly to deliver primary and secondary education. In addition, the central government also provides direct transfers to primary and secondary schools in the form of school operational assistance grant (known as BOS). In 2014, the BOS transfer reached Rp24 trillion (equivalent to US\$2 billion),¹ with around 70% of education spending at the primary and secondary education levels.

Al-Samarrai and Cerdan-Infantes (2013) found that teachers have benefited the most from the increase in education spending. As an example, about one-half of the US\$7 billion increase between 2006 and 2009 (in 2009 constant prices) went to hiring more teachers—which has resulted in Indonesia having one of the lowest student to teacher ratios in the world—and increasing teacher salaries (which we discuss further in Section IV). At the *kabupaten* level, 80% of the salaries went to teachers, while about 16% of BOS allocations were allocated to teachers (Artha, 2017).

In summary, the Indonesian Government invests a significant amount of resources into the education sector. In proportional terms, spending on education has increased from around 10% of national expenditure in 2001 to 20% in 2009 and continues at that rate. Most of the spending goes to primary and secondary education, especially to hiring more teachers and increasing teacher salaries. In the next section, we show whether the increased spending has resulted in better learning outcomes.

¹See Government Regulation of the Minister for Finance of the Republic of Indonesia No. 201/PMK.07/2013 on the General Guidelines and Allocation of the School Operational Assistance Budget Year 2014.

III. NUMERACY AND LITERACY IN INDONESIA

We use data from the Programme for International Student Assessment (PISA), a triennial international survey that tests the skills and knowledge of 15-year-olds. Administered by the OECD (Organisation for Economic Co-operation and Development), PISA started in 2000 and until 2015 has been undertaken six times. Countries participating in the PISA include both OECD and non-OECD countries. In total, 88 countries and economies (for example, China and Shanghai participate separately) have participated at least once.

The tests are conducted in the national language of the countries. The skills and knowledge tested by PISA are on numeracy, science, reading, collaborative problem solving, and financial literacy; however, only the numeracy, science, and reading tests have been undertaken in every PISA. The focus of PISA is on the application of knowledge and skills for tasks relevant in adult life, as opposed to memorization (OECD and UNESCO-UIS, 2013). Since we are interested in how the education system provides skills relevant for adult life, including in the labor market, PISA is appropriate.

Indonesia has participated in PISA since 2000 so we can use these PISA rounds to see the skills trend amongst Indonesian 15-year-olds and compare them with other countries participating in PISA. In this paper, we use the 2003, 2006, 2009, 2012, and 2015 PISA tests, specifically the mathematics and reading tests.

Figure 2 shows the mathematics skills of Indonesian 15-year-olds over time, relative to two metrics: the 25th percentile score and the 75th percentile score. The former represents a low level of skills, and the latter represents the level of skills that could be considered globally competitive.

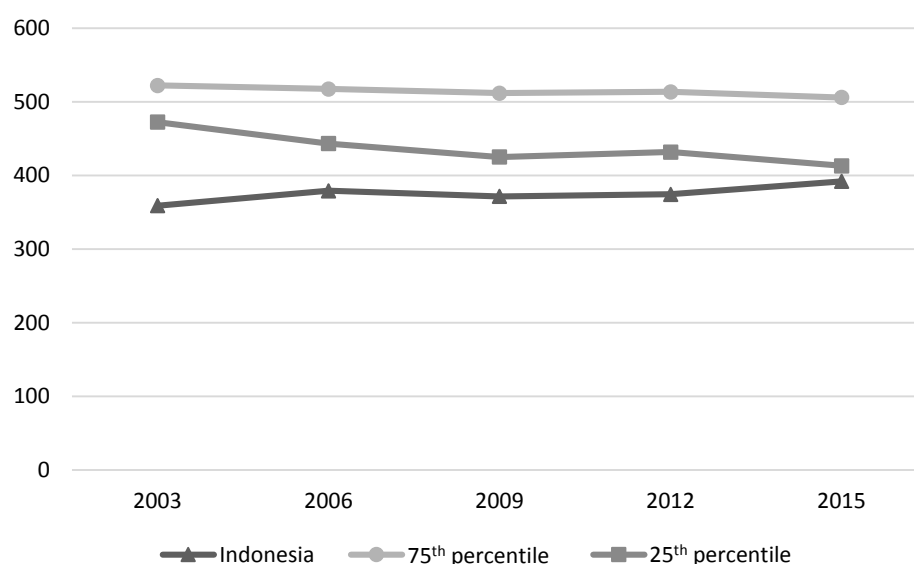


Figure 2. PISA mathematics, 2003–2015

We observe three facts about the mathematics skills of 15-year-olds. First, Indonesia is below the 25th percentile globally and has been in every PISA round up to 2015. Second, Indonesia has been catching up. The gap between Indonesia’s performance and the 25th percentile continued to decline, from more than 113 points in 2003 to around 20 points in 2015. Similarly, the gap between Indonesia and the 75th percentile has also narrowed, from 163 points to 114 points over the period

that we observe. Indonesia is, therefore, close to catching up with the 25th percentile, but is still far from being globally competitive.

Thirdly, the reduced gap between Indonesia and the 25th percentile is, to some extent, caused by a decline in the performance of the 25th percentile. In 2003, the gap between the 25th and 75th percentile is quite small at 50 points, while, in 2015, the gap has almost doubled to 93 points. The main cause appears to be a reduction in the performance of the 25th percentile, rather than an increase in the 75th percentile. Inequality in mathematics skills is rising globally, caused by a decline in the worst performers rather than an increase in the top performers. While beyond the scope of this paper, one cause of this could be ever increasing access to education, where children—mostly from poor families—who previously could not attend schools are now in school. It also shows, however, that education systems cannot deliver quality education for all. It appears that the way Indonesia is narrowing the gap with the 75th percentile in the context where the 75th percentile is moving further away from the 25th percentile is a positive outcome.

Figure 3 shows the trend in PISA reading tests. Overall, the same three trends as with the mathematics results can be observed. Indonesia started off quite far behind in 2003 and has since closed the gap with both the 25th percentile and the 75th percentile, however, the decline in reading gap has been slower than in mathematics. Proportionally, the gap in mathematics between Indonesia and the 75th percentile narrowed by 30% between 2003 and 2015. The decline in reading over the same period was 26%.

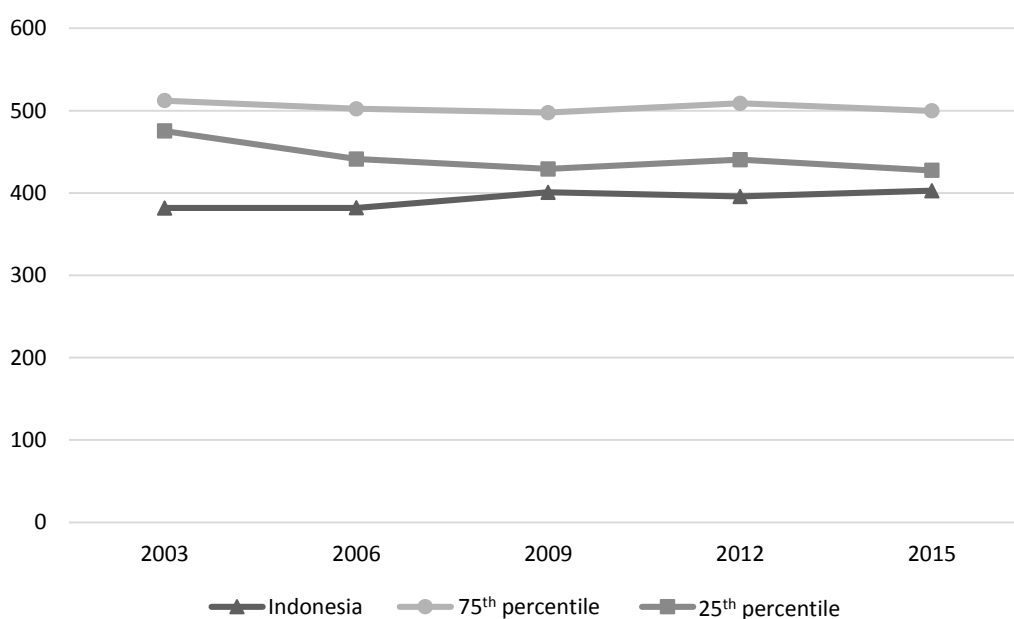


Figure 3. PISA reading, 2003–2015

Overall, the gap between Indonesia and the 75th percentile—the level that could be considered globally competitive—has declined in both mathematics and reading. Next, we ask two further questions. First, given the long-term trends, how long would it take for Indonesia to catch up to the 75th percentile and be globally competitive, as President Widodo wishes? Second, if Indonesia wants to catch up faster or take advantage of the demographic dividends in 2030, what mathematics and reading skills trends are required, compared to the ones we observe in Figures 2 and 3?

To address these questions, we conduct a simple data extrapolation using the PISA data, extending Beatty and Pritchett (2012). Table 1 shows the results. If we assume that the long-term narrowing of the gap between Indonesia and the 75th percentile from 2003 to 2015 persists, then Indonesia would need 28 years to catch up to the 75th percentile in mathematics performance, and 35 years for reading performance (Column 5). If we assume that some of these 15-year-olds start working after completing senior secondary school and others after four years at university, Indonesia would be globally competitive around 2060. While the mathematics and reading skills of Indonesian 15-year-olds have improved between cohorts, the improvement is too small for Indonesia to be globally competitive anytime soon. By 2060, the demographic dividends would have been long past.

Table 1. Years Needed for Indonesia to Reach the 75th Percentile in PISA

	Gap in 2003 (points)	Gap in 2015 (points)	Decline in Gap, 2003–2015 (points)	Average Annual Decline in Gap (points)	Years Needed for Gap to Reach Zero (years)
	(1)	(2)	(3)	(4)	(5)
Math	163	114	49	4	28
Reading	131	97	33	3	35

The second question is how much improvement is needed to the overall education system, especially before individuals reach the age of 15, for Indonesia to be in the 75th percentile faster? From Table 1, we find that the average annual reductions in the gap between Indonesia and the 75th percentile in mathematics and reading are four and three points respectively. Table 2 shows different improvements in mathematics and reading skills needed annually to catch up to the 75th percentile. Suppose we would like Indonesia to have a skilled labor force by the height of the demographic dividend in 2030, then Indonesia must reach the 75th percentile around 2023–2027; 10 years from 2015. Column 3 in Table 2 shows that for this to happen, the gap must be reduced by 11 and 10 points annually for mathematics and reading respectively starting from 2015. Correspondingly, Column 7 shows that the education system must increase its performance by 178% for mathematics and 248% for reading.

Table 2. Improvement Needed to Reach 75th Percentile, Various Targets

	Gap in 2015 (points)	Annual Decline in Gap Needed for Indonesia to be in the 75 th Percentile (points)				Increase in Education Sector Performance Needed (%)			
		5 years	10 years	15 years	20 years	5 years	10 years	15 years	20 years
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Math	114	23	11	8	6	455.0	177.5	85.0	38.7
Reading	97	19	10	6	5	595.6	247.8	131.9	73.9

Such an improvement demand is very challenging for an education system. Education has received a significant increase in investments over the past decade but outcomes have only improved marginally. Since investments have reached 20% of government expenditure, as shown in Figure 1, the government may not be able to afford further significant increases. The only way to improve skills is, therefore, by improving the productivity of the education system. It must achieve more with the same level of investment.

Before moving to the next section, we note that children from low socioeconomic status households perform much worse than children from high socioeconomic status, and in numeracy, the gap has not narrowed (Al-Samarrai and Cerdan-Infantes, 2013). While the enrollment gap between children from poor and rich households has narrowed, as noted in the previous section, the condition is less encouraging in terms of numeracy. This may indicate that children from poor households are enrolling in inferior schools.

In the next section, we discuss education policies that the Yudhoyono and Widodo governments have enacted. The reason for focusing on both presidencies is because the effect of education policies on learning outcomes tend to materialize over the long term, if at all. For the policies that have been evaluated, we provide the impact estimates. For those that are relatively new and have not been evaluated, we provide a discussion of their potential impacts, especially whether they have the potential to significantly improve the productivity of the education system.

IV. EDUCATION POLICIES AND THEIR IMPACTS ON LEARNING OUTCOMES

In this section, we describe six main education policies implemented in Indonesia since 2004, the start of Yudhoyono presidency. We exclude the scholarship program for children from poor families, Cash Transfers for Poor Students or BSM (during Yudhoyono's presidency) and Indonesia Smart Card or KIP (during Widodo's presidency), because they are considered social protection programs, with the aim of getting children to school or keep them from dropping out. As such, the program is not relevant to the quality of education which is the topic of this paper. For the same reason, we also exclude the government's conditional cash transfer program, the Family of Hope Program (PKH) and PNPM Generasi, where school participation is a conditionality for program receipt. Finally, we also sidestep *kabupaten*-level education policies because many of them focus on providing more allowances for teachers and have virtually no effects on learning (Bima and Yusrina, 2018).

The first two policies that we discuss are those that take up a significant amount of the education budget: teacher certification and school operational assistance. Afterwards, we discuss the teacher competence test, the new teacher in-service development program, the new pre-service teacher training program, and computer-based testing (CBT).

4.1 A Brief Review of the Correlates of Student Learning Outcomes

Many of the policies we discuss below have not been rigorously evaluated or are relatively new, so with the exception of the teacher certification program, there is not yet any estimation of the impacts of these policies on learning outcomes. For this reason, we believe that it would be informative to provide a brief review of the correlates of education quality in Indonesia, usually proxied by student test scores in various subjects. The evidence would allow us to determine whether the education policies could be expected to have much impact.

Examining the correlation between teacher characteristics and student performance, Suryadarma et al. (2006), using survey data from 100 primary schools across Indonesia, found that teacher absenteeism rates have a statistically significant and negative correlation with mathematics performance. In addition, teachers with other occupations, teachers with permanent (civil servant) status, and female teachers are all negatively correlated with mathematics performance. In a survey of 360 primary and junior secondary schools in 20 *kabupaten* that match students with their teachers, the World Bank (2016) found that teachers with formal qualifications such as having a bachelor's degree are only moderately better in teaching, while paying teachers more does not make them teach better.

On the other hand, the World Bank (2016) study found that teacher content knowledge is very important in determining student performance. This is especially important since many teachers in Indonesia still have very low content knowledge, however, Popova, Evans, and Arancibia (2016), in their systematic review of 26 in-service teacher training programs around the world with rigorous impact evaluations, found that there is little detail on teacher training interventions. While they found that programs that provide complementary materials, focus on a specific subject, and include follow-up visits tend to show higher gains, overall there is little evidence on the kinds of training programs that may produce large gains.

An often-ignored aspect related to teachers and principals that matter is incentives. Kurniasih, Utari, and Akhmadi (2018) noted that the Indonesian Constitution views education as a way to build character. Bjork (2006) found that in Indonesia, schools are viewed as a way to instill patriotism, evidencing a particularly striking observation that no teachers were absent during the Monday flag-raising ceremony, but some left school immediately after the ceremony concluded. Panjaitan (2017) found rampant cheating in national school examinations in Indonesia and that teachers and principals, rather than attempting to teach well and obviating the need for the students to cheat, are complicit in these practices. This research shows that incentives for teachers and principals are not aligned with ensuring that students learn. Policies that do not align the incentives paid to teachers or other education personnel with learning outcomes would, therefore, have little chance of succeeding.

On school-level characteristics, Suryadarma et al. (2006) found that the quality of school facilities predicts better performance. Well-functioning toilets are especially important for girls' performance. The authors found that student-teacher ratio has a concave relationship with performance and an optimal ratio appears to be 25 students per teacher. The World Bank (2018) found that relevant and accurate student assessments, both formative and summative, would significantly improve learning outcomes.

Given Indonesia's large public investment in education, a particularly relevant aspect is the correlation between the amount of funds allocated to education and student performance. Suryadarma (2012) found no correlation between *kabupaten*-level spending and student performance. At the school level, Suryadarma et al. (2006) found zero correlation between amount of school fees and student performance in mathematics or dictation tests. One reason could be corruption, but another reason is that the funds are not spent on things that matter for education quality. The latter could happen when teachers and principals are not incentivized to care about learning, which appears to be the case in Indonesia.

4.2 Major Education Policies in Indonesia Since 2004

Teacher Certification. The main purpose of the policy is to ensure that teachers have sufficient skills. The World Bank (2016) states that the motivation for the program arose from Indonesia's poor performance in the 2000 PISA. Policymakers felt that teacher quality was inadequate and must be upgraded. To gain buy-in, the policy promised a significant increase in remuneration for certified teachers. With the certification allowance being equivalent to base pay, certified teachers essentially receive a doubling of income. While there are various estimations with regards to the cost of this policy, ranging from US\$5.6 billion (Fahmi, Maulana, and Yusuf, 2011) to virtually all of the public education budget (Al-Samarrai and Cerdan-Infantes, 2013), it is clear that this policy is very expensive.

To be certified, the initial policy design required teachers to obtain a bachelor's degree, pass a written competency test, undergo classroom observation, and have a portfolio of past training and experience. The original idea was that teachers without these qualifications would have a clear financial incentive to upgrade their skills (World Bank, 2016). In practice, however, the initial design was significantly watered down due to pressure from teachers' unions. Only the portfolio assessment, experience, and bachelor's degree requirement were retained (Chang et al., 2013). Suryahadi and Sambodho (2013) noted that there are also other channels to receive certification, such as through passing the in-service teacher development program (see further below in this section) or having a masters or doctoral degree.

The certification program started in 2006 and has certified around 20,000 teachers annually. The aim was to have all teachers certified by 2015. While detailed data on the proportion of teachers certified is not available, it seems that this target has been missed.

Teacher certification is one of the very few government education policies in Indonesia whose impact has been rigorously evaluated. Given the watering down of certification requirements, lack of conditionality on receiving the allowance, and the finding that formal qualification by itself has a very small impact on learning outcomes, there is little hope that the certification program will have any effect on learning outcomes. De Ree et al. (2017) indeed found that the certification program improves teacher satisfaction and reduces the incidence of teachers holding outside jobs, however, there is no improvement in student learning outcomes across the whole distribution of test scores. Fahmi, Maulana, and Yusuf (2011) arrived at the same conclusion despite using a different research methodology, while Kusumawardhani (2017) found that the certification policy does not improve teacher content knowledge or attendance.

School Operational Assistance (BOS). The program, known by its Indonesian acronym as BOS, is a direct per-student grant from the central government to schools. The Indonesian Government began implementing the program in 2005 as part of compulsory education, the abolition of school fees, and to support school-based management (World Bank, 2015). The grant is provided to both public and private schools at primary and secondary levels and can be spent on an approved list of expenditure items, ranging from administration to teacher allowances.

As of 2014, BOS covered 43 million primary and junior secondary school students annually, costing around US\$2 billion or equivalent to 7% of the total education budget. Artha (2017) found that the top three BOS spending items are on buying school supplies, paying for student extracurricular activities, and teacher salaries which consists of both providing additional teacher allowances and hiring more teachers. These three areas made up 48% of BOS spending in 2015.

The BOS grant can affect education participation and learning through three channels: increased funding and reduced household burden; direct support to poor students; and strengthened school-

based management. The World Bank (2015) found little effect from BOS on reducing household education spending. Instead, as discussed in the previous paragraph, a large proportion of the grant is used to hire more teachers. The report found, however, that junior secondary enrollment among poor households appears to benefit from BOS, although there is no impact on the transition rate to senior secondary level. Finally, there is no impact on school-based management. In summary, out of the three potential channels, only the one on direct support to poor students appears to have worked. It is not surprising, therefore, that there is no statistically significant effect of BOS allocations on national examination scores at the primary or junior secondary level (Artha, 2017).

Teacher Competence Test. As part of the teacher certification program, the government introduced a teacher competence test (known by its Indonesian acronym as UKG). After much pushback from teacher unions, the first teacher competence test was administered in 2012, covering pedagogical knowledge and content knowledge. In total, just over one million teachers participated in the first test. Given that the government had set a passing threshold of 65, the resulting average of 47 (out of 100) was discouraging.

Although controversial and subjected to criticism by many parties—from those who do not believe teachers should be tested to those who think that the test is not actually measuring skills which matter for teachers—for the first time the government has a mapping on teacher level of knowledge. As a diagnostic tool, the competence test is invaluable.

In-service Teacher Professional Development. With the UKG results in hand, the government has the ability to map teacher weaknesses down to the individual level. To improve the quality of in-service teachers, the government implements an in-service teacher professional development program called Guru Pembelajar (Teachers as Learners), which has now been renamed as In-service Teacher Professional Development Program (PKB). This program started in 2014 and still continues.

To participate in this program, teachers should be a member of a teacher community, such as the primary school teachers' working group (KKG) and secondary school subjects teachers' working group (MGMP). The Center for Teacher and Education Personnel Development and Empowerment (P4TK) is the technical unit at the Ministry of Education and Culture that is responsible for managing and supervising the PKB program and UKG post-test.

The current setup of the program is that (i) teachers undertake face-to-face training in the modules of UKG that they failed; (ii) each module is around 60 hours, consisting of 30 hours of training, 10 hours of on-the-job mentoring, and 20 hours of review/feedback/sharing workshop; and (iii) upon completion of the 60 hours, a teacher needs to sit for another UKG related to the specific modules that they have failed. Anecdotal stories say that the pass rate in this UKG post-test is 100%.

We are not aware of any rigorous evaluation of the program, either on the quality of implementation or with regards to its impact on teacher knowledge, teaching practice, or student learning outcomes.

One-year Professional Training for Pre-service Teachers. This brand new program, called Teacher Professional Education (PPG,) and started in September 2017, is aimed at increasing the quality of teacher candidates. It is a one-year program modeled after other professional programs for aspiring doctors, lawyers, or psychologists. After finishing a 4-year degree, Indonesians who want to pursue a career in teaching could enroll in the PPG program. To widen the pool of high-quality teachers, the PPG program is open to both graduates from teacher colleges and non-teacher colleges. The PPG is arguably the government's main vehicle to improve teacher quality in Indonesia. For this reason, part of the PPG program is subsidized by the government.

According to discussions with the Ministry of Research Technology and Higher Education, which is responsible for higher education including teacher colleges, this additional year toward teaching, in theory, would improve the quality of teacher candidates. The first channel is through the selection process. PPG applicants need a minimum GPA of 3.0/4.0 to pass the first screening. These applicants then go through a series of online standardized tests that assess their professional, pedagogic, social, and personal competencies. They also take a psychological test to determine whether the applicant is talented and interested in teaching. The selected PPG students will study in selected teacher training institutes (LPTK) across the country. During the program, PPG students will sit through various teaching workshops and practice classroom teaching (microteaching). This is the second channel of how PPG increases teacher quality, through high-quality teaching workshops and microteaching.

Despite the rigorous selection process and few changes in curriculum, the program is still too recent to be evaluated, however, the reliance on a selective admission system is encouraging. If strictly enforced, it could indeed have the potential to improve teaching quality and eventually result in better learning outcomes.

Computer-based Testing. A feature of the Indonesian education system is the high stakes national examination at the end of junior secondary and senior secondary levels. Students must pass these examinations in order to graduate. In addition, *kabupaten* governments regularly use national examination pass rates as the measure of education quality. The result is rampant cheating. Panjaitan (2017) documented the extent of this practice and finds that teachers and principals, under pressure from *kabupaten* officials and parents, are active participants in the scheme. The government has attempted to address this issue. In 2016, the Ministry of Education and Culture removed performance in the national examination as a condition for graduation. Instead, school-based examinations determine whether a student graduates. While this policy effectively turns the national examination into a diagnostic (formative assessment) tool rather than a summative evaluation tool, cheating in the national examination remains rampant.

The problem with cheating is that the results do not reflect the true amount of learning that students accrue. It cannot, therefore, be used as a diagnostic tool or be used to measure the impact of particular policies or practices.

In 2013, the Ministry of Education and Culture piloted CBT in two schools. In practice, CBT means that each student receives a unique test, as the items are randomly drawn from a centralized item bank. There are several ways that cheating becomes more difficult with CBT: (i) each student receives a unique exam, so students cannot copy answers from other nearby students; (ii) teachers cannot supply students with answers to the test because there are virtually an infinite number of tests; and (iii) the test is retrieved online and has a time limit, so it is impossible to prepare answers before the test is taken.

In 2015, the Ministry of Education and Culture piloted CBT in 556 junior and senior secondary schools across the country. The pilot revealed a significant reduction in test scores in schools that participated in CBT. The decline in test scores was larger in schools that initially had a lower integrity index, suggesting that this was at least partially the result of reduced cheating, rather than student difficulty with navigating the new test format. In 2016, 4,382 junior and senior secondary schools participated in CBT, while in 2017, the number had increased to 30,577 (Ministry of Education and Culture, 2017). The ministry plans to roll out CBT in 70% of junior secondary schools and 100% of senior secondary schools by 2018.

While the CBT is not implemented with an explicit aim to improve teaching or learning outcomes, the severely diminished prospect of cheating, together with the still-high stakes nature, has the

potential to incentivize teachers to actually teach better. With the easy way of cheating removed, teaching properly is the only way their students could perform well in the examination. While there is yet to be an evaluation of the impact of CBT on teaching and student learning outcomes, the potential is there.

Table 3 presents a summary of the policies we discuss in this section, and some of their characteristics. Out of six policies, four address the issue of poor teaching skills. It appears, therefore, that the government realizes that teaching skills or teacher knowledge are the most important constraints to address, however, the main lesson from the two most expensive policies, teacher certification and BOS, is that unconditionally providing resources would not lead to any learning gains. While there is yet to be evaluations of the in-service or pre-service training programs, these programs must be directly tied to student learning outcomes. Simply providing training would not lead to any learning gains, let alone gains that are large enough for Indonesia to quickly catch up to other countries.

Table 3. Summary of Central Government Education Policies in Indonesia

Policy	Year Started	Constraint the Policy Aims to Alleviate	Provide Incentives Directly Tied to Learning (Yes/No)	Impact on Learning
Teacher certification	2005	Poor teaching skills	No	Statistically not different from zero
School Operational Assistance (BOS)	2005	School-level resources; support for children from poor families; weak school-based management	No	Statistically not different from zero
Teacher Competence Test	2012	Lack of information on teacher knowledge	No	N/A because this is a diagnostic tool, although the World Bank (2016) found positive correlation between teacher knowledge and student performance
PKB (In-service Teacher Professional Development program)	2014	Poor teacher knowledge	No	Unknown
PPG (One-year Pre-service Teacher Training)	2017	Poor teaching skills	No	Unknown
CBT	2015	Inaccurate assessment of student learning	Yes, unintended	Unknown

V. CONCLUSION

President Widodo views human resources as a necessary condition for Indonesia to be globally competitive. This view is supported by evidence, either globally or from Indonesia, that highly skilled individuals not only earn more, they also cope better, even thrive, in a rapidly changing environment.

In this paper, we find that Indonesia is indeed on a positive long-term trajectory to producing skilled individuals, however, the trajectory is not sufficiently steep to achieve significant improvements in the medium term. Making simple out-of-sample projections using Indonesia's performance in PISA mathematics and reading from 2003 to 2015, we find that the country would only reach the global 75th percentile with regards to mathematics and reading skills in 2060. Given that Indonesia essentially doubled its public investment in education in this era, we observe that the returns from this increased investment have been very small.

Accelerating the level of mathematics and reading skills requires either significantly more investment, or better returns on the existing investment. Indonesia does not have much room for the former, so it has to focus on the latter. We find that the education system must increase its productivity by 178% in mathematics and 248% in reading in order to have a globally competitive workforce by 2030, as opposed to 2060.

From our review of the central government's major education policies, we find that they are indeed quite expensive. The two most expensive policies, Teacher Certification and BOS, have a combined cost that uses up almost all of the public education allocation. These two policies, however, have had no discernible effect on improving student learning outcomes. The main reason, as de Ree et al. (2017) and the World Bank (2015) suspected, is because of a lack of accountability. These programs are essentially unconditional transfers to teachers and schools.

Given that it would be virtually impossible to roll back these programs without suffering significant political costs, we recommend that the government add accountability measures to these policies and to all other education policies that focus on learning as the ultimate performance indicator. In fact, we believe that the teacher certification and BOS programs should be urgently reformed to incorporate such measures in 2019. Fundamentally, the government needs to set preconditions that must be achieved before teachers and schools receive these transfers. One of these preconditions must be observable progress in student learning outcomes that is commensurate with the cost of these policies. Without such accountability measures, Indonesia has little chance to be globally competitive anytime soon.

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