

THF Literature Review

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EARLY CHILDHOOD, EARLY GRADE EDUCATION, ENGLISH AND NUMERACY STANDARDS WITH REFERENCE TO INDONESIA

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Introduction

Indonesia, a rising middle-income country and Group of 20 (G20) member, has made considerable strides to improve its education quality. However, there are still many areas that require improvement. In this paper, I review the literature on Indonesian literacy and numeracy in early childhood and early grade education, followed by a review of English language and numeracy or mathematical standards in the wider Indonesian education system. I aim to identify the gaps in the literature for both cases. For English and numeracy standards, I aim to address the following questions:

- 1) What is the standard of English literacy and numeracy for Indonesian high school students?
- 2) What do donors and policymakers say about Indonesia's English literacy and numeracy standards?
- 3) What is the impact of such literacy and numeracy standards on Indonesia's economy?

My paper proceeds as follows: I first describe the relationship between early childhood and early grade education and overall development of a nation. Second, I start by reviewing the themes surrounding early childhood education, such as access to education, teacher quality, governance and financing. I follow by reviewing early grade education, specifically the early grade reading assessments (EGRAs) and early grade mathematics assessments (EGMAs) used to evaluate Indonesian early grade education.

The second section reviews English language and numeracy standards in the wider Indonesian system. First, I describe how a strong command of both English and numeracy skills can help improve national development. Second, I review the current teaching of English in Indonesia with specific reference to the nation-wide 2013 curriculum, which changed the teaching hours of English in Indonesian schools. I follow by reviewing numeracy standards and look at the impact of Indonesia's English and numeracy standards on its employment and economic growth. I conclude by identifying the gaps in the literature for both forms of education and present my recommendations. It should be noted here that most the referenced sources are in English, and the possibly wider literature written in *Bahasa Indonesia* has not been consulted.

Early Childhood Education

Early childhood is defined as the age range between infancy and 6 years old. Early childhood comprises of aspects such as stable caregiving, nurturing the mental and physical welfare of the child, good nutrition and child's health development (Tan, 2016). Early childhood education involves both parental nurturing and community care to provide children with a smooth transition to primary school education (UNESCO Bangkok, 2017). In addition, investment in early childhood education contributes to the children's cognitive and socio-emotional development and is crucial in advancing human capital, a more capable and skilled workforce and therefore, stronger economic growth for the future (Heckman, 2008 in Tan, 2016: pp.4-5).

Reports such as those by UNESCO Bangkok (2008: p.21) and Palmer (2015) further note specifically how language development is a critical component in early childhood education. Globally, the United Nations (UN) has highlighted the

significance of early childhood through several conventions. These include: the 2000 UNESCO World Education Forum and the 2015 UN Summit which established the Sustainable Development Goals (SDGs) (Tan, 2016: pp.6-9). SDG Goal 4 on Quality Education aimed for all to have access to quality early childhood education. It is thus clear that early childhood education, especially through literacy and numeracy, can play an important role in the development of future workers. With this overview of early childhood education in mind, I now turn to early grade education.

Early Grade Education

Early grade education follows on from early childhood education, focusing on the education of children in the early primary school years. Early grade education is similarly crucial as these school years form the foundation of a child's knowledge for their future education and development of skills. As UNESCO points out, at least 250 million children worldwide completed early grade education in 2007 without acquiring basic knowledge and skills (UNESCO, 2007). Conversely, well-educated children can contribute significantly to the quality of the future workforce, future economic growth, and improve overall health, gender equality and even its political participation (Hanushek and Woessmann, 2012 in ACDP Indonesia, 2014a: 2).

The 2000 World Education Forum and the 2015 UNESCO Education for All (EFA) Global Monitoring Reports noted that there have been country assessments on primary school quality. There were a higher number of assessments in later grades—Grade 4 to 6—than in early grade levels. Early grade reading assessments (EGRAs) and early grade mathematics assessments (EGMAs) are two such assessments to evaluate primary reading and mathematical skills and many countries have conducted individual EGRA and EGMA studies. These studies are intended to focus the attention of for policy makers to seek more effective strategies to improve their country's early grade education systems (Gove and Cvelich, 2010; EFA, 2015: pp.191-193). Having established these definitions, I now turn to describe the relationship between English literacy, numeracy and economic growth.

English and Mathematics as subjects for economic growth

Economic growth is clearly central for any nation's progress. One main factor that affects economic growth is the level of skills of workers, or 'human capital', which contributes to productivity. Human capital theory (HCT) states that 'better educated workers...earn higher wages because they are presumed [to be more productive] as a result of their education [level]' (Aslam and Rawal, 2015: 114). Economic growth theories such as the 'Neoclassical Growth Theory' and the 'New Growth Theory' indicate a positive relationship between investing in capital such as HCT and economic growth. New growth theory in particular asserts that strong investment in human capital, as opposed to physical capital such as machines, helps to improve overall economic development (Aslam, and Rawal, 2015: 118; Todaro and Smith, 2012: 151).

The specific content of education that adds to human capital is not clearly specified by these scholars. However, some empirical studies have used indicators such as 'literacy rates in the populations' to test the correlation between education and growth. Others such as Hanushek and Kimo (2000 in Aslam and Rawal, 2015) and Hanushek Woessmann (2008 in Aslam and Rawal, 2015) used mathematics scores to assert that there is a relationship between educational quality and growth.

In addition, Deng and Gopinathan (2016) argued how specific subjects such as English and mathematics were crucial for the economic and social development of Singapore. English language proficiency was considered necessary so that students

and later workers could engage more effectively with the global economy and the international community (Tan, 2007: 97; Ponnusamy and Gopinathan, 2013: 237-238). The focus on mathematics in the Singapore curriculum was aimed at increasing the number of workers and to develop a high-skilled, technology-based economy. Mathematics was also viewed as a means to develop technical abilities while education as whole was intended to improve their competitiveness and productivity (Tan et al. 2009: 150-152; OECD, 2011). In Vietnam, a rising middle income country, education has been seen as a core driver for the country's economic progress. The World Bank' 2014 Vietnam Development report specifically noted that mathematics was a key subject for improving the standard of Vietnamese workers' skills and Vietnamese students were performing strongly in that subject (World Bank, 2013; VnExpress, 2016). This report did note that there were still challenges to Vietnamese education such as equity, and in fact noted that early childhood development would help improve student's cognitive skills (World Bank, 2013).

The above sections have defined early childhood and early grade education, and how a good command of English and mathematics would shape students into highly-skilled workers that would contribute to economic growth. The next section turns to review the state of Indonesian early childhood education.

Early Childhood Literacy in Indonesia

Early childhood literacy in Indonesia has undergone many changes over the last few decades. In the following sections, I outline the various factors affecting early childhood literacy in Indonesia—governance, teacher quality, access and financing—and highlight the shortfalls and challenges.

Governance

One feature of Indonesian education governance is the sometimes overlapping, modes of organisational control within early childhood education. The governance of early childhood education in Indonesia falls under many different ministries: 1) the Ministry of Education and Culture (MoEC) controls kindergartens (or *Taman Kanak-kanak*, (TK)), non-formal playgroups (or *Kelompok Bermain*, (KB)) and other childcare units; 2) the Ministry of Religious Affairs (MoRA) controls Islamic kindergartens or RAs; 3) the Ministries of Home Affairs and Health jointly control health service units (see Table 1 below).

Table 1: Different Early Childhood governance in Indonesia

	<i>Ministry of Education and Culture</i>	<i>Ministry of Religious Affairs</i>	<i>Ministry of Home Affairs with Ministry of Health Staff</i>	<i>National Family Planning Board</i>
Formal	Kindergartens (<i>Taman Kanak-kanak</i> , TK)	Islamic kindergarten (<i>Raudhotul Atfal</i> , RA)	–	–
Nonformal	Playgroups (<i>Kelompok Bermain</i> , KB)	Islamic kindergarten (<i>Taman Pendidikan Quran</i> , TPQ)	Integrated health service unit (<i>Posyandu</i>)	Toddler family groups (<i>Bina Keluarga Balita</i> , BKB)
	ECED Posts (<i>Pos-PAUD</i>)	–	–	–
	Child care centers (<i>Taman Penitipan Anak</i> , TPA)	–	–	–
	Other early childhood units (<i>Satuan PAUD Sejenis</i> , SPS)	–	–	–

Note: ECED = early childhood education and development.

Source: Hasan et al. 2013: p.71

It may be said that such diversity is acceptable, even inevitable, in a country with many different islands and communities. This diverse and complex governance, has however, affected the delivery and the quality of early childhood education in Indonesia. First, despite the MOEC's control over TKs and KBs, the former has a stronger focus on academic topics while the latter is geared more towards play-centred programmes, even though it has reading and writing programmes (Ministry of National Education Indonesia, 2004: p.30; Tan, 2016, p. 15). Islamic TPQs as seen in Table 1 also teach basic content and knowledge; however, there is a stronger emphasis on religious knowledge and values in their curriculum. It is therefore claimed that TKs provide the strongest education route in Indonesia for children to progress to primary school (Mustafa, 2007: pp.32-33).

Second, this diversity has resulted in poor coherence, resulting in poorer quality. There were earlier efforts to coordinate nation-wide early childhood education, for example, the 2007 'Coordination of a Holistic and Integrated Early Childhood Development Program' which set out which agencies should coordinate efforts on children from the embryonic phase to 4 years old (Mustafa, 2007: p. 64). Despite this, the diverse governance has meant that there has been a duplication of curriculum and a lack of targeted funding for concrete improvement (Ministry of National Education Indonesia, 2004: p.35; UNESCO, 2005: pp. 19-21, 26-27). Therefore, a lack of coordination in governance has adversely affected the quality of Indonesian early childhood education and much reform is required.

Teacher Quality

Teacher quality is a second crucial factor influencing early childhood education and another area of concern. There is, at present, no fixed qualification requirement for early childhood teachers—TK and RA teachers require a training college diploma while KB teachers require only a secondary school education—and this spread of qualification is uneven throughout Indonesia. Even if teachers have an academic qualification, a large portion of them have little training in caring for young children (UNESCO, 2005: p.5; Mustafa, 2007: p.42; BAPPENAS, 2013: xiii; OECD and ADB, 2015: p.91). It again may be said that this is common in populous countries like Indonesia. Yet, such uneven standards and quality naturally adversely affects students in early childhood education.

Access to Early Childhood Education

There are significant gaps to access to early childhood education in Indonesia. For example, a study by Hasan et al. (2013) raised concerns that 'fewer than 40 percent of children' could express themselves in their own mother tongue. This group of children also had difficulty with basic mathematical skills, although there were some reforms implemented which resulted in some improvement. Children from higher-income families, however, in general, perform better but there is only a marginal difference between them and other income groups (Hasan et al. 2013: p.5; Jung and Hasan, 2014: p.16). Another study by Denboba et al. (2015: 83) examined Indonesia's early childhood services in the late 2000s, noting that some rural areas do not follow government guidelines and teach other native languages besides *Bahasa Indonesia*.

In 2012-2013, 38.6% of children from urban areas attended pre-primary school. Children from higher-income families would be more likely to attend early childhood centres, especially those with higher quality services. Although there are government-sponsored kindergartens, only 4% of children were enrolled in them, with the remainder in privately-run institutions. This is mainly due to a perception gap over the quality of institutions, as well as physical access to early childhood centres.

There have also been reforms with government subsidies aiding 1.9 million children since 2013 and improvements in school facilities, but much more reform is required (BAPPENAS, 2013: xiii; OECD and ADB, 2015: p.89). Improving access to early childhood education thus remains a core challenge for policy makers.

Financing

The financing of Indonesian early childhood education is another area of concern. UNICEF reports that the national funding of early childhood amounts to only 1.2% of the education budget, which is way below the international benchmark of 4-6% (UNICEF, 2012 in OECD and ADB, 2015, p. 92). Government funding has also not fully focused on marginalised and disadvantaged children. Although there has been expanded investment on early childhood services, this is complicated with other funds from districts, community development grants, private and external organisations, creating a duplication in some areas and a neglect in others (Hasan et al. 2013, p.72; OECD and ADB, 2015: pp.92-93).

My review above shows that early childhood literacy and numeracy in Indonesia has been shaped by diverse organisational structures, low financial investment, inadequately qualified teachers, and varying accessibility across the country. This presents children with limited or poor literacy and mathematical skills when entering primary school. I now turn to the literature on early grade education in Indonesia.

Early Grade Literacy in Indonesia

In this section, I review early grade education, specifically the subject of literacy. Early grade or primary school is defined as Indonesian school grades Grade 1 (6 years old) to Grade 3 (8 years old).

Early Grade Reading Assessments

The quality of Indonesian early grade education is not that different from its early childhood education. As noted above, EGRAs and EGMA's are key assessments for countries to measure the quality of their learning at primary levels. Gove and Wetterberg (2011 in ACDP Indonesia 2014a: 4) created a table noting the 'subtasks and skills' for EGRA, specific to Indonesia. For instance, at Grade 1, students should be able to point to items to comprehend basic oral vocabulary and by the end of Grade 3, be able to translate sound into writing and editing passages (see Table 2 below).

Table 2: EGRA Subtasks and Skills

Early Childhood, Early Grade Education, English and Numeracy Standards with Reference to Indonesia

Skill and approximate timing	EGRA subtask	Skill demonstrated by students' ability to:
Emergency literacy: Birth to grade 1	Concept about print	Indicate text direction, concept of word, or other basic knowledge of print
	Phonemic awareness: Identification of onset/rime sounds; phoneme segmentation	Identify initial or final sounds of words or segment words into phonemes (words are read aloud to student by assessor)
	Oral vocabulary	Point to parts of the body or objects in the room to indicate understanding of basic oral vocabulary
	Listening comprehension	Respond correctly to questions about a passage read aloud to the student by the assessor
Decoding: Beginning grade 1	Letter identification: names and/or sounds	Provide the name and/or sound of upper- and lowercase letters presented in random order
	Syllable naming	Identify legal syllables presented in random order
	Nonword reading	Identify nonwords composed of legal syllables presented in random order
	Familiar word reading	Read a list of words drawn from a corpus of frequent words presented in random order
Confirmation and fluency: End of grade 1 to end of grade 3	Oral reading fluency (paragraph reading) with comprehension	Read narrative or informational text with accuracy, with little effort, and at a sufficient rate and respond to literal and inferential questions about the text they have read
	Dictation	Translate sound to print and spell correctly
	Maze or cloze	Silently read a passage and select an appropriate missing word (multiple choices are provided in the case of maze)

Source: ACDP Indonesia 2014a: 4

There have been at least two EGRAs conducted, one in 2012 and the second in 2014. The first showed that Grade 3 students could read various texts but only half of the 4,233 students sampled could comprehend their reading. The sample students also could not answer half of the questions set in spoken Indonesian (RTI International, 2013). The second EGRA, sponsored by the United State Agency for International Development (USAID), covered 4,812 students across 4 regions in Indonesia. It showed that only about half of the sample could 'read fluently with comprehension'. The worst performing EGRA sub-task was 'initial-sound identification'—only 39.4% could correctly answer the questions. A quarter of the sample also failed the sub-task of 'listening comprehension' and on average, students could only read out 52 words a minute, known as Oral Reading Frequency (ORF) (Stern and Nordstrum, 2014: 20-21).

Explaining early grade students' performance

These studies provide clues as to why students attained this level of early grade literacy. Stern and Nodstrum (2014: 34-40) used the Snapshot of School Management Effectiveness (SSSME) model to assess factors contributing to the above average or high ORFs. SSME results indicate that factors such as: 1) parental literacy; 2) parental involvement in homework; 3) feedback on schoolwork; 4) teachers with positive pedagogic practices would have high ORF scores. A study by Pradhan et al. (2011) also argued that parental involvement in school aids literacy skills¹. Students with low ORF scores tend to have a) weak access to books at home; b) low proportion of completed workbooks; c) teachers with lower educational qualifications and d) weak teacher reaction to student performance. Two different evaluations conducted by Save the Children similarly note that a nurturing home

¹ Pradhan's sample size is much smaller, covering just four random schools

environment and more experienced teachers help improve children's literacy skills (Brown, 2013; Pisani et al. 2014). EGRAs of this nature have allowed organisations and policy makers to create more accurate recommendations for reform.

There is also literature on factors influencing general early grade education quality. As the OECD and ADB (2015) noted, there is still no formal arrangement to progress from early childhood education to early grade education; transition issues have long been neglected, to the detriment of educational quality in Indonesian early grade education. There are also shortages in the number of teachers, with a higher shortage in private than public schools. Rural areas suffer the most in terms of lack of resources, teachers and student enrolment. As with early childhood education, household income and physical access also affects student performance; teacher absenteeism in rural areas (ACDP Indonesia 2014b; OECD and ADB, 20015: pp.103-104, 107-110), is another cause of low student achievement. Together, these factors have shaped the lower than desirable literacy level of early grade Indonesian students.

Both these sections clearly highlight the shortfalls in Indonesian early childhood and early grade education. In particular, it has shown that early childhood quality suffers from the diverse governance and poor teacher quality while early grade students are still falling behind language standards. These standards naturally affects students' ability and skills in later life. The next section moves to review the wider English and numeracy standards of Indonesian students and how it affects the skills of job-seekers and workers.

Indonesia students and English literacy: The 2013 curriculum

All economies required worked skilled in core abilities in order for the economy to grow. Adequate proficiency in English has been identified as a core skill to help companies attract foreign investment and increase the earning power of workers (English Proficiency Index (EPI), 2013: 36). Indonesia scored 32nd out of 72 countries participating in the 2016 international EPI, with Indonesian females scoring, on average, higher than males This was a slight improvement from its 2014 score of 28 out of 63. (EPI, 2016).

These scores may be attributed to recent changes in the Indonesian curriculum implemented in 2013. Previously, under the Ministry of Education and Culture's (MoEC) 2004 and 2006 curriculum, English was not a compulsory subject at primary school (*Sekolah Dasar* (SD)) and only taught from grade 4 to grade 6 (Nur, 2004: 181; Widodo, 2016: 1320135, 136-149). In 2013, the government altered the national curriculum by removing the formal teaching of English at primary school level and only teaching it at lower secondary school (*Sekolah Menengah Pertama* (SMP)) and high school (*Sekolah Menengah Atas* (SMA)). Students are taught English for 4 hours a week in SMPs and 2 hours a week in SMAs, a reduction in time from the previous 2006 curriculum (Putra, 2014: 70).

This curriculum plan aimed to have SMP students 'interact [with] and appreciate their environment [in English]' and SMA students 'to [use English] effectively explain and socialise with their social environment' (MoEC, 2013a, b, c). The rationale was also to have primary school students first master the mother tongue or *Bahasa Indonesia* before learning other languages. Table 3 below summarises the basic and core competencies the MoEC asserts students should achieve from studying English at lower secondary and high school level.

Table 3

Competencies	Junior high school	Senior high school
Core competencies (Year 1)	Understand knowledge (facts, concepts, and procedures) based on curiosity about science, technology, arts, and culture as well as observed phenomena	Understand knowledge (facts, concepts, and procedures) based on curiosity about science, technology, arts, culture, and humanities; knowledge about humanity, nationalism, citizenship, and civilization; and procedural knowledge about topics of interest to solve problems
Basic competencies	Understand texts about greetings, thanking, and apologies to build a social relationship with others at home and in school	Understand spoken and written texts to respond to questions, compliments, and care
	Understand purposes, rhetorical elements, and linguistic features of simple spoken and written texts about self-introduction	Understand purposes, rhetorical elements, and linguistic features of self-introductory texts
	Understand purposes, rhetorical elements, and linguistic features of simple spoken and written texts to name days, months, years, and time	Understand purposes, rhetorical elements, and linguistic features of greeting texts

Source: Widodo, 2016: 138

English Teachers' perception of 2013 curriculum

A fair amount of the literature focuses on teachers' perspectives and experience with the 2013 curriculum. Sahrudin (2013) argued that teachers were previously largely unqualified and still not well-trained in teaching the English material produced by the MoEC. Muth'im (2014: 1098; Elyda, 2016) similarly argued that English language teachers need to have specific training but the MoEC did not have sufficient funds for all teachers. Nur and Madkur (2014: 128-129) presented contrasting case studies, with some English language teachers praising the 2013 curriculum for components such as 'active learning' and 'authentic texts'. In contrast, some teachers voiced concern over the smaller time allocation for English and a problematic scoring criteria. Other scholars such Ahmad (2014) similarly found that some teachers had ambiguous understandings of the new curriculum. These differing views and comprehension in fact led to a temporary suspension of the curriculum in 2014 (Magetan, 2016). The literature also covers challenges faced by primary school teachers, for example, inadequate training in the language, and lack of understanding of the curriculum and professional development opportunities across the country (Hawanti, 2014; Zein, 2016).

Students' perception of English under the 2013 curriculum

There has also been coverage of students' views studying English under the 2013 curriculum. The 2013 curriculum was supposed to be more student-centric and with less direct teaching from teachers (Sahiruddin, 2013: 571). The objective was, as noted in Table 3, for students to use oral and written English to describe and interact in their social environment. Another key objective was to ensure that after school completion, lower secondary students should be able to fully read written texts while higher school students should be able to confidently access information via English (Putra, 2014: 69-70).

There have been, however, challenges for students in fully meeting these objectives. First, as noted above, the removal of teaching English at primary school level means students will have much less exposure to the language at an early age. Critics of this curriculum change have argued that the teaching English needs to start from young so students can adequately master the language and compete in the global economy (Arif, 2015). Second, the number of English texts provided at either school stage was reduced from the previous 2006 curriculum. Further, they were provided texts that did not enable them to master the basic and core competencies. Third, students were given texts unrelated to their local environment, thus leading to disengagement (Sahiruddin, 2013: 571-572; Putra, 2014: 70-73). It is therefore clear that Indonesia students struggle with English, especially with this new curriculum. The next section covers Indonesian's students and workers numeracy or mathematical skills.

Indonesian students and numeracy

Indonesian students similarly lag behind in numeracy or mathematical skills. Indonesia is 64th out of 65 countries for the 2012 Programme for International Student Assessment (PISA), scoring 375 points (OECD, 2012: 47). In PISA 2015, it saw a slight improvement, rising to 65th of 72nd countries with a score of 386 (OECD, 2016a: 117). Indonesian students also were in the bottom ranks in the Trends in Mathematics and Science Study (TIMSS). In 2015, Grade 4 students also scored close to the bottom with a score of 397 in mathematics, scoring higher than four other countries. That was marginally higher than its 2011 score for Grade 8 students (Mullis et al 2015; TIMSS, 2011: 42).

The 2013 curriculum stated that Indonesian primary school students would study five hours of mathematics per week at Grade 1, and 6 hours from Grades 2 to Grade 6 (Ministry of Education and Culture, 2013a: 1). In lower secondary school, they are taught mathematics for five hours a week from Grades 7 to 9, while in senior high school, it is four hours a week from Grades 10 to 12 (Ministry of Education and Culture, 2013a: 1, b:2).

Reasons for numeracy standards

The literature does cover possible reasons for Indonesian students' poor performance in mathematics. For example, Safrudiannur (2015: 1, 5, 7) argued that the MoEC had to temporarily suspend the 2013 curriculum for some Grade 7 students as not all had received the required mathematics textbooks and others were not informed about the new curriculum. Students could not solve certain problems in the provided textbooks while others appeared demoralised upon encountering such questions. Students were not trained in the meaning of algebraic expressions; previous teaching had concentrated on just simple calculations. Students also had much difficulty in comprehending mathematics topics since they lacked materials and poor teaching since primary school. They further had a lack of training in basic 'arithmetic calculations' (Jupri et al., 2015: 703-704). This lack of training in arithmetic was further supported by a study on Indonesian students' performance in physics (Wenno, 2014). Another study by Thien et al (2015) showed that factors such as perception of mathematical problems and mathematics-based activities and poor student behaviour are further factors explaining Indonesian students' performance in mathematics (Thien et al. 2015: 9).

Mathematics teachers impact on numeracy standards

There is also some literature regarding the relationship between teacher quality, instructional style and the numeracy level of Indonesian students. Some Grade 7 teachers noted that the 2013 curriculum mathematics textbooks failed to provide solutions for complex and unfamiliar problems (Safrudiannur, 2015: 8). A study on

teacher-student relationships in lower secondary schools stated positive characteristics of mathematics teachers but stated that students found them domineering, directive and not very cooperative. Maulana concluded that this had an adverse effect on their motivation to study mathematics and their overall performance (Maulana et al 2012: 41).

Other challenges facing the teaching profession may have also add to low numeracy standards. First, although there have been more certified teachers, the bar for teacher accreditation is still low—many teachers still do not have the capacity to teach effectively and to be accountable for student progress. Second, the allocation of teachers in different schools, especially secondary schools, is problematic. There are, for example, substantial teacher shortages and teacher absenteeism in certain regions such as Papua (Surhati, 2013 in OECD and ADB, 2015: 276; Tobias et al. 2014: 21-22; ACDP, 2014 in OECD, 2016d: 120). While there are guidelines for teacher performance, this however, is left to individual school principals who often have not been trained in accountability measures (OECD and ADB, 2015: 277-278). While all of this may not apply explicitly to mathematics teachers, they all remain factors influencing Indonesian students' overall performance.

Numeracy standards of job-seekers and workers

Indonesian students' performance in mathematics since primary and high school has led to graduates, job-seekers and workers with weak numeracy standards. In the recent Organisation for Economic Cooperation and Development (OECD) *Survey for Adult Skills*, only 1.4% of adults in Jakarta attained a Level 4 or 5 score, or could comprehend complex mathematical information in an unfamiliar context (OECD, 2016b: 2) . A Center for Global Development article further noted that 60.4% of Indonesians in Jakarta only scored Level 1 or below in the numeracy category. This indicates that this proportion of residents in Jakarta could only solve basic arithmetic problems (Prichett, 2016: 1; OECD, 2016c: 48).

A 2011 report by the World Bank also identified mathematics as another core skill required for Indonesian workers. It also noted that there was a high skills gap in numeracy standards for Indonesian job-seekers and employees, especially those in the export-oriented and technology sectors (di Gropello et al. 2011: 6, 11, 13). A joint OECD and Asian Development Bank (ADB) paper similarly highlighted that literacy and mathematical standards were below other OECD countries. It further noted that employers also noted that those skills were often lacking in not just job-seekers but in mid-level managers and professionals. This was especially so in sectors such textiles, food and beverage and shipbuilding (OECD and ADB, 2015:28, 231, 233)². It is therefore clear that Indonesia requires much education reform for its students and workers if it is to gain a skilled workforce that can match the needs of employers and the economy.

Gaps in the literature

The above has shown the status of Indonesian early childhood and early grade education, as well as English and numeracy standards for older students and workers. There are however, still gaps in the English-based literature.

First, with regards to early childhood, specific literature on early childhood literacy is sparse. Hasan et al. (2013) mentioned studies of language abilities of children in their studies. Denboba et al. (2015) only mentioned it in small paragraphs and placed

² di Gropello et al. 2011 and World Bank and ADB (2015) mention 'literacy' without stating which language. I therefore focus more on their discussions on numeracy or mathematical standards.

it within the broad category of quality. There are also no specific documents on the curriculum of early childhood literacy. In addition, there is little or no specific literature on early childhood numeracy. This absence therefore makes it difficult to judge not just young children's numeracy abilities, but the impact it has on later education and the future workforce. For early grade education, while the above shows early grade literacy assessments exist, there is also an absence of studies on early grade mathematics assessment in Indonesia. There was only one academic paper by Rumiati and Wight (2010). It argued that Grade 1 and 2 students do have mathematical knowledge, but this is affected by their school and home influences.

For English and numeracy standards, first, although the basic and core competencies are spelt out in the MoEC papers, there is no English language data with regards to the exact English language curriculum for each different grade in high school. Second, while TIMSS has information on the mathematics curriculum up to Grade 8, there is sparse information in the curriculum at each particular school grade from Grade 7 to Grade 12 (Mullis et al. 2016). The knowledge of the curriculum at different stages will provide a stronger understanding of English language and mathematics teaching to Indonesian students. This would help judge their skills when entering the job market and contributing to the wider economy.

Third, there needs to be stronger understanding of the relationship between parents and students' English literacy and numeracy standards. The *Survey for Adult Skills*, for example, does note that that parents with higher education background help improve the numeracy standards of their children compared to (OECD, 2016b: 6). Another gap in the available literature is that the focus on literacy standards is on is *Bahasa Indonesia*, and not specifically English literacy. There should be more studies on English literacy, especially since that language is crucial for Indonesia's economic advancement.

Recommendations

The evidence is clear that higher quality education, particularly in English literacy and mathematics, can improve economic growth. Strong early childhood and early grade education gives long-term payoffs not only for school readiness, but beyond that in later life. Indonesia has taken steps to improve the quality of its early childhood education, however, much reform is definitely required to positively improve Indonesia's education system.

One suggested option for early childhood and early grade education is to form a nation-wide framework or model, based on best practices, one that all schools could adopt. Such a model has been identified as low-cost, politically feasible and has a high impact (BAPPENAS, 2013: p.113). Also, an appropriate framework could be extended to primary and secondary education. Nevertheless, there cannot be a single model for all regions in such a populous country; the model must be shaped to match the local institutions or environment of that region in order to be well-received and to have any positive impact.

Second, the governance structure urgently requires reform. As noted, there are many ministries governing early childhood and early grade education and different school options. Policy makers should reduce the governing bodies, for example, limit it to just the MoEC and the MoRA. There should be less diverse school choices, for example, TKs and TBs could combined together, and this would improve curriculum quality. This could be more difficult to implement, given the bureaucracy and political nature of governance. Nevertheless, governance reform is required if Indonesia is to have any chance of improving education quality across the system.

Third, strong evaluation of teacher and student performance in English and mathematics, followed by effective reform. Even with the 2013 curriculum in place, the quality of teachers, teaching material and student performance needs to be improved. These evaluations may be led by schools or local districts to prevent overlapping control and bureaucratic resistance. Such evaluations and reforms must also be placed in the context of Indonesian employer's needs and the current and future outlook for Indonesia's economy. Table 4 and Table 5 below detail the gaps in the literature and suggestions for Indonesian education respectively.

Table 4: Key Gaps in the Literature

Key Gaps in the Literature	Suggestions
Lack of specific literature on early childhood literacy	More studies on early childhood literacy or the curriculum
Absence of assessments on early grade numeracy (EGMA) in Indonesia	More studies required on the quality of early grade numeracy and plausible reforms required
Lack of specific curriculum design on English language for Indonesian high schools	Specific English language curriculum for each high school grade required
Lack of specific mathematics curriculum for each grade in high school	Specific mathematics curriculum for each high school grade required
Lack of literature on parents education background and students' English and numeracy standards	Reviews on relationship between parents education background and students' English and numeracy performance

Table 5: Recommendations for Indonesian Education

Recommendations
<ul style="list-style-type: none"> • Form a nation-wide early childhood/early grade framework/model based on best practices—each district tailoring it towards their needs • Reform the governance of early childhood programmes—reduce ministries involved, combine schools to improve efficiency • Stringent evaluation of teachers and students' performance in English mathematics and implement reforms with reference to employers' needs and Indonesia's

Conclusion

It is evident that education plays a crucial role in increasing economic growth and this is especially so in developing or middle-income countries such as Indonesia. In this review, I have shown that education from early stages or early childhood help shape individual skills and help prepare them for later schooling and meet the requirements of employers in the future. I have reviewed the standard of early childhood and early grade education, and highlighted how governance, poor financing, poor teacher quality have adversely affected early childhood standards. In the case of early grade education, I have particularly shown that Indonesian primary school students lack behind their international peers in mathematics and that reform in this area is needed.

A strong command of English and appropriate numeracy or mathematics standards are two subjects that would help individuals in the workforce. I have reviewed and shown that Indonesian students have poor command of these subjects, particularly due to the government's 2013 curriculum. I have also shown that job-seekers and even mid-level professionals lack appropriate command of these subjects, thus negatively affecting job performance.

I thus recommend a model, based on best practices for early childhood programmes to be implemented with regions tailoring it to their requirement. There should be more studies specific to literacy and numeracy curriculum for early childhood and early grade programmes. I recommend strong evaluation of teaching English and mathematics at high school, evaluation of student's performance and responsive reform, tailoring it to the demands of Indonesia's economy.

Note

The views and opinions expressed in this paper are those of the author(s) and do not necessarily reflect those of The HEAD Foundation.

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