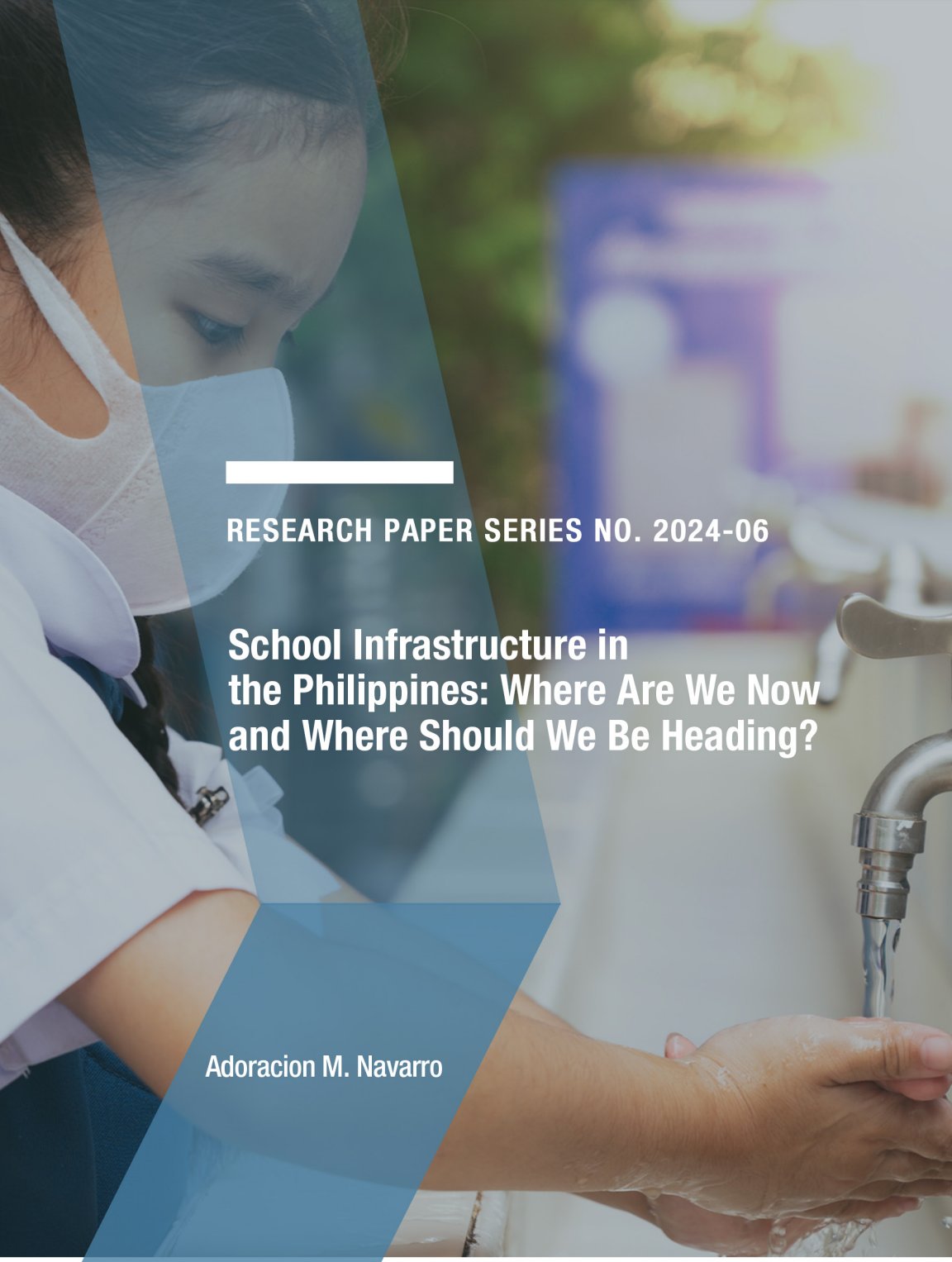

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School Infrastructure in the Philippines: Where Are We Now and Where Should We Be Heading?

Adoracion M. Navarro

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Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

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List of Acronyms

AusAID	Australian Agency for International Development
BARMM	Bangsamoro Autonomous Region in Muslim Mindanao
BEF	Basic Education Facilities
BOOT	build-own-operate-transfer
COA	Commission on Audit
COVID-19	coronavirus disease 2019
CSR	corporate social responsibility
DBM	Department of Budget and Management
DCP	DepEd Computerization Program
DepEd	Department of Education
DICP	DepEd Internet Connectivity Project
DICT	Department of Information and Communications Technology
DPWH	Department of Public Works and Highways
DOST	Department of Science and Technology
DTI	Department of Trade and Industry
eBEIS	Basic Education Information System
FOSS	free and open source software
GAA	General Appropriations Act
GIDA	geographically isolated and disadvantaged area
GILAS	Gearing Up Internet Literacy and Access for Students
ICT	information and communications technology
ISP	internet service provider
JMP	Joint Monitoring Programme
KII	key informant interview
LCD	liquid crystal display
LED	light-emitting diode
LGU	local government unit

MOOE	maintenance and other operating expenses
NCR	National Capital Region
NEA	National Electrification Administration
OECD	Organisation for Economic Co-operation and Development
PC	personal computer
PDP	Philippine Development Plan
PHP	Philippine peso
PISA	Programme for International Student Assessment
PPP	public-private partnership
PSA	Philippine Statistics Authority
PSIP	PPP for School Infrastructure Project
RA	Republic Act
SDG	Sustainable Development Goal
SEF	Special Education Fund
SY	school year
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPS	universal power supply
WASH	water, sanitation, and hygiene
WB	World Bank
WHO	World Health Organization

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Abstract

This study assesses the adequacy of school infrastructure in the Philippine basic education sector while benchmarking it against developmental targets and other countries' performance. It finds that with respect to classrooms, there has been progress in decongesting schools, but spatial inequality in the classroom-student ratio persists and requires attention. Spatial inequality is evident, given the congested classrooms in some administrative regions. Moreover, additional classrooms are needed, given that school buildings in certain remote areas do not meet quality and safety standards, enrollment is increasing, and existing classrooms deteriorate due to wear and tear and natural calamities. In terms of water, sanitation, and hygiene (WASH) facilities, the gaps are huge and become more evident when benchmarked against other countries. The Philippines is lagging behind most Eastern and South-Eastern Asian countries in providing WASH facilities to schools, even when compared to neighboring countries with lower per capita incomes. Schools' access to electricity is also an issue. Many countries in the Eastern and South-Eastern Asia region have already achieved universal access, yet the Philippines still struggles to complete the electrification of schools. This challenge is compounded by the need to upgrade the electricity connections of schools to stabilize electric current fluctuations and meet digital learning requirements. Information and communications technology (ICT) access is another area where the gaps are huge. Computer package delivery targets were not met, and to make things worse, the percentage of schools with computer packages declined. Philippine schools have low computer and internet access rates, unlike those in neighboring countries that have achieved universal access to computers and the internet. Moreover, efforts to increase computer and internet access rates have been marred by poor implementation of programs for ICT infrastructure in schools. All these imply the need to invest more in school infrastructure and pursue policy improvements. Both the public and private sectors must assume responsibility for improving the students' learning environment through adequate and quality school infrastructure. After all, a good learning environment is a good investment, resulting in better student learning outcomes, higher productivity of workers in the future, and higher potential for endogenous economic growth.

Introduction

Poor school infrastructure, such as overcrowded classrooms, inadequate sanitation facilities, unsafe water supply, and lack of access to electricity, can create uncomfortable, unhealthy, and distracting physical learning environments for both children and teachers. Gaps in school infrastructure provision can thus adversely impact the learning outcomes of children and, subsequently, the future human capital of a country.

Based on a learning outcomes assessment in 2019, a learning crisis is said to exist in the Philippines, given that 91 percent of primary school children ages 10 and below could not read short, age-appropriate text[1] (World Bank 2022). In the 2020 Human Capital Index[2] released by the World Bank, the Philippines scored only 0.52 (World Bank 2020a). This implies that Filipino children born in 2020 are expected to achieve only a little more than half their potential when they reach 18 years old. The country's 2020 rating is not only low but also a deterioration from its score of 0.55 in 2018, the first year of publication of the Human Capital Index.

Addressing the learning crisis and reversing the deterioration of human capital potential in the Philippines necessitate urgent and big interventions in the education and health sectors. In the education sector, which is the concern of this study, one intervention is ensuring adequate and equitable access to quality school infrastructure to improve the delivery of education services and learning environments. Thus, it is important to assess the current state of Philippine school infrastructure and determine areas for improvement. So where does the Philippines currently stand in terms of adequacy and quality of school infrastructure, and where should the country be heading?

Objectives and significance of the study

The general objective of the study is to assess the current state of school infrastructure in the Philippine basic education sector, identify and explain the gaps, and formulate policy recommendations.

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[1] Data are based on the Southeast Asia Primary Learning Metrics (SEA-PLM) 2019 assessment.

[2] The index, which ranges from 0 to 1 with 1 indicating highest human capital potential, measures the amount of human capital that children born today can expect to attain by age 18 given the health and education risks in the evaluated economy. In the World Bank benchmark of complete education and full health, a score of 1 for an economy in a particular year means that a child born that year can expect to accumulate full human capital in terms of complete education and full health by the time he or she becomes part of the next generation of workers at age 18. Meanwhile, a score of less than 1 means expectation of less than full human capital accumulation by age 18.

The specific objectives are as follows:

a. To present indicators of the current state of school infrastructure in the country's basic education sector and assess these by comparing them with targets or benchmarks
b. To assess how previous programs on school infrastructure in basic education contributed to the current state and discuss lessons learned
c. To identify current gaps in the provision of school infrastructure in basic education and analyze the key challenges in filling those gaps
d. To formulate policy recommendations.

If the study could contribute to reforming policies affecting school infrastructure, such as department-level issuances, local government policies, or national government policies on budgeting, prioritization, standards, and procurement, then the potential policy impacts would be better learning outcomes and, eventually, higher productivity among the next generation of workers. Pouring in the right amount of resources at the right school infrastructure priorities and with the right timing, and then implementing and monitoring the projects and programs well, together with other interventions (e.g., quality textbooks, highly capable teachers, good nutrition, psychosocial support to families and communities), can contribute to better learning environments and a higher quality of education. These, in turn, can result in higher human capital accumulation.

Research framework and method

The education production function concept, which is based on the theory of the firm, frames the analysis. Harris (2010) provides a textbook explanation of this concept, which relates a combination of inputs, such as school variables (including school infrastructure) and family and nonschool variables, to measures of education outcomes, such as achievement scores and graduation rates. Most correlation analyses that count school infrastructure among the input variables reveal that better school infrastructure improves education outcomes. However, since the education production function concept is a supply-side analysis, it only provides a partial view. Readers of this study must recognize that demand-side factors, such as parents' perceived opportunity costs in

educating their children, gender biases in families and communities, and cultural barriers faced by indigenous peoples, also influence learning outcomes. Moreover, education production functions can also be nonlinear (i.e., do not have constant returns to scale) in the sense that there can be diminishing marginal returns to providing more infrastructure (e.g., classroom sizes are standardized, school buildings are not expanded on a whim).

This study used qualitative research as a general research method, with document review[3] and key informant interviews (KIIs) as specific qualitative research techniques. Document review was used to collect data on school infrastructure and gain insights into the implementation of programs. Due to health and safety risks posed to participants during the COVID-19 pandemic, KIIs were conducted via email and video conferencing rather than in-person meetings.

Limitations of the study

Physical infrastructure in education institutions covers buildings, classrooms, libraries, laboratories, furniture (e.g., desks, chairs, cabinets), equipment, and facilities providing access to electricity, water, sanitation, and internet connection. It can also cover playgrounds, sports facilities, and dormitories. For studies on basic education, the term often used is "school infrastructure" (e.g., World Bank 2016), which is also adopted in this study.

As this study contributes to the Philippine Institute for Development Studies' research agenda on the basic education sector, it covers only basic education, not higher education. Considering school infrastructure as inputs (as framed by the education production function concept), the study covers classrooms and school buildings, water and sanitation services, electricity access, and information and communications technology (ICT) access. Textbooks are excluded,

[3] Frey (2018) describes document review as "a form of qualitative research that uses a systematic procedure to analyze documentary evidence and answer specific research questions". Since the study is not looking for the importance or repetitions of certain words or ideas in documents and mapping relations between them, it does not apply the so-called "coding", where word occurrences are counted and their relationships mapped using software. Instead, the study reviews the insights revealed in the reading of whole chapters and sections of documents. It has been proven that program-level documents can reveal early program development history, implementation challenges, and the rationale behind decisions made during milestone events (United States DHHS-ACF 2016).

given that it will be difficult to separate the effect of their physical production and distribution from the effect of their contents. Similarly, furniture and fixtures, libraries, playgrounds, sports facilities, and dormitories are not considered due to nonavailability of comprehensive data.

Link between School Infrastructure and Learning Outcomes

Improving school infrastructure results in better learning outcomes. This has been consistently demonstrated in empirical literature. For instance, the United Nations Sustainable Development Agenda 2030 included education facilities and learning environments as a means of implementation for Sustainable Development Goal (SDG) 4: Quality Education. This crucial link between school infrastructure and learning outcomes also underpins the strategies and target-setting in the *Philippine Development Plan (PDP) 2017–2022*, particularly under the human capital and social infrastructure development themes.

Literature relating school infrastructure with learning outcomes

The positive relationship between better school infrastructure and better education or learning outcomes is well established in the literature. One example is the study of Murillo and Roman (2011) of school infrastructure and resources vis-à-vis the performance of Latin American students. Their results revealed that the availability of basic services and facilities such as potable water, electricity, proper sewage, sports installations, laboratories, libraries, books, and computers in the school has a positive effect on the performance of primary education students in standardized tests on mathematics and language.

Studies focusing on access to specific infrastructure services and its relation to learning outcomes also abound. School electrification is one rich area of study. In Kenya, Kirubi et al. (2009) showed that electric power offsets the negative impacts of teacher shortage by providing extra teaching hours in early mornings and late evenings to make up for the materials not adequately covered during normal teaching hours. Sovacool and Ryan (2016), in a regression analysis of World Bank 2014 data from 56 countries, established a strong correlation between electricity access

and primary school completion rates. Mejdalani et al. (2018) showed in a study of rural schools in isolated communities in Brazil that dropout rates tend to decline with electrification. There is also evidence that in terms of enrollment, electrification somewhat promotes gender equity. Gurung et al. (2011) showed that after microhydropower plant installation in the Tangting village in Nepal, girl and boy student enrollment improved by 23.33 percent and 33.33 percent, respectively, and 40 percent of adult women joined evening classes. Electrification can also facilitate the functioning of other education infrastructure. Welland (2017) observed that electrifying schools, especially those in rural areas, indirectly affects school performance by powering and improving ICT, water delivery, water treatment, sanitation, heating, and cooling, among other school services.

Some studies investigated the relationship between students' academic performance and access to computers, other ICT devices, and the internet. Diaz and Cano (2019) employed mixed research analysis of the 2009 Programme for International Student Assessment (PISA) survey in the Canary Islands to evaluate the degree of association between ICT use and students' performance in mathematics. The PISA is an international assessment that measures 15-year-old students' reading, mathematics, and science literacy every three years. The study confirmed that ICT can enhance learning, as positive changes were observed in the performance of students who used ICT tools to browse the internet when doing school work. Nketiah-Amponsah et al. (2017) also arrived at similar findings in their cross-sectional survey among final-year undergraduate students of a university in Ghana. Their results showed a positive and statistically significant relationship between ICT expenditures and the students' cumulative grade point average. Overall, these studies suggest that investing in ICT breaks access barriers to online platforms, which are becoming more essential in today's education landscape.

School infrastructure in the SDGs

The link between school infrastructure and learning outcomes is also recognized in the SDG for education. Education is tackled in the Sustainable Development Agenda 2030 as **SDG 4 - Quality Education: Ensure inclusive and equitable quality education and promote lifelong opportunities for all.** In pursuing SDG 4, there are seven outcome targets and three means of implementation, which are also expressed as targets (see Box 1).

Box 1. Sustainable Development Goal 4 Targets

Outcome Targets

Target 4.1 - By 2030, ensure that all girls and boys complete free, equitable, and quality primary and secondary education leading to relevant and effective learning outcomes.

Target 4.2 - By 2030, ensure that all girls and boys have access to quality early childhood development, care, and preprimary education so that they are ready for primary education.

Target 4.3 - By 2030, ensure equal access for all women and men to affordable and quality technical, vocational, and tertiary education, including university.

Target 4.4 - By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship.

Target 4.5 - By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.

Target 4.6 - By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy.

Target 4.7 - By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

Means of Implementation

Target 4.a - Build and upgrade education facilities that are child, disability, and gender sensitive and provide safe, nonviolent, inclusive, and effective learning environments for all.

Target 4.b - By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States, and African countries, for enrollment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries.

Target 4.c - By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States.

Source: Lifted in full from UNESCO (2017, pp.31–32)

School infrastructure is covered by means of implementation for Target 4.a on education facilities and learning environments. It can be inferred from the formulation of SDG 4 target outcomes and means of implementation that school infrastructure will help achieve all the SDG 4 outcomes, given that the means of implementation for the SDGs consider the interdependencies of actions and outcomes. An action in one goal will affect the action and outcomes in other goals, and the outcome in one goal will also affect the actions and outcomes in other goals. For instance, expanding and upgrading school infrastructure will help meet the access and equity objectives in SDGs 4.1 to 4.5. Additionally, ensuring adequate and high-quality school infrastructure and creating an inclusive learning environment will help provide a conducive atmosphere for acquiring the skills and knowledge being targeted in SDGs 4.6 and 4.7.

In the thematic indicators monitoring framework for the SDG 4 targets, the United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted indicators recommended for countries when monitoring their achievements based on the national context, priorities, and capacity. For Target 4.a, the monitoring indicators (UNESCO 2017, p.35) are:

1. Proportion of schools with access to (a) electricity, (b) internet for pedagogical purposes, (c) computers for pedagogical purposes, (d) adapted infrastructure and materials for students with disabilities, (e) basic drinking water, (f) single-sex basic sanitation facilities, and (g) basic handwashing facilities (as per the water, sanitation, and hygiene (WASH) indicator definitions)
2. Percentage of students experiencing bullying, corporal punishment, harassment, violence, sexual discrimination and abuse
3. Number of attacks on students, personnel, and institutions

The monitoring indicators for 4.a.1 pertain to school infrastructure. The Philippines' SDG Watch, a monitoring webpage being maintained by the Philippine Statistics Authority (PSA), the update of which as of this writing is March 2021, reports the baselines for 4.a.1 indicators in the year 2016 or 2017, the targets by year 2030, and the achievements in year 2018. Table 1 summarizes the SDG Watch data but with the achievements updated to the year 2020 using inputs from the Department of Education (DepEd).

Table 1. Monitoring of SDG Target 4.a.1 indicators in the Philippines

Goal/Targets/Indicators	Baseline		Latest		Target		Data Source Agency
	Data	Year	Data	Year	Data	Year	
Goal 4. Ensure inclusive and quality education for all and promote lifelong learning							
Target 4.a. Build and upgrade education facilities that are child, disability, and gender sensitive and provide safe, nonviolent, inclusive, and effective learning environments for all							
4.a.1. Proportion of schools with access to (a) electricity, (b) the internet for pedagogical purposes, (c) computers for pedagogical purposes, (d) adapted infrastructure and materials for students with disabilities, (e) basic drinking water, (f) single-sex basic sanitation facilities, and (g) basic handwashing facilities (as per the WASH indicator definitions)							
4.a.1.1. Proportion of schools with access to electricity							
Elementary schools	88.7	2016	97.6	2020	100.0	2030	EBEIS, DepEd
Secondary schools (junior high school)	93.1	2016	98.7	2020	100.0	2030	EBEIS, DepEd
Secondary schools (senior high school)	88.9	2016	98.3	2020	100.0	2030	EBEIS, DepEd
4.a.1.2. Proportion of schools with access to the internet for pedagogical purposes							
Elementary schools	25.6	2016	64.2	2021	100.0	2030	EBEIS, DepEd
Secondary schools (junior high school)	34.0	2017	72.2	2021	100.0	2030	EBEIS, DepEd
Secondary schools (senior high school)	31.0	2017	67.3	2021	100.0	2030	EBEIS, DepEd

Table 1 *(continued)*

Goal/Targets/Indicators	Baseline		Latest		Target		Data Source Agency
	Data	Year	Data	Year	Data	Year	
4.a.1.3. Proportion of schools with access to computers for pedagogical purposes							
Elementary schools	78.5	2016	75.7	2021	100.0	2030	EBEIS, DepEd
Secondary schools (junior high school)	83.1	2016	82.3	2021	100.0	2030	EBEIS, DepEd
Secondary schools (senior high school)	23.6	2016	80.8	2021	100.0	2030	EBEIS, DepEd
4.a.1.4. Proportion of schools with access to single-sex basic sanitation facilities							
Elementary schools	45.1	2016	49.1	2019	100.0	2030	EBEIS, DepEd
Secondary schools (junior high school)	77.1[a]	2016	75.9	2019	100.0[a]	2030	EBEIS, DepEd
Secondary schools (senior high school)	77.1[a]	2016	65.8	2019	100.0[a]	2030	EBEIS, DepEd
4.a.1.5 Proportion of schools with access to basic handwashing facilities (as per the WASH indicator definitions)							
Elementary schools	61.0	2016	90.6	2020	100.0	2030	EBEIS, DepEd
Secondary schools (junior high school)	60.5	2016	89.3	2020	100.0	2030	EBEIS, DepEd
Secondary schools (senior high school)	65.3	2018	83.2	2020	100.0	2030	EBEIS, DepEd

SDG = Sustainable Development Goal; EBEIS = Enhanced Basic Education Information System; DepEd = Department of Education; WASH = water, sanitation, and hygiene

[a] Baseline and target data were recorded for secondary schools in general before they were disaggregated into junior and senior high school categories.

Source: PSA (2021, 2022); DepEd EMISD-PS (2022)

As can be gleaned from Table 1, the country posted notable improvements in most indicators. However, there was only a minimal change (less than 10% increase) in the proportion of junior high schools with access to electricity. Access to computers for pedagogical purposes in elementary and junior high schools also declined. In elementary schools, the percentage decreased from 78.5 percent in 2016 to 75.7 percent in 2021. For junior high schools, it declined from 83.1 percent in 2016 to 82.3 percent in 2021. Basic sanitation also regressed, as indicated by declines in the indicator related to "proportion of schools with access to single-sex basic sanitation facilities" for both junior and senior high school levels.[4]

Philippine Development Plan 2017–2022 strategies and targets

The *PDP 2017–2022* recognizes the importance of school infrastructure and the need to reduce inequities. This is apparent in the assessment of baselines and targets, albeit for only one indicator assessed in the PDP document (i.e., the student-to-classroom ratio) and the articulation of strategies.

The assessment of the education sector baseline for the *PDP 2017–2022* plan period includes the sector's performance in the previous PDP plan period with respect to the student-to-classroom ratio. The assessment showed that the student-to-classroom ratio in the school year (SY) 2014–2015 was 1:34 at the elementary level and 1:48 at the secondary level, an improvement from the SY 2010–2011 ratios of 1:39 for the elementary level and 1:54 for the secondary level. The *PDP 2017–2022* targeted to improve the student-to-classroom ratios to 1:25 for kindergarten, 1:30 for Grades 1–3, 1:40 for Grades 4–6, 1:40 for junior high school, and 1:40 for senior high school by the end of the plan period.[5]

The *PDP 2017–2022* also highlighted school infrastructure in the K to 12 program implementation strategies. Specifically, the PDP stated, "Pursue the full implementation of K to 12 - The following are the substrategies to ensure the success of K to 12: (a) timely delivery of adequate education inputs such as school infrastructure, quality learning materials including assistive devices, and ICT equipment…" (NEDA 2017, p.153).

[4] These indicators are unpacked and assessed further in the subsequent section of this paper (pp.25–50).

[5] The assessment of how these targets are met is discussed in the subsequent section (pp.12–25).

The *Updated PDP 2017–2022* (released in February 2021 to incorporate pandemic responses) no longer included school infrastructure in its target indicators but had it in the strategies, with crucial emphasis on geographically isolated and disadvantaged areas (GIDAs). Specifically, this was articulated as "improvement of the learning environment by ensuring that schools, classrooms, and other learning facilities promote productive learning experiences. Particular focus will be given to last mile schools—schools in GIDAs, which are not prioritized when determining the needed inputs using established formulas and ratios for education inputs" (NEDA 2021a, p.187).

Assessment of the State of Philippine School Infrastructure

The current state of the country's school infrastructure provision can be assessed by examining its achievements relative to the targets it set and comparing its performance with that of its neighboring countries. Its achievement or nonachievement of targets and its ranking relative to other countries can provide insights on where it should be heading from here onwards. Thus, this study presents the Philippines' achievements relative to the PDP and SDG targets across four key indicators: adequacy of classrooms; access to water, sanitation, and hygiene facilities; electricity access; and ICT access. It also presents a benchmarking of Philippine indicators, except for classrooms, against Eastern and South-Eastern Asian countries. (For the classroom indicator benchmarking, classroom data on Organisation for Economic Co-operation and Development [OECD] countries are used given the unavailability of easily accessible Eastern and South-Eastern Asia classroom data). It also discusses the implementation experience in the major programs aimed at improving the school infrastructure indicators.

Due to a lack of data, compliance with construction standards is not included in the discussion. The presumption is that school infrastructures in the Philippines are being built with due consideration for the Department of Public Works and Highways (DPWH)-DepEd standards. The DPWH and the DepEd jointly formulated standards and construction handbooks that both the DPWH contractors and the private partners

of the DepEd are required to follow. Construction contracts also have designated periods for remedial measures; that is, if the construction fails to meet the standards, defects must be remedied before releasing the certificate of acceptance for the particular school infrastructure facility.

Adequacy of classrooms

Classroom shortages were a serious problem in the 2000s, with ratios of 40.14 elementary pupils per classroom and 55.44 secondary students per classroom in SY 2002–2003, indicating overcrowding in schools. Despite continuous funding for constructing additional classrooms to reduce overcrowding, a 2012 public expenditure review by the World Bank (WB) and the Australian Agency for International Development (AusAID) observed that progress in improving the ratio was slow because many new classrooms were not counted as additional facilities but merely as replacements for old, dilapidated classrooms (WB and AusAid 2012).

Many innovations were implemented to address the classroom backlogs, including the "principal-led construction scheme"[6] introduced in 2005, the Public-Private Partnerships for School Infrastructure Project (PSIP) introduced in 2011, and the transfer of implementation responsibility for all school building programs to the DPWH starting in 2013 and continuing at present. Eventually, the school building programs managed to address classroom overcrowding, as seen from the trends in Table 2.

Table 2 shows that from 39 elementary students per classroom and 53 high school students per classroom in SY 2010–2011, the ratios improved to 29 elementary students per classroom, 39 junior high school students per classroom, and 31 students per classroom in SY 2019–2020. This scenario indicates that classroom provision in the Philippines has been outpacing enrollment growth, with classrooms getting less congested.

These accomplishments can be compared with the *PDP 2017–2022* targets, as reflected in the NEDA's Enhanced *PDP 2017–2022* Results Matrices (December 14, 2021 Update). Comparing

[6] Under the principal-led construction scheme, school principals are entrusted with the management and supervision of all construction and repair works within a school building project, with technical assistance from an engineer hired by the DepEd.

Table 2. Classroom-student ratio in the Philippines, SY 2010–2011 to SY 2019–2020

	Elementary	High School	Junior High School*	Senior High School*
SY 2010–2011	1:39	1:53	–	–
SY 2011–2012	1:40	1:53	–	–
SY 2012–2013	1:40	1:51	–	–
SY 2013–2014	1:34	1:49	–	–
SY 2014–2015	1:34	1:48	–	–
SY 2015–2016	1:32	1:35	–	–
SY 2016–2017	1:35	1:39	n.d	n.d.
SY 2017–2018	1.34	1:36	n.d	n.d.
SY 2018–2019	1:28	–	1:40	1:38
SY 2019–2020	1:29	–	1:39	1:31

SY = school year; n.d. = no data; "–" = not applicable; NEDA = National Economic and Development Authority; DepEd = Department of Education; EMISD-PS = Educational Management Information System Division–Planning Service
* Starting June 2016, high school education consisted of junior high school and senior high school, with the addition of Grades 11 and 12 (i.e., the senior high school levels) to the basic education system in accordance with the Enhanced Basic Education Act of 2013.
For SY 2010–2012 up to SY 2014–2015, data on the ratios were given by the NEDA-Social Development Staff, citing the DepEd as the source. For SY 2015–2016 to SY 2019–2020, data on the ratios were given by the DepEd EMISD-PS.
Sources: NEDA-SDS (2021); DepEd (2021a, 2021b); DepEd EMISD-PS (2022)

the accomplishments in classroom-student ratios for elementary in Table 2 with the target ratios for Grades 1–3 and Grades 4–6 of primary education in Table 3, and comparing the ratios for junior and senior high schools in Table 2 with the target ratios for the same levels in Table 3, it can be concluded that most PDP targets on the classroom-student ratio indicator have been achieved. However, the accomplishments data for primary education are not broken down per grade level, and the same conclusion cannot be drawn for kindergarten.

Benchmarking against other countries is possible using OECD data. In 2020, OECD countries had an overall average of 20 primary students per classroom and 23 lower secondary students per classroom. The largest average class size in an OECD country in 2020 was 33 (observed in Costa Rica) (see Figure 1). In SY 2019–2020, the Philippines had student-to-classroom ratios of 29 primary students, 39 junior high school students, and 31 senior high school students per classroom.

Table 3. Classroom-to-pupil ratio targets in the *PDP 2017–2022* versus accomplishments

Indicator	Baseline		Annual Plan Targets and Accomplishments						End of Plan Target[a]
	Year	Value	2017	2018	2019	2020	2021	2022	
Classroom-to-pupil[b] ratio improved									
Primary			Annual Plan Targets						
Kindergarten	2014	1:34	1:30	1:25	1:25	1:25	1:25	1:25	1:25
Grades 1–3			1:34	1:32	1:30	1:30	1:30	1:30	1:30
Grades 4–6			1:40	1:40	1:40	1:40	1:40	1:40	1:40
			Annual Accomplishments						
Elementary[c]			1:34	1:28	1:29	–	–	–	
Secondary									
Junior high school	2014	1:48	Annual Plan Targets						1:40
			1:46	1:45	1:44	1:42	1:40	1:40	
			Annual Accomplishments						
			1:36	1:40	1:39	–	–	–	
Senior high school			Annual Plan Targets						1:40
			1:46	1:45	1:44	1:42	1:40	1:40	
			Annual Accomplishments						
				1:38	1:31	–	–	–	

PDP = Philippine Development Plan; "–" = data not available as of writing; DepEd EMISD-PS = Department of Education's Educational Management Information System Division–Planning Service

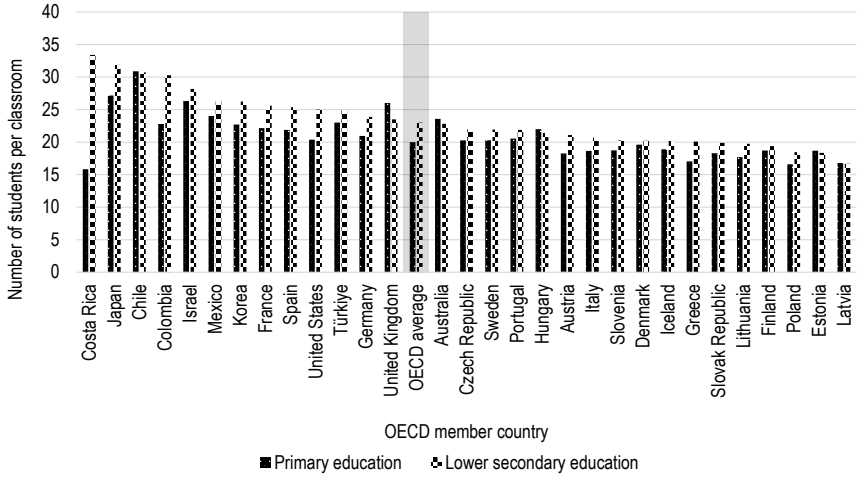
[a] End of *PDP 2017–2022*

[b] The *Enhanced PDP 2017–2022 Results Matrices* (December 14, 2021 Update) publication used the term "classroom to pupil ratio".

[c] The DepEd EMISD-PS classroom-to-pupil-ratio data on accomplishments at the elementary school level are in the aggregate and not broken down by grade level.

Sources: NEDA (2021b); DepEd EMISD-PS (2022)

Figure 1. Average class size in educational institutions in OECD countries by level of education, 2020



OECD = Organisation for Economic Co-operation and Development
Note: Countries are ranked in descending order in lower secondary education in 2020.
Source: OECD (2022)

These were above the OECD averages, indicating that Philippine class sizes were larger relative to the OECD average. However, the ratios were still close to the largest average class size in the OECD, an indication that Philippine classrooms were getting less congested even if set against the OECD standard.

Although the national classroom-student ratios show significant progress in addressing classroom overcrowding, the regional ratios reveal spatial inequality (see Table 4). The SY 2019–2020 data show that achieving the target 1:40 classroom-student ratio set by the PDP has been difficult for the National Capital Region (NCR) at both the elementary and junior high school levels. Region IV-A has also been experiencing classroom congestion at the junior high school level. The congestion in these two regions can be attributed to highly populated areas where rapid enrollment growth has outpaced the construction of new classrooms.

The ratios for junior high school in Region XI and junior high school and senior high school in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) also indicate congestion, as

these ratios exceed the targets set by the PDP. Unlike the NCR and Region IV-A, these regions have lower population densities. However, they have more geographically dispersed schools, and some schools are in remote locations, such as indigenous peoples' communities. Historically, addressing the underdevelopment of physical infrastructure, including school infrastructure, has been difficult in these regions.

Table 4. Classroom-student ratio for SY 2019–2020 (public) by region and school level

	Elementary	Junior High School	Senior High School
Philippines	1:29	1:39	1:31
National Capital Region	1:46	1:48	1:31
Cordillera Administrative Region	1:18	1:29	1:26
Region I (Ilocos Region)	1:23	1:31	1:29
Region II (Cagayan Valley)	1:22	1:28	1:27
Region III (Central Luzon)	1:31	1:36	1:30
Region IV-A (CALABARZON)	1:39	1:48	1:32
MIMAROPA	1:25	1:36	1:31
Region V (Bicol Region)	1:26	1:39	1:33
Region VI (Western Visayas)	1:24	1:35	1:29
Region VII (Central Visayas)	1:29	1:39	1:33
Region VIII (Eastern Visayas)	1:20	1:34	1:31
Region IX (Zamboanga Peninsula)	1:27	1:40	1:31
Region X (Northern Mindanao)	1:30	1:37	1:29
Region XI (Davao Region)	1:32	1:41	1:32
Region XII (SOCCSKSARGEN)	1:34	1:40	1:32
Region XIII (Caraga)	1:26	1:34	1:28
Bangsamoro Autonomous Region in Muslim Mindanao	1:40	1:54	1:48

CALABARZON = Calamba, Laguna, Batangas, Rizal, and Quezon; MIMAROPA = Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon, and Palawan; SOCCSKSARGEN = South Cotabato, Cotabato, Sultan Kudarat, Sarangani, and General Santos; DepEd = Department of Education
Notes:
(1) Ratios are computed from enrollment data and classroom data on public schools in the DepEd databases.
(2) The databases used are the Learning Information System (for enrollment) and the National School Building Inventory (for classroom). No data are available for private schools.
Sources of data: DepEd (2021a, 2021b)

Achieving the PDP targets on classroom-student ratios at the national level should leave no room for complacency. The Philippine government still needs to monitor the emergence of classroom shortages. The demand for new classrooms persists as school enrollment increases and existing classrooms get dilapidated due to wear and tear and natural calamities. Moreover, planners now recognize the additional demand for quality classrooms in so-called "last mile schools", which require upgrading to meet basic standards and ensure safety, among other requirements. The planning parameters of the DepEd, therefore, consider three factors: the requirements due to enrollment increment, the needed replacements of old and dilapidated school buildings, and the requirements of last mile schools.

In planning for classroom needs using enrollment data, standardizing class sizes is needed. The standard planning parameters for kindergarten classrooms are 25 learners in a class and double shift or one classroom per two classes. The standard planning parameters for Grades 1–10 are 30–40 learners and single shift or one classroom per class. The standard planning parameters for senior high school are 40 learners in a class and a single shift or one classroom per class. To assess the classroom gap, the DepEd compares the classroom requirements of the estimated enrollment with the national school building inventory and anticipated completion of ongoing school building projects. Based on analysis using SY 2019–2020 enrollment data, the 2019 National School Building Inventory, and remaining projects for completion in 2019–2020, the DepEd estimated a total requirement of 110,954 classrooms in 2021. The DepEd also estimated that school enrollment increases by an average of 1.5 percent to 2 percent per year, which translates to around an additional 10,000 classrooms required on top of the baseline requirement per year (DepEd-OUA 2020a).

Estimating the number of required classrooms based on building depreciation and structural damages entails a regular structural assessment of school building conditions. The DepEd's assessment of the schools' physical structure indicates which buildings already pose a danger to students and require immediate demolition and replacement. Table 5 illustrates the estimation of classroom requirements based on this assessment. Firstly, the buildings that are subject to condemnation and those that were already declared condemned are determined.

Across all regions, the 2019 National School Building Inventory revealed that CALABARZON [Cavite, Laguna, Batangas, Rizal, and Quezon] has the highest number of such buildings. The nationwide total is 28,508 school buildings either subject to condemnation or already declared condemned. Secondly, the number of classrooms equivalent to the number of buildings to be demolished and then replaced with new ones is estimated in accordance with the DepEd planning parameter of an average of three classrooms per school building. The 2019 structural assessment implies an additional requirement of 85,524 classrooms in 2021.

With respect to the last mile schools, the DepEd, in Section 2 of its Memorandum Circular 59 (s. 2019), listed the following indicators for identifying last mile schools:

a. have less than four classrooms;
b. with makeshift or nonstandard rooms;
c. lack electricity;
d. have not received funds for repairs or new construction projects in the last four years;
e. are situated more than one hour from the town center or in areas with difficult terrain;
f. have multigrade classes/rooms;
g. with less than 5 teachers;
h. have a student population of less than 100 learners; and
i. with more than 75 percent indigenous learners.

In 2019, DepEd field offices conducted an assessment and estimated a total of 9,225 last mile schools nationwide. If these schools are to be provided with at least five classrooms each, a total of 46,125 classrooms would be the last mile classroom requirement as of 2020. DepEd set five classrooms per last mile school as a planning parameter as it deems that the usually small number of learners in a multi-grade system plus the requirements of a library or equipment corner will need four classrooms, and the principal and teachers will need one room (DepEd-OUA 2020a).

Table 5. Projected 2021 classroom requirements due to building replacements

Region	Total Buildings for Condemnation	Total Buildings Condemned or for Demolition	Total Buildings for Replacement	Total Equivalent Number of Classrooms
	(a)	(b)	(c = a + b)	
CAR	341	523	864	2,592
Region I (Ilocos Region)	945	548	1,493	4,479
Region II (Cagayan Valley)	729	447	1,176	3,528
Region III (Central Luzon)	1,535	1,188	2,723	8,169
NCR	88	69	157	471
Region IV-A (CALABARZON)	1,746	1,956	3,702	11,106
MIMAROPA	507	387	894	2,682
Region V (Bicol Region)	1,061	1,071	2,132	6,396
Region VI (Western Visayas)	1,011	742	1,753	5,259
Region VII (Central Visayas)	970	952	1,922	5,766

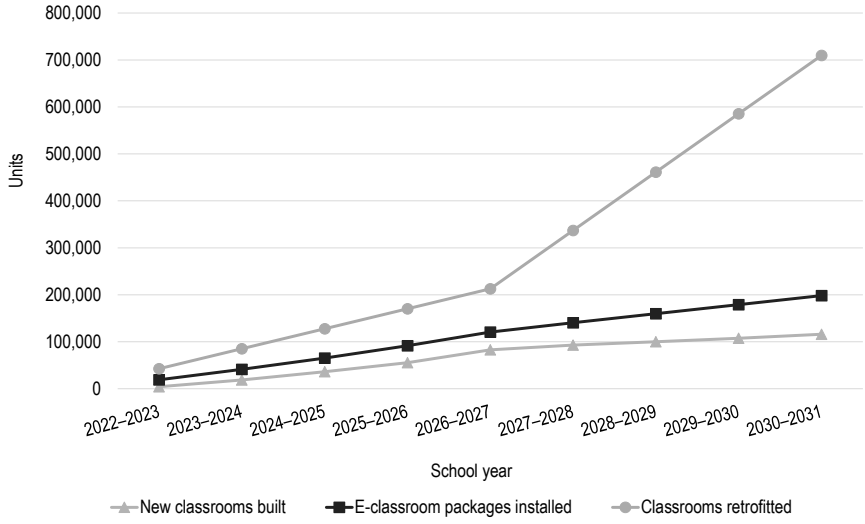
Table 5 *(continued)*

Region	Total Buildings for Condemnation	Total Buildings Condemned or for Demolition	Total Buildings for Replacement	Total Equivalent Number of Classrooms
	(a)	(b)	(c = a + b)	
Region VIII (Eastern Visayas)	622	470	1,092	3,276
Region IX (Zamboanga Peninsula)	522	634	1,156	3,468
Region X (Northern Mindanao)	2,101	1,512	3,613	10,839
Region XI (Davao Region)	1,311	1,150	2,461	7,383
Region XII (SOCCSKSARGEN)	983	701	1,684	5,052
Region XIII (Caraga)	592	537	1,129	3,387
BARMM	270	287	557	1,671
Grand Total	**15,334**	**13,174**	**28,508**	**85,524**

BARMM = Bangsamoro Autonomous Region in Muslim Mindanao; CALABARZON = Cavite, Laguna, Batangas, Rizal, and Quezon; CAR = Cordillera Administrative Region; MIMAROPA = Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon, and Palawan; NCR = National Capital Region; SOCCSKSARGEN = South Cotabato, Cotabato, Sultan Kudarat, Sarangani, and General Santos
Note: The assessment was based on the 2019 National School Building Inventory.
Source: DepEd-OUA (2020a)

In its Basic Education Development Plan 2030, the DepEd used the projected enrollment from SY 2022–2023 to SY 2030–2031 to estimate the number of classrooms to be built, retrofitted, and installed with e-classroom packages to achieve and maintain the ideal classroom-student ratios annually (Figure 2). Through its simulation in the plan, the DepEd estimated that a total of PHP 1.34 trillion is needed to build these classrooms.

Figure 2. Projected cumulative classroom requirements (in units), SY 2022–2023 to SY 2030–2031



SY = school year; ICT = information and communications technology
Note: Existing stock of classrooms retrofitted and installed with e-classroom packages prior to SY 2022–2023 are not included. "E-classroom" refers to classrooms with computer laboratories and ICT packages.
Source: DepEd (2022a)

How can the government meet the funding requirements of the growing demand for classrooms? It can be through a combination of national government funds, local government funds, and public-private partnerships (PPPs), but with due consideration for the lessons learned from implementing related projects in previous years.

The implementation experience in the Basic Education Facilities (BEF) budget, the main national government allocation for school building construction, proves that a substantial expenditure increase should be

accompanied by adequate project-level preparation, such as complete cost estimates, site preparation, bidder availability, and workforce sufficiency. In the 2013 General Appropriations Act (GAA), the BEF budget was allocated to the DepEd to replace an existing budget line item for school buildings, and the implementation responsibility was fully transferred to the DPWH. From 2013 to the present, the DPWH has been implementing all school building projects funded by the DepEd. Under this setup, the DepEd manages project planning, site selection, and then hands over the priority list and the funds to the DPWH for implementation.

The BEF appropriation, which stood at PHP 5.95 billion in the 2022 GAA, had an initial budget of PHP 14.11 billion in 2013. It peaked at PHP 109.31 billion in 2017 but was cut drastically to PHP 14.36 billion in 2019 (DepEd-OUA 2020a) due to lingering concerns about underutilization. This underutilization is evident in low disbursement-to-appropriation ratios, as raised by the Department of Budget and Management (DBM). In its 2018 recommendation to cut the BEF appropriation, the DBM pointed out very low disbursement-to-appropriation ratios in previous years, specifically 12.4 percent in 2015, 19.9 percent in 2016, and only 6.2 percent in 2017 (DBM 2018).

School building programs implemented by the DPWH under the BEF suffered delays due to various factors. As reported by the World Bank and AusAID (2016), a survey of district engineering offices revealed that the common problems faced by the DPWH in school infrastructure projects implemented in 2014 included insufficient funds for hauling, site availability, impractical uniform pricing, difficulties in attracting contract bidders, insufficient DPWH staff, late receipt of project list, very rigid specifications, and political intervention. It should be noted that these problems, aside from political intervention, can be solved through adequate project preparation.

The DepEd also reported other problems that arose in the past. These include poor coordination between the DPWH and the DepEd, lack of information dissemination at the field level, no joint DepEd-DPWH validation of the priority list (which necessitated revalidation by the DPWH), nonavailability of buildable space in the sites, repeated bidding failures because sites were hard to access, and issues with payments for completed projects due to procedural lapses. Issues have been minimized as coordination between the DepEd and the

DPWH improved, especially with regular monthly coordination meetings and reporting by the DepEd on necessary corrections in the quality of construction (DepEd-OUA 2020a). However, implementation challenges continue to hound both agencies, especially since there were backlogs in projects from previous years. For instance, the DepEd reported that as of September 1, 2021, 9,627 classrooms from the 2014–2018 implementation list are still ongoing, either with unresolved issues or awaiting further verification of their status. Notably, among the regions, only Region X has no backlog (DepEd-OUA 2021a). In June 2021, the DPWH reported that it was able to build a total of 144,925 classrooms in the past five years (Unite 2021).

Another funding source for school building construction is the Special Education Fund (SEF) of local government units (LGUs). The SEF is derived from the 1 percent surcharge on real property taxes collected by LGUs, as authorized by Republic Act (RA) 7160 or the Local Government Code of 1991. It is administered by local school boards co-chaired by the local chief executive and the school division supervisor in the particular LGU. RA 7160, Book 2, Section 272 provides that "the proceeds shall be allocated for the operation and maintenance of public schools, construction, and repair of school buildings, facilities and equipment, educational research, purchase of books and periodicals, and sports development as determined and approved by the local school board." Although the SEF is being used to fund the construction of school buildings, there is no systematic data collection on how much of the nationwide classroom shortage is being financed by the SEF. Moreover, the World Bank (2020b) reported that its Philippines Public Education Expenditure Tracking and Quantitative Service Delivery Survey in 2016 found that fewer than 50 percent of schools receive any kind of LGU financial assistance.

A PPP arrangement can also help meet the future demand for classrooms, given that the Philippines has successfully utilized such an arrangement in the past. The PSIP is the DepEd's first PPP project. It was approved by the NEDA Board in 2011 under a build-lease-transfer arrangement where the so-called availability payments of the DepEd to the contractor is for 10 years. Construction under Phase 1 started in February 2013 and concluded in December 2015. Phase 1 delivered 2,156 classrooms in Region I, 2,885 classrooms in Region III, and

9,296 classrooms in Region IV-A (PPP Center n.d.). Under Phase 2, the PPP structure shifted to build-transfer because when the project was being evaluated, the government had "considerably more comfortable fiscal space that can allow it to absorb the cost of a one-time payment for the Project", as indicated by the DepEd.[7] Construction under Phase 2 started in April 2014 and concluded in December 2019 for one contract package and in March 2021 for another contract package. Phase 2 delivered 2,438 classrooms in the Cordillera Administrative Region and Regions I, II, and III and 1,657 classrooms in Region X and Caraga (PPP Center n.d.).

A case study conducted by the PPP Center showed that the PSIP-Phase 1 suffered delays. The following issues affected the timely delivery of milestones: delay in independent consultant procurement due to initial failed bidding; project site challenges such as inaccessibility, poor security, geotechnical concerns, obstructions, bad weather conditions, and delay in getting replacement sites; delay in LGU permit issuances; and subcontractors abandoning their assigned subprojects, resulting in re-contracting for new subcontractors. Both the DepEd and the PPP Center documented key learnings from the PSIP-Phase 1, which include: ensuring there is sufficient time for site inspection and other preparation activities to avoid delays related to project site issues; improving site appraisal reports by including information on hazards, climate type, presence of obstruction, setback requirements, security issues, distance and travel time from town proper or distance from port for island location, and other incidental works; incorporating clear contract provisions on lease payments, periodic maintenance works, and furniture and fixtures warranty; improving the minimum performance standards and specifications to ensure that all classrooms are conducive to learning; having a dedicated PPP unit in DepEd; ensuring close coordination among the DepEd regional offices, LGUs, and other stakeholders during the project development stage; increased marketing of PPP opportunities to encourage bidder participation; ascertaining the payment mechanisms prior to the bidding proper and sharing relevant guidelines with the bidders; and engaging independent consultants early in the project procurement stage and

[7] Phebean Belle A. Ramos-Lacuna, Director, PPP Center, in discussion with the author via online meeting, November 10, 2021, Quezon City, Philippines.

improving evaluation and certification procedures for independent consultants (DepEd and PPP Center 2020). These lessons are applicable not only to future PPPs for school building projects but also to regular contracting or subcontracting by the DPWH for school buildings. The DepEd also reported that it is open to implementing another PPP project and applying the lessons gained from implementing the PSIP-Phases 1 and 2 (DepEd-OUA 2020a).

Water, sanitation, and hygiene facilities

In February 2016, the DepEd institutionalized policies and guidelines for the comprehensive Water, Sanitation, and Hygiene (WASH) in Schools Program, dubbed as the WinS Program,[8] through DepEd Order 10 (s. 2016). The DepEd recognized at the time that the lack of access to safe and clean water, as well as poor sanitation and hygiene practices, led to about 43.7 percent of preschool children and 44.7 percent of school-age children being infected with soil-transmitted helminths or parasitic worms. The department order outlined basic requirements and standards such as regular water supply, regular monitoring of water quality, access to functional toilets with individual handwashing facilities for boys and girls, proper septage and wastewater disposal, program on supervised group daily handwashing and toothbrushing, health education, and deworming activities (DepEd 2016).

The shortage of water and sanitation facilities is also recognized in the assessment part of the *PDP 2017–2022*. The 2017 edition of the PDP reported that 3,819 schools lacked water supply and sanitation facilities (NEDA 2017). Although the assessment did not specify the base year, it can be deduced from the results matrices released by the NEDA that the PDP adopted 2014 as the base year for the assessment (NEDA 2021b). The *PDP 2017–2022* also included the provision of water and sanitation facilities for schools in its strategies for social infrastructure. The *Updated PDP 2017–2022*, released in February 2021, reiterated this strategy and added the qualifier that water supply must be clean and potable.

As can be gleaned from Table 6, the PDP results matrices for social infrastructure established specific targets for water and sanitation access. The water and sanitation facility-to-pupil ratios exhibited progress up to 2019, surpassing the PDP targets. From the 2014 baseline levels of 39 pupils

[8] The "W" in WinS stands for WASH (water, sanitation and hygiene).

sharing a single water and sanitation facility at the primary school level, 49 pupils sharing one facility at the junior high school level, and 49 pupils sharing a facility at the senior high school level, the ratios have shown improvement by 2019. At the primary school level, the ratio decreased to 30 pupils sharing one water and sanitation facility, surpassing the 1:33 ratio. Similarly, at the junior high school level, the ratio improved to 42 pupils sharing one facility, exceeding the 1:43 target. At the senior high school level, the ratio also improved to 36 pupils sharing one facility, outperforming the 1:43 target.

Likewise, the PDP results matrices outlined annual targets for the proportion of public schools with adequate water and sanitation facilities, with the ultimate goal of attaining near-universal access to water and sanitation for primary schools and universal access for secondary schools. However, accomplishments data from the DepEd showed that as of 2020, these targets had not been attained (see Table 6).

The gender dimension of these results indicators can be seen in Table 1 on the monitoring of SDG accomplishments. The proportion of schools with access to single-sex basic sanitation facilities shows mixed results. For elementary schools, the proportion improved from 45.1 percent in 2016 to 49.1 percent in 2019. However, for secondary schools, there was a decline from 77.1 percent in 2016 to 75.9 percent for junior high schools and 65.8 percent for senior high schools in 2019. Government agencies in charge of tracking this indicator should consistently monitor and report on it to ensure that the Philippines remains on track to meeting the SDG 4.a.1.4 target of 100 percent access to single-sex basic sanitation facilities by 2030. It is important to note that the gender-segregated toilets indicator is monitored under the WinS program, but the coverage is limited to schools that voluntarily participate in the WinS monitoring. Therefore, the reported WinS figures do not accurately reflect the actual national-level accomplishment.

With respect to the proportion of schools with access to basic handwashing facilities, the latest data from DepEd indicate progress across all school levels. For elementary schools, there was an improvement from 61 percent in 2016 to 90.6 percent in 2020. Junior high schools also saw progress, increasing from 60.5 percent in 2016 to 89.3 percent in 2020. Similarly, improvement was noted for senior high schools, rising from 65.3 percent in 2018 to 83.2 percent in 2020 (see Table 1).

Table 6. Water and sanitation targets in the *PDP 2017–2022* versus accomplishments

Indicator	Baseline[a]		Annual Plan Targets and Accomplishments						End of Plan Target
	Year	Value	2017	2018	2019	2020	2021	2022	
Water and sanitation facility-to-pupil ratio improvements									
Primary (K to 6)[b]	2014	1:39	Annual Plan Targets						
			1:37	1:35	1:33	1:31	1:30	1:30	1:30
			Annual Accomplishments						
			1:32	1:32	1:30				
Junior high school	2014	1:49	Annual Plan Targets						
			1:47	1:45	1:43	1:41	1:40	1:40	1:40
			Annual Accomplishments						
			1:39	1:42	1:42				
Senior high school	2014	1:49	Annual Plan Targets						
			1:47	1:45	1:43	1:41	1:40	1:40	1:40
			Annual Accomplishments						
			n.d.	n.d.	1:36				

Table 6 *(continued)*

Indicator	Baseline[a]		Annual Plan Targets and Accomplishments						End of Plan Target
	Year	Value	2017	2018	2019	2020	2021	2022	
Proportion of public schools with adequate water and sanitation facilities to total number of public schools increased (%, cumulative)									
Primary (K to 6)	2014	91	Annual Plan Targets						
			92	93	94	96	98	98	98
			Annual Accomplishments						
			83	86	91	94			
Junior high school	2014	94	Annual Plan Targets						
			96	98	100	100	100	100	100
			Annual Accomplishments						
			89	93	93	96			
Senior high school	2014	94	Annual Plan Targets						
			96	98	100	100	100	100	100
			Annual Accomplishments						
			84	95	97	98			

PDP = Philippine Development Plan; K to 6 = Kindergarten to Grade 6; n.d. = no data
[a] Most recent available data; not necessarily year-end values
[b] Average ratio for primary level (disaggregated baseline values unavailable)
Sources: NEDA (2021b) for the baseline and targets; DepEd EMISD-PS (2022) for the accomplishments

These accomplishments, however, are quite far from the SDG 4.a.1.5 target of 100 percent access to basic handwashing facilities for all school levels by 2030.

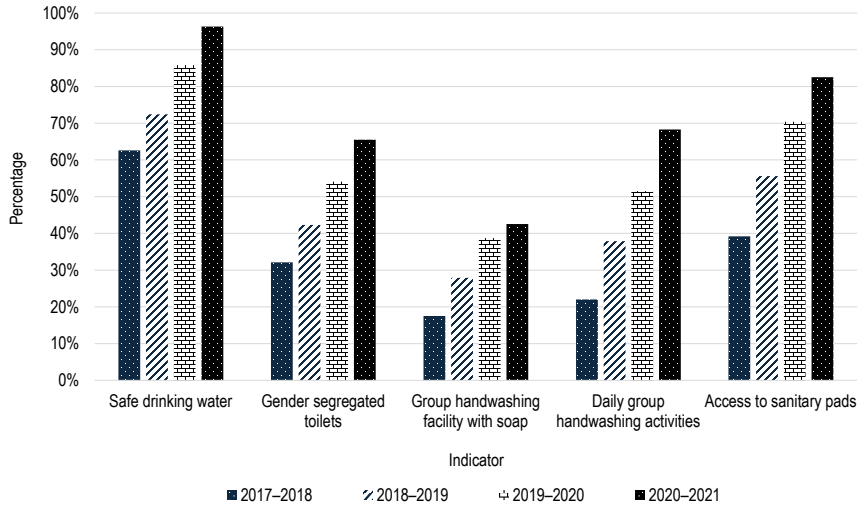
The issue of water supply availability persists, as many schools still lack access. According to DepEd estimates in 2020, there remained 3,861 schools without access to potable water (DepEd-OUA 2021b), equivalent to around 7 percent of the total of 55,502 schools in the DepEd's master list of schools for SY 2019–2020 (DepEd 2021b).

The WinS program's WASH monitoring has revealed facility inadequacies. The DepEd uses an online tool to monitor the WinS program accomplishments, where schools upload independent assessments of their WinS status. In effect, a participating school analyzes its own accomplishments, and the aggregated self-analysis serves as DepEd's basis for addressing gaps or continuing improvements. The WinS monitoring system tracks multiple indicators, with five deemed "crucial": availability of safe drinking water, gender-segregated toilets, supervised daily group handwashing, group handwashing facilities with soap, and access to sanitary pads.

The DepEd WinS monitoring report from SY 2017–2018 to SY 2020–2021 showed a consistent increase in school participation rates. In SY 2017–2018, 65.6 percent of the 46,645 schools nationwide participated, and participation rates rose to 74.4 percent among 47,023 schools in SY 2018–2019 and further to 87.9 percent of the 45,313 schools in SY 2019–2020. The participation rates peaked in SY 2020–2021, with 92.9 percent of the 48,219 schools nationwide participating. According to the WinS report, the BARMM was excluded from the assessment because data for the region were not available (DepEd 2020). Figure 3 below shows that as of SY 2020–2021, 96 percent of the monitored schools reported the availability of safe drinking water, 66 percent indicated the availability of gender-segregated toilets, 43 said they have group handwashing facilities with soap, 68 percent reported conducting daily group handwashing activities, and 83 percent indicated having access to sanitary pads. It is important to reiterate that these figures represent aggregate access rates for the WinS participating schools only and do not reflect nationwide access rates.

With respect to access to toilet facilities, DepEd Order 10 (s. 2016) has set a standard pupil-toilet ratio of 50:1 for boys and girls (DepEd 2016).

Figure 3. Compliance with the five crucial indicators of WinS



WinS = WASH in Schools Program
Source: DepEd (2022b)

However, data from the WinS monitoring for SY 2018–2019, including BARMM, showed significant underachievement in meeting this standard. In SY 2018–2019, only 26,182 schools (55.5% of the total 47,203 schools) adhered to the specified ratio of 50 students per toilet bowl. A total of 5,398 schools (11.4%) had ratios ranging from 51 students per toilet bowl to 100 students per toilet bowl, while 2,691 schools (5.7%) exceeded the ratio of 100 students per toilet bowl. Meanwhile, 734 schools (1.6%) lacked toilet facilities, and 12,018 schools (25.5%) had no available data in the WinS monitoring system (DepEd-OUA 2021b).

In assessing the Philippines' performance on WASH indicators relative to other countries, reference can be made to the progress report produced by the Joint Monitoring Programme (JMP) of the United Nations Children's Fund (UNICEF) and the World Health Organization (WHO) for the SDGs related to WASH. In its most recent report, based on 2021 data from surveyed countries (UNICEF 2022), the JMP uses service ladders for WASH in schools in benchmarking across countries and defines three levels of service: basic service, limited service, and no service (see Box 2 for the definitions).

Box 2. UNICEF and WHO JMP service ladders for WASH in schools

Drinking water
- Basic service – Drinking water from an improved source and water is available at the school at the time of the survey
- Limited service – Drinking water from an improved source, but water is unavailable at the school at the time of the survey.
- No service – Drinking water from an unimproved source or no water source at the school

Sanitation
- Basic service – Improved sanitation facilities at the school that are single-sex and usable (available, functional, and private) at the time of the survey
- Limited service – Improved sanitation facilities at the school that are either not single-sex or not usable at the time of the survey
- No service – Unimproved sanitation facilities or no sanitation facilities at the school

Hygiene
- Basic service – Handwashing facilities with water and soap available at the school at the time of the survey
- Limited service – Handwashing facilities with water but no soap available at the school at the time of the survey
- No service – No handwashing facilities or no water available at the school

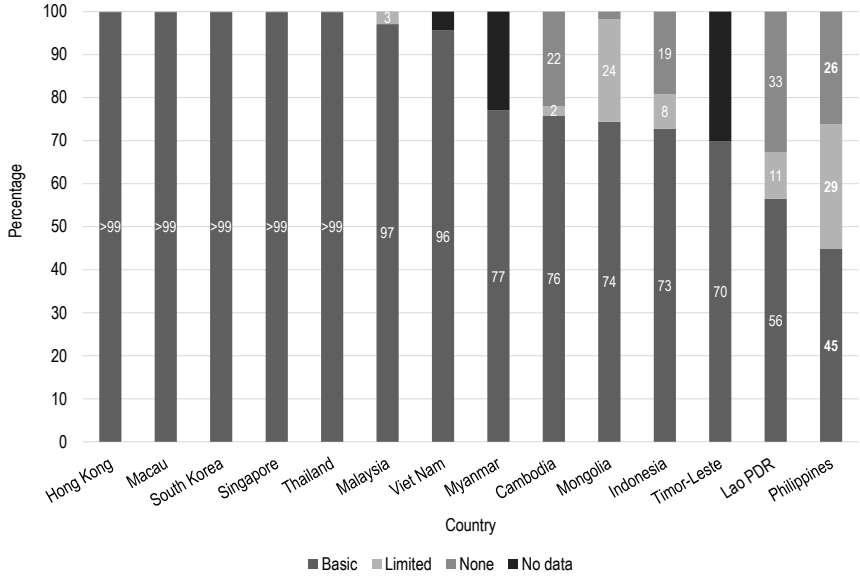
UNICEF = United Nations Children's Fund; WHO = World Health Organization; JMP = Joint Monitoring Programme; WASH = water, sanitation, and hygiene
Source: Lifted in full from UNICEF and WHO (2020, p.6)

The Philippines lags behind most countries in the Eastern and South-Eastern Asia region,[9] as it falls below the median with respect to the three WASH indicators. In 2021, only 45 percent of Philippine schools had access to basic drinking water services (Figure 4), only 74 percent had access to basic sanitation services (Figure 5), and only 61 percent had access to basic hygiene services (Figure 6).

Despite the information gaps in monitoring, it can be inferred from available data that the Philippines needs to accelerate investments in WASH facilities. At present, WASH programs in schools are funded through the maintenance and other operating expenses (MOOE) budget of schools. DepEd Order 10 (s. 2016) placed on the school head the responsibility of ensuring that the basic requirements and standards are met. It also specifies that the DepEd Central Office shall allocate funds and prepare logistical programs and funding through schools' MOOE budgets.

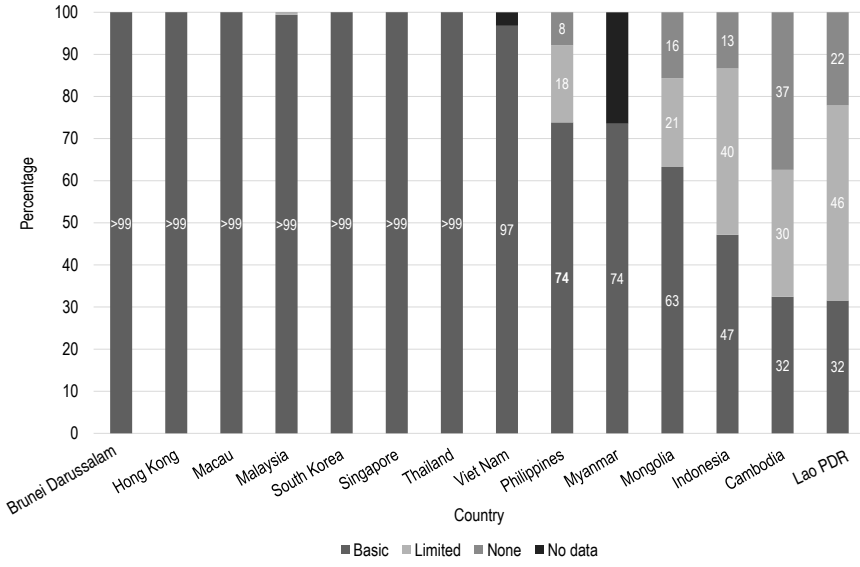
[9] The Eastern and South-Eastern Asia region is one of the major regional groups being monitored by the UNICEF and WHO Joint Monitoring Programme for WASH indicators. For consistency, the same region is used in coming up with cross-country comparisons throughout this paper.

Figure 4. Access to drinking water of schools in Eastern and South-Eastern Asia, 2021



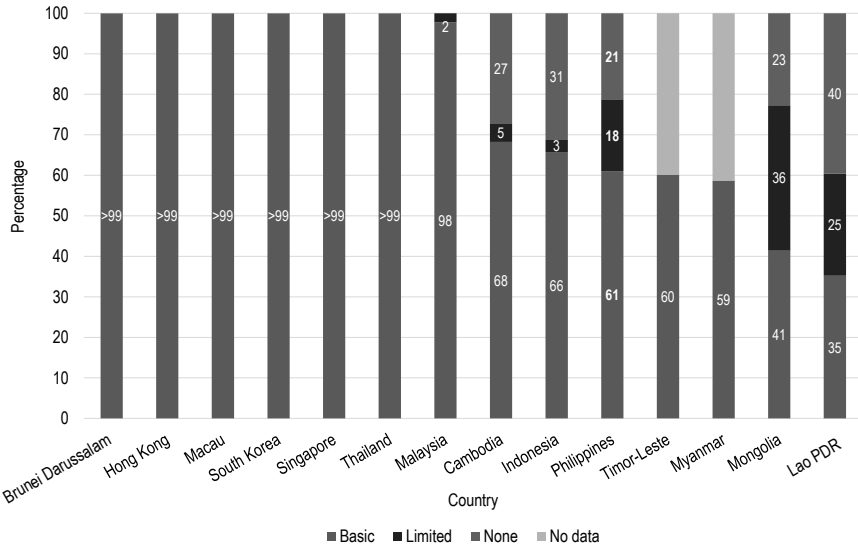
PDR = People's Democratic Republic
Source: UNICEF (2022)

Figure 5. Access to sanitation facilities of schools in Eastern and South-Eastern Asia, 2021



PDR = People's Democratic Republic
Source: UNICEF (2022)

Figure 6. Access to hygiene facilities of schools in Eastern and South-Eastern Asia, 2021



PDR = People's Democratic Republic
Source: UNICEF (2022)

The MOOE budgets of schools are supposed to fund the maintenance and repair of toilets, handwashing facilities, drinking water supply, clean running water for hygiene and sanitation, and waste disposal facilities. Additionally, the annual BEF budget of DepEd for the school building program also covers the water and sanitation facilities in new and replacement school buildings. Although a significant number of schools have no data (i.e., BARMM data for SY 2019–2020 and 25.5% of schools in SY 2018–2019), the monitored indicators still reveal that past government expenditures had not been enough.

The private sector could help augment public investments in WASH access for schools, but not necessarily through a PPP contracting scheme like the one implemented for the school building program. PPP contracts for water and sanitation facilities may be more suitable for service areas benefiting from scale economies in residential and commercial demand rather than for schools dispersed across various locations. As an alternative, the private sector can assume at least two roles in WASH in schools. Firstly, it can act as a developer of low-cost technologies that can meet the requirements of schools facing cost

constraints due to the geography or socioeconomic characteristics of their location. Secondly, the private sector can partner with schools in the demonstration of corporate social responsibility practices that integrate WASH projects and programs, ultimately promoting health and well-being of the future workforce.

Electricity access

Ensuring access to electricity in schools is an important component of the social infrastructure strategies outlined in the PDP. The initial edition of the *PDP 2017–2022* claimed that school buildings would be equipped with electric power, along with other complementary facilities (NEDA 2017). The *Updated PDP 2017–2022* reaffirmed this commitment, emphasizing the exploration of renewable energy sources, such as installing solar panels, for public school electrification (NEDA 2021a).

The targeting and monitoring of accomplishments in this area are conducted through the indicator "proportion of schools with electricity access". The PDP Results Matrices articulate the PDP targets (NEDA 2021b), while the PSA's StatDev for monitoring PDP targets reports the accomplishments on this indicator, but as a proportion of public schools only (PSA 2020). Accomplishments up to 2020, as presented in PDP monitoring, are detailed in Table 7.

Electricity access in schools is also included in the monitoring indicators for SDG 4.a.1 (PSA 2021). Unlike the PDP monitoring, the SDG indicator for schools' electricity access is measured as a proportion of all schools rather than just public schools. The earlier section on Monitoring of SDG Target 4.a.1 indicators in the Philippines shows the targets and accomplishments on school electrification based on the SDG monitoring (see Table 1).

Both PDP and SDG monitoring indicate progress in school electrification, surpassing the specified targets. Based on the PSA's PDP accomplishments monitoring (Table 7), as of 2020, 98 percent of public primary schools, 99 percent of public junior high schools, and 98 percent of public senior high schools have electricity access. Similarly, based on the SDG monitoring (see Table 1), as of 2020, 97.6 percent of elementary or primary schools, 98.7 percent of junior high schools, and 98.3 percent of senior high schools have electricity access.

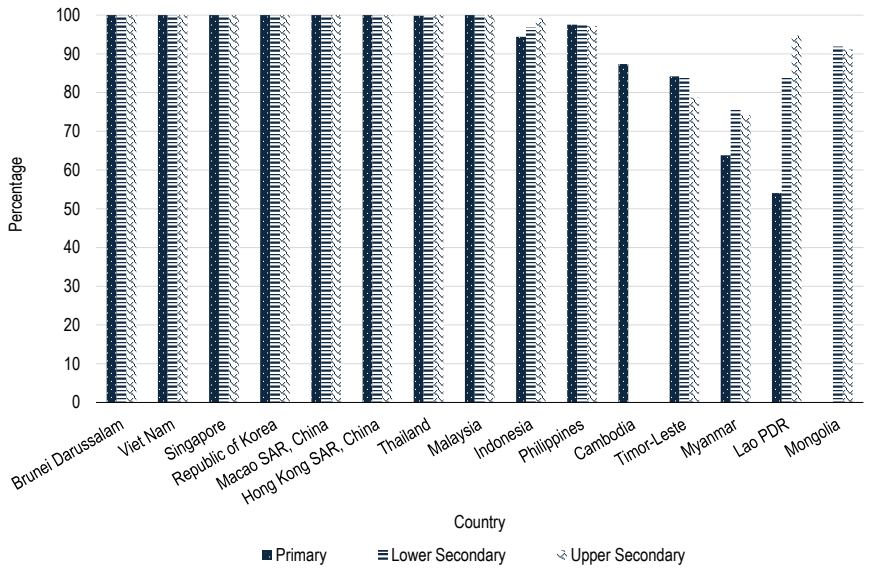
Table 7. Electrification targets in the PDP 2017–2022 versus accomplishments

Indicator	Baseline		Annual Plan Targets and Accomplishments						End of Plan Target
	Year	Value	2017	2018	2019	2020	2021	2022	
Proportion of public schools with connection to electricity to total number of public schools increased (%, cumulative)									
Primary (K to 6)	2015	85	Annual Plan Targets						95
			87	88	90	92	94	95	
			Annual Accomplishments						
			92	95	97	98	–	–	
Junior high school	2015	95	Annual Plan Targets						100
			95	96	97	98	99	100	
			Annual Accomplishments						
			96	96	98	99	–	–	
Senior high school	2015	95	Annual Plan Targets						100
			95	96	97	98	99	100	
			Annual Accomplishments						
			89	92	98	98	–	–	

PDP = Philippine Development Plan; K to 6 = Kindergarten to Grade 6; "–" = data not available
Sources: NEDA (2021) for the targets; PSA (2020) and DepEd EMISD-PS (2022) for the accomplishments

In the Eastern and South-Eastern Asia region, the Philippines is among those that have not achieved universal access to electricity in schools. Figure 7 and Table 8 present country statistics reported by the UNESCO Institute for Statistics in 2021. Viet Nam, with a per capita income close to that of the Philippines, achieved a 100 percent electricity access rate for primary and secondary schools in 2020. Thailand and Malaysia were close to achieving universal access to electricity at all school levels in 2020. Indonesia, which is archipelagic like the Philippines, had not yet achieved universal access to electricity in primary and lower secondary schools; however, it was close to achieving universal access to electricity in upper secondary schools in 2019, with an access rate of 99.22 percent. The Philippines joins Cambodia, Timor-Leste, Myanmar, Lao People's Democratic Republic, and Mongolia in striving to make significant progress in providing electricity to all schools.

Figure 7. Schools' access to electricity in Eastern and South-Eastern Asia (latest available data)



SAR = Special Administrative Region; Lao PDR = Lao People's Democratic Republic
Notes: Data are shown only for countries where information is available.
2020 data - Brunei Darussalam; Viet Nam; Macao SAR, China; Hong Kong SAR, China; Thailand; Malaysia; Lao PDR; Philippines;
2019 data - Singapore; Indonesia; Cambodia; Timor-Leste; Myanmar
2016 data - Republic of Korea (popularly known as South Korea)
Source: UNESCO Institute for Statistics (2021)

Table 8. Schools' access to electricity in Eastern and South-Eastern Asia (latest available data)

Country/Territory	Primary		Lower Secondary		Upper Secondary	
	Year	(%)	Year	(%)	Year	(%)
Brunei Darussalam	2020	100.00	2020	100.00	2020	100.00
Viet Nam	2020	100.00	2020	100.00	2020	100.00
Singapore	2019	100.00	2019	100.00	2019	100.00
Republic of Korea	2016	100.00	2016	100.00	2016	100.00
Macao SAR, China	2020	100.00	2020	100.00	2020	100.00
Hong Kong SAR, China	2020	100.00	2020	100.00	2020	100.00
Thailand	2020	99.84	2020	99.53	2020	100.00
Malaysia	2020	100.00	2020	100	2020	100.00
Indonesia	2019	94.39	2019	96.82	2019	99.22
Philippines	2020	97.54	2020	97.51	2020	97.18
Cambodia	2019	87.35	–	–	–	–
Timor-Leste	2019	84.19	2019	84.19	2019	78.71
Myanmar	2019	63.81	2018	75.59	2018	74.18
Lao PDR	2020	54.06	2020	83.77	2020	94.74
Mongolia	–	–	2016	91.88	2016	91.18

SAR = Special Administrative Region; PDR = People's Democratic Republic
Notes:
(a) "–" means no data
(b) Data are shown only for countries where information is available.
Source: UNESCO Institute for Statistics (2021)

The challenge of electrification in Philippine schools will continue for some time as previous programs have failed to address it. School electrification programs were jointly implemented by the DepEd, the National Electrification Administration (NEA), electric cooperatives, and the private sector. In 2015, the DepEd and the NEA, through the "LightEd PH" campaign, identified some 2,414 off-grid schools[10] nationwide lacking electricity access. In 2016, deliberations for the 2017 budget included these identified targets, leading to the allocation of funds in the 2017 GAA for the electrification of these schools. Subsequently, annual funds were earmarked as part of the BEF budget (DepEd-OUA 2020b). Later, the NEA identified some schools that were on-grid but without electricity connections, and these became part of the annual BEF targeting. In addition, the private sector contributed and continues to contribute to the electrification of schools, such as through the partnership between the DepEd and the One Meralco Foundation (Estabillo 2021). Despite these programs, many schools still lack access to electricity. According to DepEd, 1,562 schools still had no electricity connection as of 2020, based on the results of the DepEd's Learner Enrollment Survey Form as of July 31, 2020, and DepEd Q&A FY 2020 for SY 2019–2020.[11]

Another concern is the need to upgrade the existing electricity connections in many schools to stabilize electric current fluctuations, prevent fires, and meet the requirements of laboratory facilities such as computer laboratories. As of 2020, the DepEd reported that 39,335 schools need upgrading of their electrical connections (DepEd-OUA 2020b).

ICT access

The DepEd's comprehensive initiative to integrate ICT into basic education started in 1996 through its 10-Year Modernization Program (1996–2005). This program involved the use of ICT and the supply of computer laboratory packages in schools, aiming to improve teaching and learning processes and streamline school administration procedures. Other agencies, such as the Department of Trade and Industry (DTI) through its Personal Computers for Public Schools project and

[10] Of these 2,414 schools, 918 are last mile schools.

[11] Per discussion with DepEd Director Roger Masapol via email to authors on October 21, 2021 and DepEd's reply letter to the authors on October 25, 2021

the Commission on Information and Communications Technology through its "iSchool Project,[12] supported the DepEd in implementing the program. At the time of writing, the DepEd's major program for expanding schools' access to computers was the DepEd Computerization Program, with comprehensive guidelines outlined in DepEd Order 78 (s. 2010). The overarching goal of the program is to improve the quality of basic education, specifically addressing the computer backlog in public schools through the provision of computer laboratory packages or e-classroom packages offering training for school staff on simple troubleshooting (DepEd 2010).

Historically, the learner-to-computer ratio has served as a metric to track progress. For instance, using government data, the UNESCO Institute for Statistics in 2012 reported that Philippine public schools had a learner-to-computer ratio of 412 learners per computer in the primary school level and 49 learners per computer in the secondary school level (UNESCO Institute for Statistics 2014). However, these ratios are no longer systematically reported, given the shift in focus. The emphasis now is placed on ensuring a 1:1 learner-to-computer ratio, specifically in the ICT education classroom, acknowledging that not all classes require computers. Thus, the ICT developmental objective in the Philippine basic education sector now focuses on providing computer packages, which involves equipping the schools' computer laboratories with necessary and up-to-date hardware and software.

The first edition of the *PDP 2017–2022* highlighted the delivery of ICT equipment as one of the implementation strategies that will ensure the success of the K to 12 program (NEDA 2017). To track progress, the PDP Results Matrices included the indicator "proportion of public schools with computer packages". Table 9 presents the PDP annual targets for 2017–2022 and the accomplishments up to 2019 (latest available) for this indicator. The data showed that the annual targets were not met for both the primary and junior high school levels, with no report on the senior high school level. Additionally, there was a regression in the achievements at the junior high school level in 2018 and 2019. For primary schools, the accomplishment in 2017 was 78 percent of public

[12] The Commission on Information and Communications Technology was one of the precursors of the Department of Information and Communications Technology. Its "iSchool Project" involved giving out packages consisting of hardware (19 desktop computers), software, one year of broadband internet access, and five training programs (Foronda 2011).

primary schools with computer packages against a 95 percent target, 78 percent accomplishment against a 99 percent target in 2018, and 79 percent accomplishment against a 100 percent target in 2019. For junior high schools, the achievement in 2017 was 82 percent of public junior high schools with computer packages (a regression from the 2018 baseline of 91%) against a 95 percent target, 81 percent accomplishment against a 99 percent target in 2018, and 80 percent accomplishment against 100 percent target in 2019. The PDP Results Matrices also include broadening the schools' access to the internet. However, the indicator is only for public schools. Table 10 shows underachievement relative to the targets, with the annual targets not met in all school levels except for senior high school in 2018.

Going back to the SDG table (see Table 1), gaps in access to computers for pedagogical purposes are evident. In 2020, access rates were 81.6 percent at the elementary school level, 84.4 percent at the junior high school level, and 81.5 percent at the senior high school level. With respect to internet access, the SDG reporting showed low rates in schools: 64.2 percent at the elementary school level, 60.4 percent at the junior high school level, and 67.3 percent at the senior high school level (see Table 1).[13]

The problem remains substantial. The *Updated PDP 2017–2022* recognizes this issue in its assessment of the education sector during the COVID-19 pandemic, noting that "As flexible learning will need [to] be adopted to continue delivery of education services during the COVID-19 pandemic, issues of expensive, slow, and unreliable internet connection, and added expenses for devices needed to access online learning resources are major challenges" (NEDA 2021a, Chapter 10, p.6).

The nonachievement of targets on computer package delivery to public schools and the low internet access rates at all school levels suggest public investment problems. An examination of project-level public documents and media releases reveals that there had indeed been problems in the implementation of the DepEd Computerization Program (DCP) and the DepEd Internet Connectivity Project.

[13] Juxtaposing the SDG accomplishments versus PDP targets is not feasible as the former covers all schools, while the latter solely focuses on public schools.

Table 9. Proportion of public schools with computer packages, *PDP 2017–2022* targets versus accomplishments

Indicator	Baseline		Annual Plan Targets and Accomplishments						End of Plan Target
	Year	Value	2017	2018	2019	2020	2021	2022	
Proportion of public schools with computer packages to total number of public schools increased (%, cumulative)									
Primary (K to 6)	2015	67	Annual Plan Targets						
			95	99	100	100	100	100	100
			Annual Accomplishments						
			78	78	79	n.a.	n.a.	n.a.	
Junior high school	2015	91	Annual Plan Targets						
			95	99	100	100	100	100	100
			Annual Accomplishments						
			82	81	80	n.a.	n.a.	n.a.	

PDP = Philippine Development Plan; K to 6 = Kindergarten to Grade 6; n.a. = not available at the time of writing
Note: The 2021 Enhanced PDP Results Matrices do not include the indicator "Proportion of public schools with computer packages to total number of public schools increased". Thus, the 2019 PDP Results Matrices were used to get the annual targets for this indicator. The 2019 PDP Results Matrices do not include targets at the senior high school level for this indicator. Although the 2021 Enhanced PDP Results Matrices include internet access as another ICT indicator for monitoring, there is no accomplishment report in the 2020 StatDev monitor (latest release) for this indicator; thus, internet access is no longer included in this table.
Sources: NEDA (2019) for the targets; PSA (2020) for the accomplishments

Table 10. Internet access targets in the *PDP 2017–2022* versus accomplishments

Indicator	Baseline		Annual Plan Targets and Accomplishments						End of Plan Target
	Year	Value	2017	2018	2019	2020	2021	2022	
Proportion of public schools with internet access to total number of public schools increased (%, cumulative)									
Primary (K to 6)	2015	20	Annual Plan Targets						100
			40	60	70	80	90	100	
			Annual Accomplishments						
			32	58	62	64			
Junior high school	2015	54	Annual Plan Targets						100
			60	70	80	90	95	100	
			Annual Accomplishments						
			34	80	72	72			
Senior high school	2015	54	Annual Plan Targets						100
			60	70	80	90	95	100	
			Annual Accomplishments						
			31	72	61	67			

PDP = Philippine Development Plan; K to 6 = Kindergarten to Grade 6
Sources: NEDA (2021a, 2021b) for the targets; PSA (2020) and DepEd EMISD-PS (2022) for the accomplishments

Under the DCP, the targeting of accomplishments was based on the provision of computer laboratory packages or e-classroom packages. However, the components of a standard package vary per year, as these were defined per budget year. For instance, in 2010, DepEd Order 78 (s. 2010) standardized the requirements as follows: an e-classroom package for elementary schools consisted of 1 host personal computer (PC), 6 sets of liquid crystal display (LCD) monitors, keyboard and mouse, 2 desktop virtualization kits, 1 universal power supply (UPS) unit, 1 interactive whiteboard, 1 printer, and 1 projector; and a computer laboratory package for secondary schools consisted of 11 desktop PCs, 1 wireless broadband router, 11 UPS units, and 1 printer (DepEd 2010). Moreover, in the 2014 DCP Orientation Handbook, the packages were changed as follows: for elementary schools, the package included 1 host PC, 6 units of desktop virtualization/access terminal/thin client,[14] 1 printer, 2 units of projector, and required peripherals; and for secondary schools, the package included 8 host PCs, 42 units of desktop virtualization/access terminal/thin client, 1 printer, and required peripherals (DepEd 2014). In the 2018 DCP Orientation Handbook, for projects using the 2017 budget onwards, the packages were also adjusted: the package for Kinder to Grade 3 included 1 laptop, 1 projector, and 1 multimedia speaker; the package for Grade 4 to Grade 6 included 12 host mini-PCs, 12 sets of LED monitor, keyboard, mouse, and UPS, 2 laptops, 2 television sets, and 1 Wi-Fi router; and the package for junior and senior high school included 2 host mini-PCs, 2 UPS, 50 tablet PCs, 1 laptop, 2 television sets, 1 Wi-Fi router, and 1 printer (DepEd 2018). Software and training are included in the packages. The guidelines also allow the augmentation of equipment for schools with large student populations.

Since 2019, the DepEd has been replacing computer laboratories with "mobile laboratories", which use tablets and laptops that can be moved from one classroom to another. This approach offers several advantages, such as freeing up more space for regular classes as there is no need to dedicate a classroom for the sole use of ICT classes. Moreover, mobile laboratories can be used by different classes in shifts, minimizing

[14] A "thin client" is a computer that relies on the server rather than a localized hard drive to perform computing tasks. In using a thin client, "either a dedicated thin client terminal or a regular PC with thin client software is used to send keyboard and mouse input to the server and receive screen output in return" (PCMag n.d.)

class disruptions given that sufficiently charged laptops and tablets allow ICT classes to continue during power interruptions. Additionally, the mobile setup facilitates easier maintenance, as students and teachers can move the mobile laboratories to safe locations during typhoons and other emergencies (DepEd-OUA 2021c).

The failure to meet the targets in computer packages under the DCP drew attention from the Commission on Audit (COA) in 2019 and 2020. In its 2019 audit, the COA noted that as of December 31, 2019, the accomplishment under the DCP funded by the GAA from 2015 to 2019 was only 59.43 percent, considering that "only 8,523 schools out of the 14,342 targeted schools were provided ICT packages" (COA 2019, p.385). The audit identified several deficiencies, including nondelivery of certain ICT packages, belated completion of procurement and delivery, delay by suppliers due to typhoons and other unforeseen events, lapses in the procurement process, and partial or nonuse of certain ICT packages due to unreadiness of recipient schools. Furthermore, instances were reported where computers became unusable due to defects shortly after delivery. Yet, there were no after-sales services, and warranty privileges could not be availed of because the supplier could no longer be contacted (COA 2019).

On the readiness of schools, the DepEd requires counterpart requirements or criteria from beneficiary schools. These criteria include having an on-site, stable, and continuous electricity supply; at least one teacher assigned to handle computer education classes who can manage the computer laboratory and is willing to undergo training; at least one teacher for each subject of English, Science, and Math who is willing to be trained; the capacity to mobilize counterpart support from other stakeholders in the community for needed structures or facilities; never been a recipient of computers from other programs (e.g., DTI's PCs for Public Schools Project) unless the equipment is due for replacement and augmentation; and a strong partnership with other stakeholders to ensure the sustainability of the program (DepEd 2010). The COA reported in 2019 that its field validation revealed some schools were not ready to receive the ICT packages due to a lack of multimedia or computer rooms, proper and sufficient electrical wiring and circuit breakers, and ventilation via window grills. Moreover, although some schools have computer rooms for the ICT packages, these were not properly set up following the prescribed layout (COA 2019).

In its 2020 audit report, noting the implementation of the DCP funded by GAA from 2018 to 2020, the COA observed that as of December 31, 2020, "the DCP has a physical accomplishment of 7,555 ICT packages out of the total targeted 46,382 ICT packages delivered or an accomplishment of 16.29 percent (COA 2020a, p.484). Although the COA report included the e-textbook packages in the count of physical targets and accomplishments (7,471 are e-textbook packages, 85.45% or 6,384 of which have been delivered), the low overall accomplishment rate still signals problems in implementation. As reported by the COA, delays in procurement are a serious problem given that there were 60 to 317 calendar days of delay for the procurement activities in fiscal year 2020, which the DepEd attributed to the COVID-19 crisis and the mobility restrictions affecting the procuring entity, bidders, and suppliers (COA 2020a).

With respect to expanding schools' connectivity to the internet, the DepEd launched in 2009 the DepEd Internet Connectivity Project (DICP), which initially covered public high schools and later all public school levels. The DepEd, through its Order 50 (s. 2009), allotted MOOE funds for public schools to avail of internet subscriptions. Schools with computer laboratories were directed to connect to the internet via their local area network, while those without computer laboratories were required to have at least one computer connected to the internet (DepEd 2009). Then, in 2011, the revised guidelines included the need to assess the performance of internet service providers (ISPs) before renewing internet subscriptions, conduct public bidding if there are more than one ISP in the service area, and engage in direct contracting if there is only one ISP in the service area (DepEd 2011).

However, it had been difficult to accelerate internet access expansion for schools because, in the first place, internet coverage was very low in the country. In 2011, there were only 320 ISPs nationwide. The fixed broadband subscription rate in the Philippines was only 1.9 per 1,000 inhabitants, which was very low compared to the subscription rates of its neighbors in the Association of Southeast Asian Nations such as Viet Nam (4.3 per 1,000 inhabitants), Brunei Darussalam (5.9 per 1,000 inhabitants), Malaysia (8.8 per 1,000 inhabitants) and Singapore (27.2 per 1,000 inhabitants) (PSA 2018).

The Department of Information and Communications Technology (DICT) offered to help the DepEd expand internet access in schools

through its "Free Wi-Fi Internet Access in Public Places Project", also called *"Pipol Konek"*, and entered into a Joint Memorandum Circular with the DepEd in 2018 for this purpose (DepEd and DICT 2018). However, the Pipol Konek project had also been marred by problems that slowed down project implementation. The slow implementation of the Pipol Konek project also affected its public schools component.

Implementing the Pipol Konek project is one of the major challenges of the DICT, a relatively young government agency. In 2017, RA 10929, or the "Free Internet Access in Public Places Act of 2017", mandated the DICT, which was then a newly created agency, to implement a program that would provide free internet access in public places. The covered public places include national and local government offices, public schools, alternative learning centers, state universities and colleges, public technology institutions, public hospitals, public health centers, rural health clinics, public parks, public libraries, barangay reading centers, public airports and seaports, and public transport terminals. The law also directed the DICT to develop a comprehensive plan for the program within one year from the effectivity of the law (RA 10929). The DICT then enhanced the existing Pipol Konek project of the Department of Science and Technology (DOST)-ICT Office (one of the offices absorbed by the DICT as mandated by the law) that was launched in 2015 under the name *"Juan Konek!"* project (DOST-ICT Office 2015).

However, the implementation of the Pipol Konek project faced several setbacks, including procurement issues (e.g., local ISPs were reluctant to bid given the huge scale of the project, and international firms found it difficult to join government procurement owing to the need for a franchising license). Geographical considerations also meant that many areas must have tailor-fit technology solutions (i.e., alternatives to the prevailing fiber optic cable technology in the Philippines, which is appropriate only for geographically flat areas and not island provinces). Thus, the DICT partnered in 2019 with the United Nations Development Programme (UNDP) to accelerate the roll-out of Pipol Konek through the latter's National Acceleration Modality that applies its procurement system and partnership agreement instruments (UNDP and DICT 2019).

The agreement with the UNDP is one among three implementation modes that the DICT was using in 2019. The other modes are the DICT's

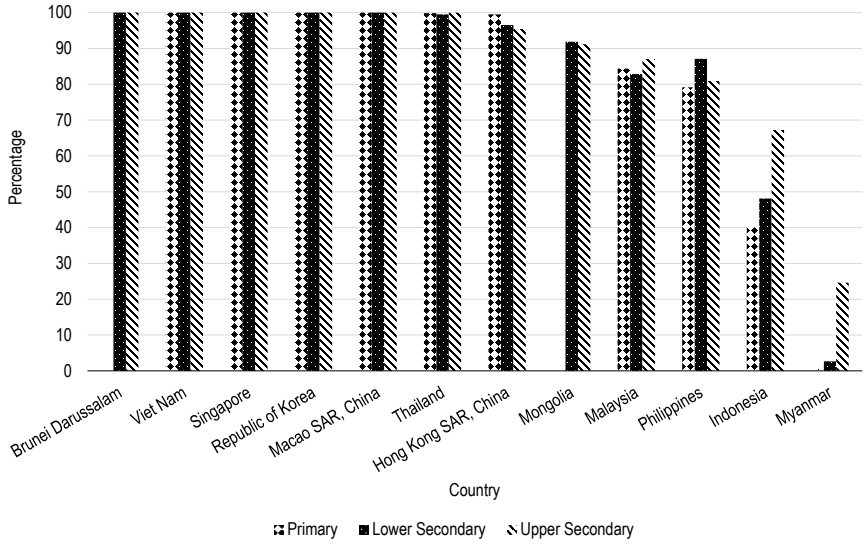
procurement of contracts with various ISPs and the use of the Philippine International Trading Corporation[15] as a procurement agent. However, all three modes performed poorly. By end-December 2019, the COA noted that the Pipol Konek project had a mere 15 percent accomplishment rate for the 2015–2019 implementation period, given that the DICT had activated only 3,251 public Wi-Fi hotspots out of the targeted 22,034 public Wi-Fi hotspots and that overall, project implementation was low in all the three modes of implementation. Many contracts for the activation of Wi-Fi hotspots were partially terminated, suspended, or not yet implemented as of audit time due to, among other reasons, procurement delays, bidding failures, supplier compliance problems, pending approvals of permits or agreements, and location or site reassessments (COA 2019).

The previous discussion shows that the poor implementation of public investments in ICT for basic education is reflected in the within-country assessment of targets and accomplishments.

Benchmarking with other countries shows that Philippine public investments in ICT for schools had indeed been inadequate. This is another important angle of how Filipino learners and future generations of workers are being shortchanged. As shown in Figure 8 and Table 11, many countries and territories across Eastern and South-Eastern Asia have already achieved universal access to computers in schools. Viet Nam, Singapore, the Republic of Korea, and Macao Special Administrative Region of China are already providing computers to 100 percent of their primary and secondary schools. Thailand is already providing computers to 100 percent of its upper secondary schools and is very close to achieving universal access for primary and lower secondary schools. Hong Kong Special Administrative Region of China is also close to achieving universal access for all school levels. Malaysia already gained universal access for its primary schools and is also close to achieving universal access for its lower secondary and upper secondary schools. Meanwhile, the Philippines is among the countries lagging behind their peers in the region in providing computers to primary and secondary schools.

[15] The Philippine International Trading Corporation is a government corporation created in 1973 with a broad mandate of serving as the country's sole state trading corporation for international trade and related activities. For many years, it has been the procurement agent of choice by many government agencies for specialized goods and services. It has a service fee of 1 to 4 percent of the government procurement contract (COA 2020b).

Figure 8. Schools' access to computers in Eastern and South-Eastern Asia (latest available data)



SAR = Special Administrative Region
Notes: Data are shown only for countries where information is available:
(a) 2020 data – Brunei Darussalam; Viet Nam; Macao SAR, China; Thailand; Hong Kong SAR, China; Malaysia; Philippines
(b) 2019 data - Singapore
(c) 2018 data - Indonesia (primary and lower secondary); Myanmar
(d) 2017 data - Indonesia (upper secondary)
(e) 2016 data - Republic of Korea; Mongolia
Source: UNESCO Institute for Statistics (2021)

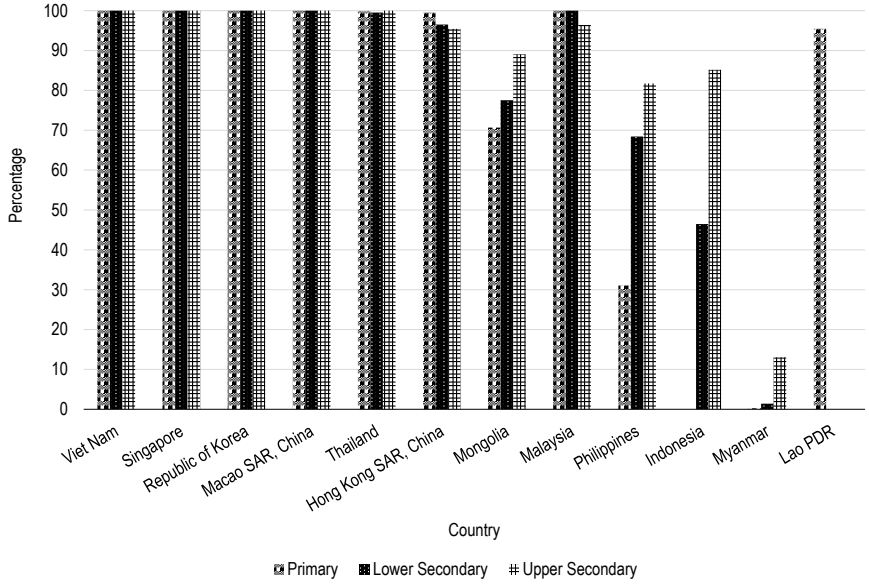
Universal access to the internet by schools has already been achieved in many countries in the region (Figure 9 and Table 11). Viet Nam, Singapore, the Republic of Korea, and Macao Special Administrative Region of China have achieved universal access. Thailand and Hong Kong Special Administrative Region of China are very close to achieving universal access. Although there is no data on secondary schools for the Lao People's Democratic Republic, it is close to achieving universal access to primary schools. There is also no data on primary schools in Malaysia, but it has already achieved universal access for lower secondary schools and is close to achieving the same for upper secondary schools. The Philippines, on the other hand, is among countries with low internet access rates in schools.

Table 11. Schools' access to computers and the internet in Eastern and South-Eastern Asia (latest available data)

Country/Territory	Computers						Internet					
	Primary		Lower Secondary		Upper Secondary		Primary		Lower Secondary		Upper Secondary	
	Year	(%)	Year	(%)	Year	(%)	Year	(%)	Year	(%)	Year	(%)
Brunei Darussalam	–	–	2020	100.00	2020	100.00	–	–	–	–	–	–
Viet Nam	2020	100.00	2020	100.00	2020	100.00	2020	100.00	2020	100.00	2020	100.00
Singapore	2019	100.00	2019	100.00	2019	100.00	2019	100.00	2019	100.00	2019	100.00
Republic of Korea	2016	100.00	2016	100.00	2016	100.00	2016	100.00	2016	100.00	2016	100.00
Macao SAR, China	2020	100.00	2020	100.00	2020	100.00	2020	100.00	2020	100.00	2020	100.00
Thailand	2020	99.84	2020	99.53	2020	100.00	2020	99.84	2020	99.53	2020	100.00
Hong Kong SAR, China	2020	99.54	2020	96.53	2020	95.45	2020	99.54	2020	96.53	2020	95.45
Mongolia	–	–	2016	91.88	2016	91.18	2016	70.66	2016	77.55	2016	89.07
Malaysia	2020	84.37	2020	82.84	2020	87.05	2020	100	2020	100	2020	96.4
Philippines	2020	79.13	2020	87.11	2020	80.89	2020	31.08	2020	68.43	2019	81.75
Indonesia	2018	40.07	2018	48.13	2017	67.23	–	–	2018	46.48	2018	85.17
Myanmar	2018	0.51	2018	2.66	2018	24.61	2018	0.23	2018	1.40	2018	13.05
Lao PDR	–	–	–	–	–	–	2019	95.49	–	–	–	–

SAR = Special Administrative Region; Lao PDR = Lao People's Democratic Republic; "–" = no data
Note: Data are shown only for countries with available data.
Source: UNESCO Institute for Statistics (2021)

Figure 9. Schools' access to the internet in Eastern and South-Eastern Asia (latest available data)



SAR = Special Administrative Region; Lao PDR = Lao People's Democratic Republic
Note: Data are shown only for countries with available data:
(a) 2020 data for Viet Nam; Macao SAR, China; Thailand; Hong Kong SAR, China; Malaysia; Philippines (primary and lower secondary)
(b) 2019 data for Singapore and Lao PDR (primary); Philippines (upper secondary)
(c) 2018 data for Myanmar and Indonesia (lower secondary and upper secondary)
(d) 2016 data for Republic of Korea and Mongolia
Source: UNESCO Institute for Statistics (2021)

Policy Insights and Ways Forward

The benchmarking against targets and comparison with other countries' indicators revealed where the gaps are in the provision of school infrastructure in the Philippine basic education sector. With respect to classrooms, there has been progress in decongesting schools, but spatial inequality in classroom-student ratio still exists and must be addressed. Spatial inequality is evident given the congested classrooms in NCR, Region IV-A, Region XI, and BARMM. Moreover, additional classrooms are needed given that school buildings in last mile schools need to meet quality and safety standards, enrollment is increasing, and existing classrooms deteriorate due to wear and tear and natural calamities.

In terms of WASH facilities, the gaps are huge and become more evident when benchmarked against other countries. The Philippines is lagging behind most countries in the Eastern and South-Eastern Asia region in providing WASH facilities to schools, even when compared with neighboring countries that have lower per capita income. With respect to schools' access to electricity, many countries in the Eastern and South-Eastern Asia region have already achieved universal access. Yet, the Philippines still struggles to complete the electrification of schools. This challenge is compounded by the need to upgrade the electricity connections of schools to stabilize electric current fluctuations and meet digital learning requirements. The continuing problems with electricity access and quality of electric connection worsen the digital divide in Philippine schools. ICT is another area where the gaps are huge. Computer package delivery targets were not met, and to make things worse, the percentage of schools with computer packages declined. Unlike many of its neighboring countries, Philippine schools have low computer and internet access rates. Moreover, efforts to increase access rates have been marred by poor implementation of ICT infrastructure programs in schools.

To help address these school infrastructure gaps, this study offers the following actionable recommendations:

- **Expand the school investment programs and reinforce them with policies.** The results of the assessment of all school infrastructure indicators in this study imply the need for more investments in school infrastructure. In addition, the COVID-19 pandemic highlighted urgent action in certain areas of school infrastructure. Classroom standards need to be adjusted to incorporate good ventilation. Programs on WASH facilities need to be scaled up to support disinfection and disease transmission prevention. Adequate ICT infrastructure and reliable electricity access are imperative to support distance learning and blended learning modes. At the department level, policies should address investment requirements, innovative financing approaches, and improved implementation strategies. Moreover, legislative proposals that promote and fund inclusive approaches must be actively supported.

- **Interpret the full devolution of school infrastructure provision to LGUs more flexibly and broadly and extend the coverage to other facilities aside from classroom construction.** The full devolution prescribed by Executive Order (EO) 138 (s. 2021) as an offshoot of the implementation of the Supreme Court ruling on the Mandanas-Garcia case introduces complexity in addressing investment requirements through public sector spending. The implementation of the Supreme Court ruling increasing LGUs' just share in national taxes beginning fiscal year 2022 reduced the national government's budget envelope for some programs, including school infrastructure. For instance, the BEF budget of the DepEd decreased from PHP 11.15 billion[16] in the GAA 2021 to PHP 5.95 billion[17] in the GAA 2022. EO 138 directs that those devolved functions outlined in the Local Government Code of 1991 (RA 7160) must be fully devolved by national government agencies to LGUs. In the case of the DepEd, the implementing guidelines of EO 138 provide that, based on the Local Government Code, public spending for the following shall be specifically devolved to municipalities: school buildings, other facilities in public elementary and secondary schools, and information services (including public library maintenance). In addition, public spending for information and reading centers shall be devolved to barangays.[18] Hence, EO 138 already provides the policy for utilizing LGUs' increased share in national taxes in a way that addresses school infrastructure needs. Its coverage should not be interpreted as limited to classroom construction, given that the implementing guidelines cover "other facilities".

[16] See the DepEd budget in Republic Act 11518 or the General Appropriations Act Fiscal Year 2021.

[17] See the DepEd budget in Republic Act 11639 or the General Appropriations Act Fiscal Year 2022.

[18] See Annex C of the Department of Budget and Management and Department of the Interior and Local Government Joint Memorandum Circular No. 2021-1 dated August 11, 2021 - Guidelines on the Preparation of Devolution Transition Plans of Local Government Units in Support of Full Devolution under Executive Order No. 138, Dated 01 June 2021.

Going forward, policy improvements can focus on targeting, prioritization, equity, monitoring, and public accountability.

- **Implement a geographic information system-based monitoring of needs vis-à-vis spending, results, outcomes, and gaps to improve monitoring.** There is no easy way of knowing if the LGUs' increased share in national taxes will be enough for the devolved services or if, indeed, the LGUs will prioritize school infrastructure in their spending and how much national government support will still be needed. Thus, geographic information system-based monitoring of school infrastructure needs vis-à-vis spending, results, outcomes, and gaps is crucial. For monitoring to be effective, it must be participative and transparent, and access to key indicators must be used openly. It should be noted that the *PDP 2017–2022* promised this: "An open and comprehensive database of education infrastructure statistics will be developed and updated regularly by DepEd to aid in monitoring and evaluation activities. This will enhance planning, programming, and budgeting for basic educational facilities" (NEDA 2017, p.309). At present, the DepEd has the Basic Education Information System (eBEIS), but it is not entirely open, or there is no open version of it. The eBEIS is operating as a limited-access database within the DepEd. An open version of at least the database on main school infrastructure indicators will be useful for policymakers, potential partners in the private sector, and the communities where the schools are located.
- **Engage more LGUs in accelerating investments and address the equity aspect by leveraging the expanded use of the SEF.** The SEF of LGUs is another source of funding for school infrastructure investments. Previously, the law (RA 7160) prescribing the collection of the SEF surcharge on real property tax was thought to be very restrictive when it came to the use of the proceeds. Thus, legislative proposals were submitted to clarify and expand the coverage (e.g., Senate Bill 396 in the 18th Congress). However, it turned out that

a department-level policy can substitute for the legislative proposal. Thus, Joint Circular 2 (s. 2020) was issued by the DepEd, DBM, and the Department of the Interior and Local Government (DILG) to clarify the expense items that are allowed, among other provisions. The allowed expense items under operation and maintenance of public schools include external storage devices for digital files, communication expenses like mobile phone load and Wi-Fi connection, subscription fees for remote applications or platforms, and health and sanitation expenses. The spending for the construction and repair of school buildings also includes the installation of health facilities like health clinics and wash areas. The spending for facilities and equipment includes personal computers and ICT devices. This policy on expanding the coverage of SEF expense items presents an opportunity to engage more LGUs in accelerating public sector investments in school infrastructure. Future policy improvements should focus on equity and monitoring. The equity aspect needs improvement, as the size of the SEF of LGUs may not be commensurate with the needs of their constituents in the basic education sector. Since the SEF is a surcharge on real property tax, high-income LGUs with high valuations of real properties receive higher SEF, while low-income LGUs with low valuations of real properties receive lower SEF. As input to the equity assessment, monitoring of needs, targets, accomplishments, results, and gaps should be undertaken.

- **Utilize PPPs to ramp up school infrastructure investments while contextualizing the financing mode based on needs and options, factoring in lessons learned from PPP experiences here and abroad, and ensuring that the PPP mode internalizes pedagogical capacity building within the education system.** PPPs and other modes involving the private sector are another strategy for accelerating investments in school infrastructure. The PPP mode has already been tested in classroom construction, and it may be resorted to once again if the DepEd would pursue it. However, it is crucial to heed the lessons learned from the previous

implementation experiences. There are also PPP models for ICT in education that can be studied. A study by the Asian Development Bank explains that the following ICT for education services lend themselves to a PPP approach: "providing connectivity; providing centrally managed systems; providing fit-for-purpose online systems; providing ICT hardware and software; managing online professional development systems; delivering preservice and in-service professional development opportunities and support personnel; setting up and running online communities of practice; providing access to repositories of digital knowledge; making educational resources and tools electronically accessible; and providing access to online and distance learning courses" (Sarvi et al. 2015, p.2).

However, pursuing a PPP approach in ICT for schools does not always guarantee success, especially if outsourcing will distort incentives for building pedagogical capacity in ICT. To illustrate, in Gurumurthy's (2010) case study of two neighboring Indian states, a comparison between the PPP approach using the build-own-operate-transfer (BOOT) scheme in a centralized model and an integrated approach using government implementation in a decentralized manner revealed the shortcomings of the centralized BOOT model. The BOOT model employed in Karnataka State's Mahiti Sindhu program did not yield significant outcomes as vendors, primarily selected based on the least cost principle, had shoddy hardware maintenance support and poorly paid deputized computer instructors. In contrast, the integrated approach in Kerala State's IT@Schools program was more successful in terms of computer-per-learner availability, teacher engagement, and cost efficiency, among other indicators. The computers used free and open source software (FOSS) rather than preloaded operating systems like Windows and software like Microsoft Office. The use of FOSS allowed the state department of education to interface with the local language and bundle hundreds of educational applications for free, redirecting savings toward in-house capacity building rather than vendor expenses. The training outsourcing was done for the master trainers only, an intensive in-house capacity

building was conducted, and the ICT training was made an integrated activity of the school support system. Moreover, rather than viewing "computer education" as an additional subject and, therefore, an additional workload for teachers, it was considered part of the educational process and handled by the teachers as essential in all other curriculum components. In 2017, Kerala's IT@School project was institutionalized, transforming it into a government corporation known as Kerala Infrastructure and Technology for Education. This special purpose vehicle was established to facilitate funding from the Kerala Infrastructure and Investment Fund Board (Express Web Desk 2017). This experience in India shows that pursuing a PPP model in ICT for schools should be studied very carefully.

To have an informed adoption of available PPP models, there should first be a comprehensive assessment of the needs and options for investment and financing, such as the approach proposed in the Public Schools of the Future in Technology Act (House Bill 10329 in the 18th Congress). As contemplated in the bill, the options are public spending, PPP models in accordance with applicable laws, and partnerships with nonprofit entities, civil society, business and industrial sectors, and other concerned sectors.

A successful model for private sector participation in the Philippines is the Gearing Up Internet Literacy and Access for Students (GILAS) program. Initiated by a consortium composed of the Ayala Foundation, Ayala Corporation, Ayala-led Globe Telecom, Integrated Micro-electronics, Inc., American Chamber of Commerce, Apple, Bato-Balani Foundation, Bayan, Digitel, GMA-7, HP, IBM, Intel, Makati Business Club, Microsoft, Mitsubishi Corp., Narra Venture Capital, PBSP, Philstar, PLDT-Smart, and SPI, the GILAS program provided computer packages, internet peripherals, and training support to public high schools for six years until it was turned over to the DepEd in 2011 (Ronda 2011). Although it has been called a PPP model, the GILAS program is not a PPP modality contained in RA 6957 and RA 7718 but

an arrangement that can be deemed as a corporate social responsibility (CSR) activity. The experience in the GILAS program demonstrates how CSR can be effective in augmenting public investments in ICT for schools. The strategy can be extended to investing in water supply and sanitation facilities in schools, which can be promoted as a worthwhile undertaking in CSR activities or as part of the environmental, social, and governance scorecards of private firms.

Private sector participation in ICT for education can also be accelerated through policies that liberalize market access, such as the recently issued EO 127 (s. 2021) and the proposed Open Access in Data Transmission Act. EO 127 on "Expanding the Provision of Internet Services through Inclusive Access to Satellite Services, Amending EO 467 (s. 1998) for the Purpose," liberalized access to satellite services, allowing not only telecommunication companies but also value-added service providers and ISPs to directly access all satellite systems for building and operating broadband facilities. The proposed Open Access in Data Transmission Act aims to enable data transmission infrastructure sharing and co-location. It was filed in the 18th Congress as House Bill 8910, Senate Bill 45, and Senate Bill 911.

It cannot be overemphasized that both the public and private sectors must assume responsibility for improving the students' learning environment through better and adequate school infrastructure. After all, a good learning environment is a good investment. It results in better student learning outcomes today and higher productivity of workers in the future. It is an important component of human capital development, which, in turn, drives endogenous economic growth. The fact that the Philippines' Human Capital Index has deteriorated in recent years means that the country has not been investing enough in human capital development. Recognizing this is the first step toward reversing the deterioration. Taking urgent action is the next one.

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This study assesses the adequacy of school infrastructure in the Philippine basic education sector while benchmarking it against developmental targets and other countries' performance. It finds that with respect to classrooms, there has been progress in decongesting schools, but spatial inequality in the classroom-student ratio persists and requires attention. Spatial inequality is evident, given the congested classrooms in some administrative regions. Moreover, additional classrooms are needed, given that school buildings in certain remote areas do not meet quality and safety standards, enrollment is increasing, and existing classrooms deteriorate due to wear and tear and natural calamities. In terms of water, sanitation, and hygiene (WASH) facilities, the gaps are huge and become more evident when benchmarked against other countries. The Philippines is lagging behind most Eastern and South-Eastern Asian countries in providing WASH facilities to schools, even when compared to neighboring countries with lower per capita incomes. Schools' access to electricity is also an issue. Many countries in the Eastern and South-Eastern Asia region have already achieved universal access, yet the Philippines still struggles to complete the electrification of schools. This challenge is compounded by the need to upgrade the electricity connections of schools to stabilize electric current fluctuations and meet digital learning requirements. Information and communications technology (ICT) access is another area where the gaps are huge. Computer package delivery targets were not met, and to make things worse, the percentage of schools with computer packages declined. Philippine schools have low computer and internet access rates, unlike those in neighboring countries that have achieved universal access to computers and the internet. Moreover, efforts to increase computer and internet access rates have been marred by poor implementation of programs for ICT infrastructure in schools. All these imply the need to invest more in school infrastructure and pursue policy improvements. Both the public and private sectors must assume responsibility for improving the students' learning environment through adequate and quality school infrastructure. After all, a good learning environment is a good investment, resulting in better student learning outcomes, higher productivity of workers in the future, and higher potential for endogenous economic growth.

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