Teacher Education Subsector Analysis Report

For the strategic upgrade of basic teacher qualifications to the degree level

February 2019

The JICA Project for Establishing Foundation for Teacher Education College

E-TEC

Contents

Abbreviations

ACC	Accreditation Committee of Cambodia
BA	Bachelor of Arts
CPD	Continuing Professional Development
E-TEC	The Project for Establishing Foundations for Teacher Education College
HEI	Higher Education Institution
INSET	In-service education and training
JICA	Japan International Cooperation Agency
LS	Lower Secondary
MA	Master of Arts
MoEYS	Ministry of Education, Youth and Sport
NIE	National Institute of Education
NIPES	National Institute of Physical Education and Sport
PGCE	postgraduate certificate of education
PRESET	Pre-service education and training
PSTTC	Preschool Teacher Training Centre
PTTC	Provincial Teacher Training College
RTTC	Regional Teacher Training Centre
TPAP	Teacher Policy Action Plan
TEC	Teacher Education College
TEI	Teacher education institution
TEPS	Teacher Education Provider Standards
TTC	Teacher Training Centre
US	Upper Secondary

Introduction to the report

1. Background of the report

One of the key reforms planned in Education Strategic Plan (ESP) 2014-18 was to upgrade pre-service teacher education. It declared that:

- From 2020, pre-service training for pre-school, primary school, and lower secondary school teachers will follow formula 12+4 or bachelor+1. Pre-service training for higher education teachers will be changed from bachelor+1 to Master degree +1.
- From 2020, all newly recruited teacher holding at least bachelor degree.

(MoEYS 2014, page 55, sic)

The Education Strategic Plan (ESP) 2014-18 recognised the importance of teachers for quality education. With an ambition to drastically improve the quality of teachers, the MoEYS developed Teacher Policy (MoEYS, 2013) aiming at the complete overhaul of the systems concerning teachers, and outlined the broad policy goals, objectives and general strategies. Teacher policy and ESP were followed by the development of the Teacher Policy Action Plan (TPAP) in 2015, which envisaged comprehensive reforms to tackle with wide-ranging issues related to teachers. Teacher qualification upgrade was one of the biggest challenges listed in it.

Teacher Policy Action Plan (TPAP) was formulated to provide clearer direction for systemic reform and implementation, and outlines the following four key objectives.

1. To attract and motivate competent persons into the teaching profession.
2. To ensure quality of pre-service teacher training.
3. To ensure regular professional development and in-service training for teachers.
4. To ensure the conditions necessary for teachers to fulfil their professional activity effectively and efficiently

The central strategy of TPAP with regard to teacher education is to upgrade the required qualification level, saying that “one of the most urgent tasks for pre-service and in-service provision is to ensure opportunities for as many teachers as possible to reach the new BA equivalency” (MoEYS 2015, p.6).

The TPAP further plans to establish two TECs in Phnom Penh and Battambang, and the 12+4 and the BA+1 preservice teacher training (PRESET) programmes will be implemented from the academic year 2018-19. MoEYS has not yet developed detailed strategies and a roadmap to roll out the degree programmes other than those two TECs.

In this context, Japan International Cooperation Agency (JICA) supports the efforts of MoEYS to transform 2-year Teacher Training Centres (TTCs) into 4-year Teacher Education Colleges (TECs), mainly focusing on primary and lower secondary school level in Phnom Penh and Battambang. Grant aid for TEC construction and scholarship programmes for future TEC lecturers are also planned in parallel with the technical cooperation.

This report is prepared by the Project for Establishing Foundations for Teacher Education College (E-TEC), a JICA’s technical cooperation project. The purpose of this study is to examine issues concerning upgrading teacher education to facilitate discussions within the MoEYS for developing a plan to roll out degree programmes to the whole country beyond Phnom Penh and Battambang.

2. The current system and issues

2.1. Teacher education system

Currently Cambodia prepares school teachers in teacher education institutions. Pre-school teachers are trained at the Preschool Teacher Training Centres (PSTTC) in Phnom Penh, primary teachers at 18 Provincial Teacher Training Colleges (PTTCs), lower-secondary (LS) teachers at 6 Regional Teacher Training Centres (RTTCs), secondary physical education teachers at the National Institute of Physical Education and Sport (NIPES) in Phnom Penh, and upper secondary (US) teachers at the National Institute of Education (NIE) in Phnom Penh. From pre-school to LS, the current teacher qualification requirement is two years of PRESET after obtaining a upper secondary school graduate certificate, called "12+2". The Ministry of Education, Youth and Sport is planning to uplift the minimum requirement to the bachelor's degree level. The table below summarises the institutions and requirements. It needs to be noted that they prepare public school teachers only, and there is no institute in Cambodia that has seats for preparing teachers for private schools.

Table 0.1 Teacher Training Institutions in Cambodia

	PSTTC	PTTC	RTTC	NIPES	NIE
Number	1	18	6	1	1
Level of teachers prepared	Pre-primary	Primary	Lower secondary	Physical education	Upper secondary
Entry qualification	Pass of upper secondary graduation exam (G12 national exam) [1]				BA
Entry examination	Yes				
Training period	2 years				1 year

2.2. Issues concerning teachers

This section briefly discusses problems that are frequently raised concerning teachers in Cambodia. Much of the TPAP activities are suggested as responses to these perceived problems. The list is not exhaustive but shows key issues that frequently appear in policy discussions. It is also important to interrogate how the issues around teachers are perceived and framed as these tend to limit subsequent thoughts and actions.

[1] Some PTTCs accept G9 (LS) graduates instead of G12 from some remote areas where there is not enough G12 graduate applicants.

Table 0.2 Frequently raised issues concerning teachers in Cambodia

Category	Sub-category	Problems frequently raised
Teacher quality	Candidates	Quality of candidates are low
		Teaching profession is not attractive enough for high calibre students
		University students/graduates only apply for upper secondary teachers
	PRESET	Standards of PRESET curriculum is low
		Practicum is weak
		Professional knowledge and skills of teacher educators are low
	In-service teachers	Continuing Professional Development (CPD) opportunities are limited
		Teacher status and salary is not high
		Teacher behaviour problems (e.g. absenteeism)
		Lack of proper career structure
		Outflow of teachers to upper level of schools
Teacher quantity	Teacher shortage	Shortage in specific subjects
		Shortage in rural and remote areas
		Double shift and contract teachers to compensate shortage
		Oversize classes
	Teacher surplus	There are surplus teachers in some areas (e.g. Phnom Penh) and subjects (e.g. Khmer), but re-deployment is extremely difficult
	Teacher supply	PRESET plan is not based on the precise data of teacher shortages
		Teacher supply is not based on a long-term analysis and plan
	Deployment	There is not an effective strategy to improve the state of teacher deployment

3. About this report

3.1. Objective

This report is a multi-dimensional analysis concerning lifting the qualifications of primary and lower secondary teachers to a bachelor's degree level. The Ministry of Education, Youth and Sport does not yet have an agreed plan beyond piloting it in Phnom Penh and Battambang. With the aim of contributing to the development of an evidence-based rollout plan, this report provides analysis of the teacher education system and a projection of teacher demand. In other words, this report does not intend to develop a policy, but to propose policy recommendations and strategy options for supplying sufficient number of teachers with upgrading teacher qualification.

3.2. Limitations

Although MoEYS prepares teachers from pre-primary to upper secondary, this paper focuses on teacher education for basic education levels, i.e. primary and lower secondary. Pre-primary and upper secondary is out of scope. Likewise, the content of learning in the ongoing teacher education programmes are not discussed.

3.3. Guiding principles

This report is prepared under the following guiding principles.

- It promotes evidence-based policy discussions. Evidence is drawn from various sources including data, other countries' experiences, and academic literature.
- Where appropriate, it tries to come up with the policy recommendations or policy options based on the discussions.

3.4. Structure of the report

This report consists of the following three parts.

A) Review of the existing PRESET system in terms of qualification upgrade to the BA level
B) Demand supply analysis on primary and lower secondary teachers in the next decade based on the projection of teachers and students up to the year 2030
C) Recommendation of policy, strategies, and actions that MoEYS can take to achieve teacher qualification upgrade in the next decade, based on the above projection

Part A. Review of the existing PRESET system

1. The current goal and plan

TPAP, multi-dimensional teacher policy reform, is under way in Cambodia. There are many related aspects to the ongoing reform, some of which are still under debate. It is sometimes difficult to see the connection between different discussions. To re-examine the reform to upgrade PRESET to bachelor level in a wider context, this chapter attempts to unpack the entangled current discussions, to reorganise and map out related issues, and to come up with policy recommendations.

Most of the analysis in this section is not new to the readers who have been involved in the policy discussion in MoEYS. Rather, this analysis is guided by the questions and discussions among colleagues and stakeholders in the past year. Issues being discussed in relation to upgrading PRESET to a degree level include the following.

- Who provides PRESET? Should universities become PRESET providers?
- What happens to the post-guarantee system? Will there be selection at hiring?
- How many teachers do we need to train?
- Is there a shortage or surplus of teachers? Where? In which subjects?
- How about training teachers at private school?
- What are the incentives to pursue degrees in teaching?
- What happens to other RTTC/PTTCs?... etc.

This part of the report attempts to make some contributions to those debates.

1.1. Policy targets

We first review the policy statements. The Education Strategic Plan 2014-2018 (MoEYS, 2014) sets the target as follows:

> 5.1.2.2 Policy objectives (Education Strategic Plan 2014-2018, p.55)
> - From 2020, pre-service training for pre-school, primary school, and lower secondary school teachers will follow formula 12+4 or BA+1. Pre-service training for higher education teachers will be changed from BA+1 to MA+1.
> - From 2020, all newly recruited teacher holding at least a bachelor's degree.

These targets are partially operationalized in the TPAP (see Table A-1). With the support from the E-TEC project, the 12+4 PRESET curriculum (TPAP activity 3.1.2.1) is prepared, and the implementation of the 12+4 programmes is scheduled to start in Phnom Penh and Battambang in the 2018/19 academic year (TPAP activity 3.1.3.1). Note that the degree-level PRESET of basic education teachers is planned as a "pilot" in Phnom Penh and Battambang and the roll out beyond these two areas is not mentioned in the TPAP.

However, it is not realistic to upgrade all the PRESET graduates to the degree level by 2020 as planned in ESP 2014-18, because other than TECs there are no teacher training mechanisms to produce BA teachers. Therefore, these targets need to be revised and a new implementation plan needs to be developed. The delay in preparing such mechanism has caused the situation that 2 PRESET models, 12+2 and 12+4, will co-exist from 2018, which makes the transition process more complicated. It is important to develop a clear transition management strategy and consult it with the stakeholders including all the RTTCs and PTTCs.

Table A-1 TPAP activities (Upgrading PRESET)

	Programs		Activities	Indicators	Deadline
3.1.2	Revise PRESET curriculum across all levels	3.1.2.1	Create B.Ed. (12+4) PRESET curriculum for Grade 12 graduates to become Basic Education teachers in RTTCs focussing on Psycho pedagogy, ICT, methodology, foreign languages, Maths and Science	Curriculum Completed	2017 Q3
		3.1.2.2	Create BA+1 PRESET curriculum for BA holders to become Basic Education teachers in RTTCs focussing on Psycho-pedagogy, ICT, methodology, foreign languages, Maths and Science	Curriculum Completed	2017 Q3
3.1.3	Introduce upgraded PRESET programs based on TEPS	3.1.3.1	Pilot B.Ed. (12+4) PRESET at two RTTCs with technical support from HEIs	- Develop Pilot Plan - Pilot commences in PP and BB	2018 Q3
		3.1.3.2	Pilot BA+1 PRESET at two RTTCs with technical support from HEIs	- Develop Pilot Plan - Pilot commences in PP and BB	2018 Q3

Source: MoEYS 2015, p.11

1.2. PRESET provider

1.2.1. "Closed" versus "Open" PRESET System

What characterises Cambodia's PRESET is its strong central planning in a "closed" system. The government directly manages PRESET providers, decides the number of entrants, and gives students teaching posts at graduation. In a nutshell, it is a system of preparing public servants. This system used to be widely found in Asian countries, but many countries have switched to more "open" system (e.g. 1953 in Japan, 1993 in China, 1994 Taiwan). Along with the discussion of upgrading the PRESET to degree level in Cambodia, some argue for opening-up the PRESET system. A consensus, however, does not seem to be reached. This section attempts to review the discussions.

Although the terms "open" and "closed" PRESET system do not seem to be widely recognised in the literature, we use these terms in this report for convenience. We tentatively define these terms as follows:

Closed system: System with a strong central planning. Typically, a limited number of teacher education institutions under the direct control of the government are the sole PRESET providers. Government controls the number of entrants and all/most of the graduates become teachers. Often the government pays the costs.

Open system: Many institutions, both public and private, provide PRESET on condition of obtaining a government permission. Typically, the number of students who go through PRESET is not strictly controlled and the selection needs to be done at certification and/or at the point of hiring.

Many countries have experienced the transition of teacher preparation from post-secondary education (12+2) to higher education, and from a "closed" to an "open" system, in the process of economic development that increases the number of students. So far as Cambodia continues to develop and employ a market economy, it seems inevitable that it will follow this path. In this vein, it is recommended to start preparing for the future within an "open" system.

There are advantages and disadvantages with both systems. The merit of a "closed" system is its easiness of planning and management because the government has strong control over the PRESET system and there is a direct link between PRESET and deployment of teachers. It is also possible to use financial resources efficiently by concentrating them on specific PRESET providers and granting scholarships and fee exemptions to targeted groups of students. Moreover, if the number of teachers is insufficient and the social status of teachers is not high, a "closed" system is more effective in securing applicants due to job security.

On the other hand, an "open" system diversifies the entry routes to teaching job and expands the teacher candidate population. Upon graduating from PRESET, selection is done through teacher license and/or teacher recruitment exams, which assure the quality of teachers. However, the premise in this case is that the social status and popularity of teachers in society are relatively high, that many students wish to apply to become teachers, and that the selection of good quality teachers from the pool of candidates at recruitment is practically possible. One problem of an "open" system is the wasted investment in PRESET on the side of universities (and by the government in the event that it is subsidised) as well as on the side of students. Many students who take PRESET at university do not necessarily apply to teaching profession. This means that universities have to offer a number of course subjects for those who may not become teachers. Students also have a risk of investing in PRESET but of then failing to pass the recruitment test. The total cost of preparing teachers is higher within the "open" system.

Although not exhaustive, some traits of "closed" and "open" system are listed in Table A-2 below.

Table A-2 Closed vs Open system

Domain	Closed System	Open system
Providers	Government institutions and other certified HEIs	HEIs that can offer PRESET programmes according to the regulations given by the government
Process to be a teacher	Completing PRESET → Appointed as a teacher of a certain school	Completing PRESET → Getting the certificate → Applying to each province → Appointed as a teacher (*Creating a pool of teaching certificate holders)
Government's control	Central policymakers' strong control over a whole process	Less government's control over students, applicants, and providers
Initial/running cost for the government	More government's expenditure to provide all the necessary physical facilities and human resources	Less government's expenditure to provide the minimum level of physical facilities and human resources
Equity in teacher distribution	Strong central control over the deployment of new PRESET graduates	Weak central control, often resulting in teacher shortages in rural provinces and certain subjects
Systemic flexibility	Less flexible: If once the number of institutions is increased, it will be difficult to reduce the number of institutions and staff when the teacher demand is shrunken.	More flexible: It does not matter if the teacher supply much exceeds the teacher demand because the remaining PRESET graduates will go to a pool of teaching certificate holders.
Quality control	At the entrance to, and the completion of PRESET institutions	At the entrance to, and the completion of PRESET institutions, and at the application to a province

It shows that they are mirror image: one system's advantage is another's disadvantage.

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In turn, we consider the benefits and risks of introducing the open system in Cambodia now.

Potential benefits of introducing an "open" system include:

- The quality of newly produced teachers is controlled not only at the entrance and completion of teacher education institutions, but also at the teacher selection in each province.
- The government's expenditure to prepare teachers will be less because the number of teacher training institutions, and so the number of teaching/non-teaching staff, will be minimised.
- It does not matter if the teacher supply much exceeds the teacher demand because the remaining PRESET graduates will go to a pool of teaching certificate holders.

Potential risks and necessary considerations of introducing the open system include:

- There is a risk of widening the disparity between urban/rural and privileged/under-privileged areas in terms of teacher quality and quantity. Under the open system, students are free to apply for any province/post and urban and privileged areas are more likely to attract more and better applicants. Moreover, it may be more difficult for students from underprivileged areas to go to university and compete with other students without the current support of a protected mechanism, which may exacerbate teacher shortages in those areas.
- The government's control over the process is weak in the open system, which may result in (i) lowering the level of teacher education in certified HEIs unless those institutions keep making efforts to maintain the quality, and (ii) causing a demand-supply gap in some subjects that those certified HEIs are unable to offer.

- The introduction of the open system reduces job security, which may result in a drop in the number of students applying for PRESET. It thus requires changing the meaning of the participation in PRESET programmes from "to be a school teacher" to "to get a teaching certificate", and adding a value to a teaching certificate as a prerequisite in applying for a teaching job both in public and private sectors.

Overall, there needs careful consideration to introduce the open system. Proper planning and preparation are crucial for the successful transition. Moreover, introducing it simultaneously with upgrading PRESET to the degree level may make difficulties more complicated. Therefore, this study recommends introducing the open system at a later stage at when the following conditions are met:

- **[Teaching certificate]** The open system produces teachers more than necessary. So before introducing the open system, MoEYS need to introduce a teaching certificate system to create a pool of certificate holders in each province and provide a variety of job opportunities for successful PRESET graduates.
  (Relevant actions:) Decentralizing the teacher recruitment system and separating teacher selection/deployment from PRESET graduation
- **[Teacher shortage]** There are teacher shortages in some geographical areas or subjects, and there are not likely to be enough applicants in those areas and subjects under the open system. Thus, MoEYS should fulfil the gap between teacher demand and supply before introducing the open system.
  (Relevant actions: providing targeted scholarships for the areas and subjects where the number of teachers is not enough)
- **[Legal framework]** While the open system requires common rules and regulations that are applied to those HEIs who offer PRESET programmes, there only is TEPS as common standards. The ministry thus should formulate common rules that stipulate what are studied in PRESET programmes and how many credits for each category of teachers.
  (Relevant actions: formulating teaching certification laws)
- **[HEIs]** Only a limited number of HEIs satisfy the conditions given by TEPS. The ministry needs to encourage more HEIs, particularly those in rural provinces, to be involved in teacher education to provide PRESET.
  (Relevant actions: stopping students' allowances and introducing a "beneficiaries pay principal", providing subsidies to certified HEIs to implement PRESET where necessary)

The introduction of the open system requires radical systemic changes. It needs to spend several years for careful planning and preparation before implementation.

Box 1.1 Transition to an "open" system in Taiwan

In Taiwan with a population of 23 million people, teachers have enjoyed traditionally high social status. That can be attributed to Confucianism that teaches respect to teachers, but more importantly, since the 1950s the government had given favorable treatment to teachers in terms of salary and pensions.

Till mid 1990s PRESET in Taiwan employed a "closed" system where primary school teacher (including private) PRESET was limited to nine teacher training institutions and secondary teacher (including private) PRESET was limited to three teacher training institutions. By limiting teacher training to these 12 institutions, it was possible to waiver tuition fees. The number of students recruited for teacher training was planned according to the population of school-age children. Teacher education institutions were very popular as future teaching jobs were guaranteed by enrolment.

Due to its popularity, universities judged that provision of teacher training would acquire them a good social reputation and would attract students with higher academic ability. Their voice became strong. After 1994, teacher-related laws were revised, and general universities were permitted to start PRESET. General universities bear the expenses of opening PRESET programs, and according to the beneficiaries-pay principal, they charge PRESET fees in addition to the conventional tuition fees.

Because of the large number of PRESET applicants, the government allocates seats to each university to limit the number of PRESET students. By doing so, the number of people participating in the teacher recruitment exams was controlled. The government also adjusts the number of seats to allocate according to the recruitment exam pass rate. Although such an open system adopts the principle of improving and maintaining the quality of teachers by competition, it also creates a social problem that most applicants cannot become teachers as the pass rate of the teacher recruitment exam is as low as 2%. This may be seen as inefficient from the macro human resource development viewpoint.

In sum, the shift to an "open" system in Taiwan was made possible by the popularity of teaching jobs. After the quantitative expansion of teachers was complete, Taiwan had shifted to an "open" system in order to further raise the quality of teachers. By expanding the routes into teaching, the popularity of teachers was further enhanced. After PRESET, students are required to pass a test to acquire a teacher's license and to pass the teacher recruitment exam, which strengthened the quality assurance mechanisms. However, competition was intensified, and the government has taken various countermeasures including restricting the number of students to enrol in PRESET and collecting additional tuition fees for PRESET. Furthermore, by doing six-months of teaching practice after graduating from university, only students who are committed to becoming teachers apply for PRESET. To this day many young people aspire to be teachers in Taiwan.

1.3. PRESET model

1.3.1. Concurrent and consecutive models of initial teacher education

Although the Education Strategic Plan as well as the TPAP refer to two PRESET models for basic education teachers, i.e. 12+4 and BA+1, neither of them clarifies the policy preference between them. These two models correspond to the concurrent model (12+4) and the consecutive model (BA+1). Teacher education can be divided into these two broad models: the concurrent model in which disciplinary studies and pedagogical studies are integrated and taught at the same time; and the consecutive model, which focuses mostly on pedagogy following the disciplinary studies already completed by university graduates interested to go into teaching. The differences between these programmes are described in Table A-4.

Table A-4 Characteristics of concurrent and consecutive programmes

	Characteristics	Scope	Advantages	Disadvantages
Concurrent models for initial teacher education	Academic subjects are studied alongside educational and professional studies throughout the duration of the course. Shorter.	Common for primary school teachers (expect France and Germany). Lower and upper secondary education teachers in Belgium, Canada, Greece, Hungary, Ireland, Italy, Japan, Korea; Turkey, the United States.	Allows a more integrated learning experience, since pedagogical and subject-matter (content knowledge) training take place at the same time.	Little flexibility in entering the teaching profession, especially for the persons who have studied something else than education, as well as for those who would want to be able to re-enter other labour markets eventually.
Consecutive	The specialized courses in pedagogy and in teacher teaching are accessible after having completed another degree in a discipline taught in school. Longer. Entry more restrictive.	More common for secondary school teachers than for primary school teachers. Denmark, France, Norway, and Spain, Austria, Australia, the Czech Republic, England, Finland, Ireland, Israel, the Netherlands, Northern Ireland, Scotland, the Slovak Republic, Sweden, Wales	Allows a more flexible entry into the teaching profession. Allow teachers to have a strong subject expertise in a precise academic discipline.	Weaker knowledge in learning techniques and in pedagogy in general. Fragmented learning process between subject-matter knowledge and pedagogical knowledge. Weaker professional identity.

Source: Musset (2010), pp 6.

1.3.2. Which model to use in Cambodia?

As indicated in the above table, the concurrent model (12+2 or 12+4) fits more to primary than secondary teachers, while the consecutive model fits well to the secondary teachers. This is because lower secondary teachers are often required to have a high standard of subject knowledge rather than pedagogical knowledge, although primary teachers need to have a broader and deeper understanding about pedagogical content knowledge than lower secondary teachers. This idea is of course applicable to Cambodia as well.

Both concurrent and consecutive models have advantages in the case of secondary teachers. The consecutive teacher education model gives teacher candidates the opportunity to receive pedagogical training after having completed undergraduate studies in one discipline. This would be particularly beneficial to secondary teachers as better disciplinary knowledge is expected. The

consecutive model focuses on pedagogy, rather than on advanced academic training within a specific subject. Which is to say that one cannot become a secondary teacher without mastery of the subject one is going to teach at a high level, as well as at least a year of challenging instruction in the craft of teaching. The concurrent model, on the other hand, provides a more integrated learning experience as pedagogical training and subject-matter training often take place simultaneously.

In the case of Cambodia, it is already decided in the sub-decree for the establishment of TEC that the concurrent model of 12+4 should be used for both primary and lower secondary teacher training. This seems a realistic choice within the current context, for two reasons. First, with consecutive model (BA+1) which requires students to have bachelor's degree at the entrance of PRESET, it would be difficult to secure students from areas with a low university entrance rate. Second, politically it does not seem feasible to equate the status of US and LS teachers (BA+1 is the current requirement for US teachers).

It is worth noting that many countries do not distinguish lower secondary teachers from upper secondary because there is not a big difference between the knowledge level required to these 2 types of teachers. Considering that there are many lycees that have both LS and US levels within a school, it would be practical if the current gaps in the contents of PRESET and the status between lower and upper secondary teachers would be smaller.

1.3.3. PRESET in other countries

The general trend has been for the length of initial teacher education to increase (Musset, 2010; OECD, 2005). The current status of PRESET for primary teachers in ASEAN countries is as shown in Table A-5. It shows that most countries not only have more than 2 years of PRESET programmes but also offer alternative routes to teaching. For example, in Malaysia, one can choose either a bachelor's degree in teaching (12+3) or a subject-based bachelor's degree followed by a postgraduate qualification (BA+1) to become primary teachers.

Table A-5 Primary teacher education in ASEAN countries

No.	Country	Length of initial teacher education at the primary level Entry requirement + Years in Teacher Training
1	Malaysia	12+3 / BA+1
2	Philippines	12+4
3	Singapore	12+2 / 12+4 / BA+1
4	Indonesia	BA + certification programme
5	Myanmar	11+2 (under transition to 11+4 and to 12+4)
6	Lao PDR	9+3 / 12+2 / 12+4 (started in 2012)
7	Thailand	12+5
8	Vietnam	12+2&9+3 (difficult areas) / 12+3 / 12+4

Sources: Countries #1-#3 adopted from UNESCO (2014), Country #4-#7 collected by the author, #8 from Nguyen (2008)

Note: "12+4" means a specialised programme to be teachers, while "BA" means an ordinary bachelor's degree.

Box 1.2 Reviewing teacher education system in Japan

Japan employs a concurrent model of teacher education under an "open" system. Obtaining additional credits for a teaching certificate while majoring in a discipline other than education is particularly popular for secondary teacher preparation. The government, however, is in the process of tightening it as a result of various problems including: an increasing gap between the abilities that a teaching certificate assures and the abilities actually required at schools; some PRESET providers having insufficient understanding of teaching profession and lacking the necessary abilities; inappropriate curriculum and fragmented training; a tendency to be more theoretical and subject specific and weak in practical skills training; trainers lacking sufficient teaching experience (MEXT, 2017). It is also well-known that there are many students who obtain a teaching certificate but not opt to become teachers, which results in an inefficient use of resource.

The table below is the data on new graduates who took teaching licensee exams and took the selection exam conducted in 2015 in each prefecture for its public schools. It shows that not all the new graduates who have a teaching certificate apply for a selection exam to be public school teachers. While 68% of new qualified individuals (i.e., those who are supposed to receive it after graduation) take the exam at the primary level, the proportion becomes much smaller at the secondary level, 37% for LS and 17% for US. The situation is more stunning when you see the employment rate. Only 22% of new primary licensee teachers are employed and it goes as low as 5% and 2% for LS and UP. There is a financial implication as PRESET is subsidised and the practicums levy an unnecessarily heavy burden on schools who receive a large number of students. It, however, should be noted that there are students who apply for and are employed by private schools. The rate of private schooling in Japan is 1%, 7%, and 25.8% for primary, LS and UP respectively (MEXT, 2010). This, however, does not change the picture as the large majority of schools at each level are public.

Table: Public school teacher hiring test application and employment rate

	(A)	(B)	(C)	(D)	(E)
	New teaching certificate holders	New certificate holders among exam applicants	(B)/(A)	New certificate holders among newly employed	(D)/(A)
Primary	27,022	18,457	68%	6,043	22%
LS	50,022	18,348	37%	2,713	5%
US	62,073	10,539	17%	1,431	2%

Source (MEXT, 2016a, 2016b)

The table below shows the percentage of new university graduates and others among teacher selection exams. It shows that around 70% of exam takers are not new graduates. Teaching jobs are highly competitive in Japan and many have to re-take the test.

Table: Public school teacher hiring test applicants

	Total	New graduates	%	Others	%
Primary	55,834	18,457	33.1	37,377	66.9
LS	60,320	18,348	30.4	41,972	69.6
US	36,384	10,539	29.0	25,845	71.0

Source (MEXT, 2016a)

1.4. Salary and benefits

It is highly commendable that the Cambodian government has significantly increased teacher salaries over the past years. Evidence from high-performing education systems across the world suggests that provision of salaries above the national average, in combination with exacting standards for recruitment and qualification, serves to strengthen perceptions of the status of teaching as a profession, and has a substantial impact on the quality of graduates seeking to enrol in teacher training programmes (OECD, 2005).

However, here we propose to re-examine the different status and PRESET level of teachers of different school levels in Cambodia. Under the current system, regardless of academic qualifications primary teachers are registered as Class or "Kropkhan" C in the salary scale, lower secondary teachers as B, and upper secondary teachers as A. The level of class is linked with salary and other benefits, while there is little prospect of career advancement within the same class. As a result, many primary and lower secondary teachers aim to become upper secondary teachers after obtaining bachelor's degrees at private universities. This can be viewed as inefficient use of limited resources in many accounts. Firstly, primary teachers are required to have a significantly different set of knowledge and skills from secondary teachers, and failing to retain those experienced teachers and training new ones to replace them makes the system inefficient. Secondly, those who wish to be upper secondary teachers have to go through another year of government-funded training at NIE, which could be used to train new graduates who have longer years of career expectancy.

Box 1.3 Aiming to be US teachers

When we interviewed students at RTTC, 11 out of 12 students said their career goal was to become upper secondary teachers in future. Only one student said she wanted to work as a lower secondary English teacher, as her lower secondary did not have an English teacher. Due to the absence of attractive career paths, becoming an upper secondary teacher is a de-facto career path for these students.

In order to ensure that children achieve the basic foundations for ongoing education in the early grades, evidence shows that the best and most able teachers should be deployed to the early grades. However, in many countries teacher recruitment and deployment policies assign less qualified or experienced teachers to lower grades, and require lower standards of qualification for primary school teachers compared with secondary school teachers (UNESCO, 2013). This is the case in Cambodia: upper secondary teachers are required to have higher levels of qualification and enjoy higher status than teachers at other levels, which seems to reflect the time when upper secondary education had an elite status and was considered "pre-higher education". This was found in many countries, but in the context of mass secondary education, upper secondary is becoming to be viewed as "post-basic education" for all eligible students, and closely connected to lower secondary.

1.5. Private school teachers

With the growth of private schooling in Cambodia, the number of children enrolled in private schools is increasing as shown in Table A-6. EMIS data for academic year 201718 shows that there

are 1,076 private schools (total of pre-primary to upper secondary) in the whole country with 203,084 students. They have 9,903 teaching staff including 1,773 foreign teaching staff. It is well known that there are many government staff (4,701), most of them are assumed to be teachers, who have second jobs at private schools. In addition, more than 60% of the private school teachers in 2018 have BA or higher degrees (BA=6,988, MA/PhD=592). However, it is not clear from EMIS about how many of these qualified teachers are working in primary, lower secondary or upper secondary levels.

Table A-6 Key statistics of private schools

Year	School	Student	Teacher	Gov. staff	Foreign teacher
2014/15	665	128,390	8,246	1,543	1,121
2015/16	829	162,046	9,592	3,742	1,494
2016/17	987	168,287	9,903	3,304	1,650
2017/18	1,076	203,084	12,248	4,701	1,773

(MoEYS 2015-2018)

The current PRESET system in Cambodia is directly linked to public servant posts, which means that it only supplies teachers to government schools. Practically it seems that there are not common rules regarding the qualification of teachers in private schools. The government, however, has a responsibility to regulate the quality of teachers in private schools so that they satisfy certain standards, such as holding a bachelor's degree, irrespective of where schools are.

One of the recommended ideas to deal with this issue is to separate "to get a teaching job" from "to complete PRESET" so that PRESET graduates have several options, including (1) taking a teacher selection exam at the central level or in each province, (2) applying for private schools, and (3) looking for other job opportunities using BA. However, as a tentative measure, it is an option to create a space or a quota in PRESET programmes for private school teacher candidates, or "paid" upgrading programmes for existing private school teachers.

1.6. Quality assurance of teachers

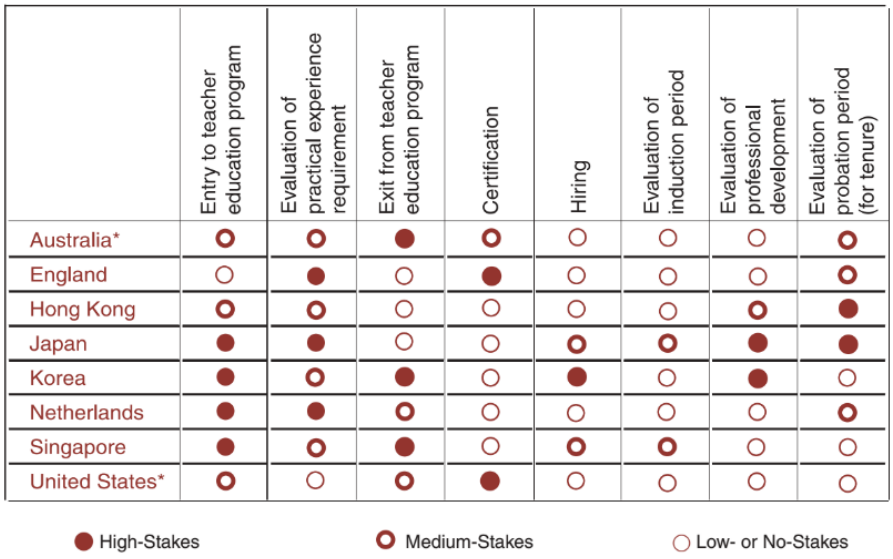
This section briefly reviews mechanisms to assure the quality of teachers in Cambodia. With the upgrade of PRESET providers to higher education institutions, they are expected to have stronger institutional autonomy, which in turn would reduce government's direct interventions. To ensure the quality of teachers in Cambodia, the government has to enhance mechanisms for quality control at a distance.

1.6.1. Phases of teacher quality assurance

To assure the quality of teachers, MoEYS can take a range of approaches to setting standards or criteria based on which the provider institutions, their programmes, or individual teachers can be measured. There are various check points and there is no single formula. As shown in Table A-7, it varies by country at what point they impose pressure: some emphasize the selection into PRESET programmes, while some others set rigorous standards for teacher recruitment or induction. Whichever model one chooses, constructing a coherent and efficient mechanism is a key for quality assurance. It should also be noted that all the countries below put emphasis on plural checkpoints

between entry and selection in order to encourage teacher candidates to stay focused on professional development.

Table A-7 Filters used along the teacher education and development pipeline



Source (Wang et al., 2003, p.38)

The table below summarises potential quality assurance mechanisms, dividing the teacher education lifespan into three phases: pre-service, new teacher, and in-service. As can be seen, Cambodia has clearly "front loaded" requirements where many high-stake assessments are done at teachers' pre-service preparation phase.

Table A-8 Teacher quality assurance at different phases

Phase	No	Sub-Phase	Relevant QA Mechanisms	Cambodia
1. Pre-service	1.1	Entry to PRESET	PRESET selection exam	●
	1.2	Exit from PRESET	PRESET graduate exam / course exams	◉
2. New teacher	2.1	Licensing	Licensing / certification exam	---
	2.2	Selection	Selection exam	---
	2.3	Induction	Evaluation of induction phase	---
3. In-service	3.1	Teacher assessment	Periodic assessment	○
	3.2	Re-registration	Periodic renewal of registration	---
	3.3	Career advancement	Advanced certificate / promotion	Δ

Symbols: ● High-stakes, ◉ medium-stakes, ○ Low-stakes, Δ under preparation, --- None

Source: Adopted from Ingvarson (2002); Wang et al., (2003)

The status in Cambodia in each phase is briefly described below.

1.6.2. [Phase 1] Pre-service

This phase is obviously the most important part to ensure the quality of teachers in Cambodia.

Phase 1.1 Entry to PRESET

This is the highest-stake screening point in Cambodia. Thousands of grade 12 graduates come to take TTC entrance exams every year; however, in reality most of those applicants were not high

calibre[2]. The survey conducted in 2012 has shown that around 70% of RTTC students and more than 80% of PTTC students are graded in Rank D or E in the grade 12 national exam (World Bank, 2014). In this context, not only a rigorous and transparent selection system but also a mechanism to attract academically advanced students to teaching profession is indispensable to assure the quality of teachers and the quality of education.

In addition, under the situation where almost all the TTC graduates will be appointed as teachers of their provinces, passing in the entrance exam to TTCs virtually means getting a teaching job in their home provinces. However, considering that there still is a large disparity in teacher sufficiency between provinces, rural-urban and schools, as well as subjects in lower secondary, it is strongly required to rigorously carry out targeted and strategic selection of candidates based on up-to-date statistical information and analysis about teacher demand and supply. Otherwise, MoEYS has to continuously prepare teachers for well-staffed provinces and subjects.

Phase 1.2 Exit from PRESET

Although there is a graduate exam in TTCs, it does not seem to work as an effective screening system; almost all the students who have entered TTCs will graduate unless they misbehave, get a job outside, or leave TTC for other personal reasons. The MoEYS may not wish to introduce a rigorous screening system at the exit from PRESET, because the MoEYS's budget plan is normally cut down in the negotiation with the Ministry of Economy and Finance, and so the number of teachers supplied by TTCs are much less than the request from provinces. Therefore, strict quality assurance is likely to result in enlarging the teacher shortage, which is a major source of concern in the quality assurance of teachers in Cambodia.

1.6.3. [Phase 2] New teacher

Currently this phase does not have much importance in Cambodia for all the graduates from PRESET are employed and deployed as teachers, whilst in many countries, education systems impose additional requirements between the completion of PRESET and full employment.

Phase 2.1 Licensing

There are several ideas around licensing. One of the ideas is to give PRESET graduates an opportunity to take a national examination to get a teaching license/certificate to be used in all the provinces, as is often applied for medical doctors. Another idea is to provide teaching certificates for those who have successfully completed a PRESET programme in a HEI or a teacher training institution. In both cases, the teacher candidates get through a screening process (documents, interview, and/or written exam) at the provincial level to get a teaching job there.

The main difference between these two options above is the way of controlling the quality. The former calls for a strong leadership of the central government to establish national professional standards and ensure equitable teacher distribution. The latter gives larger discretion to provincial governments for teacher selection and deployment, which makes each province takes more responsibility for the quality and outcomes of education in the province and is required to maintain a high ethical standard to avoid misbehaviours in teacher selection process.

The current system in Cambodia is more like national licensing, although there are neither teaching certificates given to each teacher, nor the national standards based on which TTC final exams are carried out.

[2] TTCs have been playing a role of "back-up schools" for those who have failed university exams.

Phase 2.2 Selection

Under the "closed" system, MoEYS plans to continue guaranteeing posts for PRESET graduates and does not intend to introduce any national licensing exam or provincial screening. If there is no room for teacher selection at the central or provincial levels, it is recommended that the final evaluation of student teachers be multifaceted to include not only paper tests on subject matters, but also observation of their mock lessons, in-depth interviews, the record of achievements, etc., so that MoEYS can carefully select and send better teachers to the schools where teachers are truly necessary, although it should be accompanied with some incentives, such as fast promotion.

Phase 2.3 Induction

There is no official induction mechanism in Cambodia. However, a number of studies have concluded that well-conceived and well-implemented teacher induction programmes are successful in increasing the job satisfaction, efficacy and retention of new teachers (Jensen et al., 2012). In countries including Singapore and Malaysia, between 92% and 100% of new teachers participate in formal induction training (OECD, 2015). Induction programmes can include a number of elements to support and develop new teachers, including orientation seminars, workshops, professional collaborations, structured support systems, and different forms of appraisal and feedback, structured mentoring programmes (Jensen et al., 2012).

1.6.4. [Phase 3] In-service

New mechanisms are under discussion in Cambodia including a merit-based teacher career path, or Teacher Career Pathways (TCP), although there are a number of hurdles to overcome for its implementation.

Phase 3.1 Teacher assessment

Currently the effectiveness of teacher assessment is limited because a culture of teacher assessment in a strict sense is yet to permeate to the provincial and school levels, and teachers are almost automatically promoted under a life-time employment system. It is important to strengthen the assessment system for both accountability and professional development purposes, for example, by developing teacher data base profiles.

Phase 3.2 Re-registration

Some countries have a system where teachers have to renew their license/certificate after meeting the requirement through training programmes and/or exams. This can be discussed when TECs will be fully opened and have capacity to start such recurrent training programmes in the near future.

Phase 3.3 Career advancement

Some countries have advanced certificate or promotion standards. Evidence shows that the establishment of clear and transparent career path options for teachers as well as the environment for professional development in association with the attainment of specific qualifications or periods of service, has a significant impact on encouraging the enrolment, recruitment and retention of quality teaching staff, and prepares them for leadership roles (Slater, 2014). In this respect, it is highly expected that TCP will encourage teachers to develop their capacity and advance their careers.

2. Findings and recommendations

Part A has reviewed the existing PRESET system and pointed out a number of challenges to upgrade teacher qualification with maintaining the quality. Listed below are the summary of major findings and recommendations in Part A.

Policy targets

- Some policy targets and associated action plans are outdated.
  - ➔ To update the policy targets and revise the associated plan to achieve these targets within a certain timeframe.

PRESET providers

- There are only TECs in the country who can offer 4-year PRESET for primary and lower secondary.
  - ➔ To increase the number of higher education institutions for teacher education to accelerate teacher qualification upgrade.

PRESET model

- There are still 12+2 and 12+4 models only, although ESP and TPAP have advocated the introduction of a BA+1 model.
  - ➔ To implement BA+1, a consecutive model, for lower secondary teachers, particularly in the subject facing severe teacher shortage.

Salary and benefits

- The current salary scale does not retain teachers in primary and lower secondary education, but rather encourage them move upward to upper secondary education.
  - ➔ To minimize the salary and status gap between teachers having the same educational qualification, through a salary scale reform.

Quality assurance

- The existing system strongly focuses on the entry to PRESET but does not have other checkpoints for teacher quality assurance.
  - ➔ To introduce a multi- faceted evaluation system to select right persons and send them to right places, if further screening at the exit of PRESET (at the centre/province) is not possible.

In Part B, we will analyse the teacher demand and supply in primary and lower secondary education in the next decade based on the available statistical data. Then we will come back to the above points in Part C to make more concrete and practical suggestions based on the statistical analysis.

Part B. Projection of teacher demand

1. Analysis of Primary Teacher Demand and Supply

1.1. Objective of the study

This study is to forecast teacher demand and supply up to 2030/31 academic year to see the level of teacher sufficiency in the future. In Cambodia, a major reform in teacher education is taking place, that is to extend the duration of pre-service teacher education for primary and lower secondary teachers from two years to four years. This provides substantial impacts on the quantity of teacher supply. Meanwhile, efforts have been made to improve access and quality by setting target years to achieve 100% of net enrolment rate (NER) and other indicators such as classroom-teacher ratio. Such targets will require more teachers. The study, therefore, intends to provide the basic information necessary to discuss how to pursue the teacher education reform while improving the access and quality of education in a feasible manner.

1.2. Method

In this analysis, teacher demand and supply are separately estimated and compared to see the gap, which equals the number of new teachers required. The projections are made both at the national level and the provincial level. The following figure shows the flow of steps taken in the analysis.

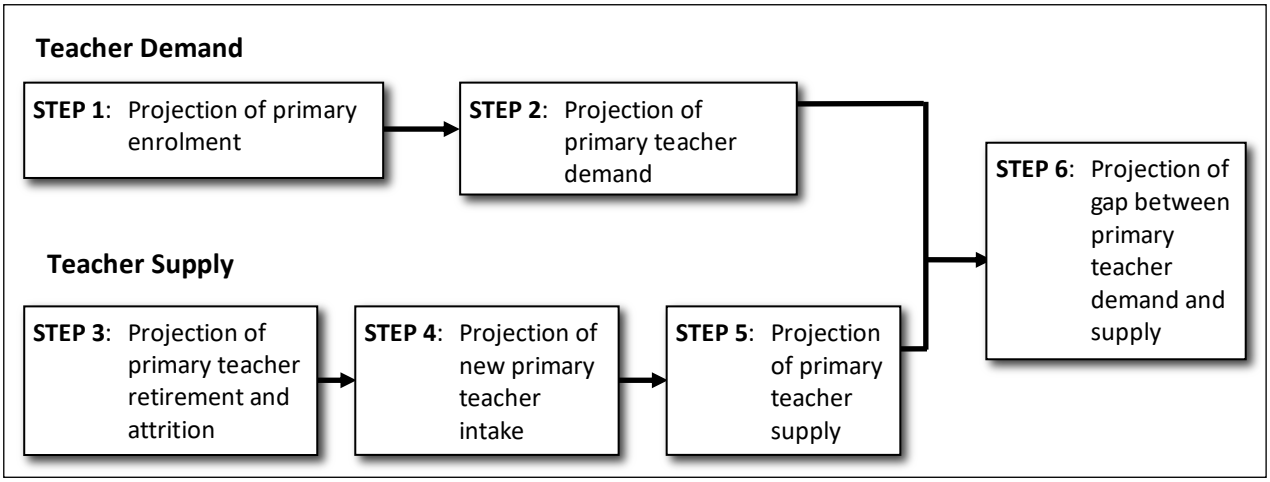


Figure B-1 Steps of Teacher Demand and Supply Analysis

The projection of student enrolment (Step 1) provides the basis of teacher demand projection (Step 2). Numbers of the necessary teachers are estimated from the projected primary enrolment by applying the teacher allocation standards set by the government.

Teacher retirement and attrition projection (Step 3) are used to estimate the number of teachers in service (Step 4). Gaps between the teacher demand and teachers in service needs to be filled in by the new teacher supply (Step 5). With the above information, the capacity of teacher education institutes (TEIs) will be planned (Step 6).

1.3. Data used

The following data sources were used in this study:

- EMIS of public schools by Ministry of Education, Youth and Sport (MoEYS) (AY2007/08-2016/17)
- EMIS of private schools by MoEYS (AY2014/15-2016/17)
- Population forecast by Ministry of Planning (MOP) (up to 2030)
- Retirement projection (AY2016/17-2030/31) and attrition data (AY2007/08-2015/16) by HRMIS
- Data of entrants to PTTC provided by MoEYS (AY2011/12-2017/18)

1.4. Limitations

There are some limitations in this study as described below.

School-age population forecast needs to be examined.

As shown in Figure 1, the size of teacher demand depends on how student enrolments are projected. Population projection by MOP, however, shows large discrepancies from the actual population. In this study, the MOP's school-age population projection is revised using the proportion of the actual population and MOP's projection as of AY2016/17. The enrolment projection needs to be recalculated in case the updated population projection by MOP becomes available.

Staffing norm is uniformly applied to all provinces

In the provincial-wise analysis, the same standard of teacher-classroom ratio and pupil-classroom ratio is applied to all provinces. Provinces with lower population density may need upward adjustment in teacher demand projection.

Additional information of retirement after AY2030/31 will add more accuracy in projection of new teacher demand

In this analysis, teacher retirement projection up to AY2030/31 is used. Retirements in the late 2020s drastically increase and are projected to be above 2,000. If such tendency will continue, the demand of the new teachers may become larger. Further information of retirement after AY2030/31 or age information of teachers could add more accuracy in teacher demand analysis.

Teacher demand for private school teachers is not discussed

This study only looks at teacher demand and supply related to public system. Policies of teacher qualification and teacher education for private school teachers are not yet formulated and private education data in EMIS is still limited. Thus, teacher demand for private schools is not estimated in this study, though private school enrolment is counted in order to produce the accurate Gross Enrolment Rate (GRE).

1.5. Projection at the national level

1.5.1 [Step 1] Projection of primary student enrolment

Projection of primary student enrolment may differ with different assumptions. In Step 1, the following five cases with different assumptions were examined.

Case 1: Estimate the future enrolment based on the past trend of changes in the total enrolment

The trend of the past enrolment is simply used to draw an approximate curve to derive the future enrolment trend.

Case 2: Estimate the future enrolment based on the past trend of changes in school-age enrolment and over-age enrolment respectively

With the assumption that school-age enrolment (Age 6-11) and overage enrolment (over 11) show different patterns of changes in enrolment, the projection for each is made separately using the past data to draw different approximate curves.

Case 3: Estimate the future enrolment using the population forecast and NER (net enrolment rate) forecast based on the past trend of changes in NER

The trend of the past NER is used to forecast the future NER trend. Then, primary enrolment is derived by multiplying the projected school-age population by the projected NER.

Case 4: Estimate the future enrolment using the population forecast and NER target (achieving 100% of NER in AY2029/30)

Annual NER target is determined based on the assumption that 100% of NER will be achieved in AY2029/2030. Multiplying the projected school-age population by the NER target of each year produces the projected primary enrolment.

Case 5: Estimate the future enrolment using the population forecast and NER target (achieving 100% of NER in AY2017/18)

Annual NER target is determined based on the assumption that 100% of NER will be achieved in AY2017/2018. Multiplying the projected school-age population by the NER target of each year produces the projected primary enrolment.

Detail explanation and results of calculation in each case are summarized in APPENDIX B-1.

The following figure and table show the enrolment forecasts in the above five cases. Enrolments of AY2007/08-AY2016/17 are actual numbers, and those of AY2017/18-AY2030/31 are projected numbers.

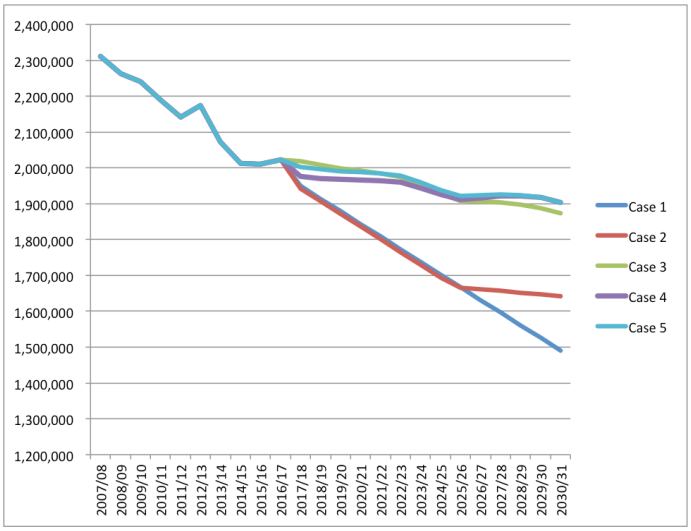


Figure B-2 Primary Enrolment Projections in Cases 1-5

Table B-1 Primary Enrolment Projections in Cases 1-5

Year	Total Primary Enrolment				
	Case 1	Case 2	Case 3	Case 4	Case 5
2007/08	2,311,107	2,311,107	2,311,107	2,311,107	2,311,107
2008/09	2,262,834	2,262,834	2,262,834	2,262,834	2,262,834
2009/10	2,240,651	2,240,651	2,240,651	2,240,651	2,240,651
2010/11	2,191,192	2,191,192	2,191,192	2,191,192	2,191,192
2011/12	2,142,464	2,142,464	2,142,464	2,142,464	2,142,464
2012/13	2,173,384	2,173,384	2,173,384	2,173,384	2,173,384
2013/14	2,073,811	2,073,811	2,073,811	2,073,811	2,073,811
2014/15	2,012,175	2,012,175	2,012,175	2,012,175	2,012,175
2015/16	2,010,673	2,010,673	2,010,673	2,010,673	2,010,673
2016/17	2,022,061	2,022,061	2,022,061	2,022,061	2,022,061
2017/18	1,949,697	1,942,877	2,019,085	1,976,038	2,003,557
2018/19	1,914,363	1,907,329	2,008,012	1,970,475	1,995,984
2019/20	1,879,029	1,871,797	1,999,439	1,967,504	1,990,983
2020/21	1,843,694	1,836,284	1,992,365	1,966,160	1,987,568
2021/22	1,808,360	1,800,788	1,985,103	1,964,789	1,984,063
2022/23	1,773,026	1,765,309	1,974,542	1,960,301	1,977,351
2023/24	1,737,692	1,729,848	1,952,893	1,944,909	1,959,596
2024/25	1,702,358	1,694,404	1,928,304	1,926,641	1,938,921
2025/26	1,667,023	1,666,284	1,907,966	1,912,660	1,922,501
2026/27	1,631,689	1,661,425	1,905,664	1,916,708	1,924,081
2027/28	1,596,355	1,656,568	1,903,911	1,921,295	1,926,207
2028/29	1,561,021	1,651,714	1,897,506	1,921,163	1,923,611
2029/30	1,525,687	1,646,863	1,887,463	1,917,297	1,917,297
2030/31	1,490,352	1,642,013	1,873,545	1,903,561	1,903,561

In all cases, the enrolment of primary students shows a declining trend. In Cases 2-5 where overage enrolment is separately estimated, the enrolment will be rather stable after 2025/26 when overage enrolment becomes zero.

In Cases 3-5, NER projection and NER target values are used to calculate the enrolment. The fact that the enrolment in these cases shows similar figures indicates that NER for both public and private schools are close to 100% and the improvement of NER will have little impacts on changes in enrolment. What might affect enrolment will then be changes in overage enrolment. In Cases 3-5, the same projection for overage enrolment is used as in Case 2. If any measures are taken to promote school-age enrolment and to reduce overage enrolment, the total enrolment projection will be different from these projections.

Case 3 use the NER calculated from the past trend, resulting that almost the same values of NER (94.52%-94.26%) are applied to all years. This may underestimate the enrolment. Case 5, on the other hand, used the 2017/2018 as the target year of achieving 100% of NER. It seems too demanding to keep this target, given the difficulty of achieving 100% of NER in some of the provinces that are far below the target as of 2016/2017 such as Kep, Koh Kong, and Pailin. Case 4 sets a modest target year of achieving 100% of NER, or 100% by 2029/2030, which is considered feasible to be achieved. The analysis below will use the Case 4 as the base information of enrolment. The following figure shows the breakdown of Case projection.

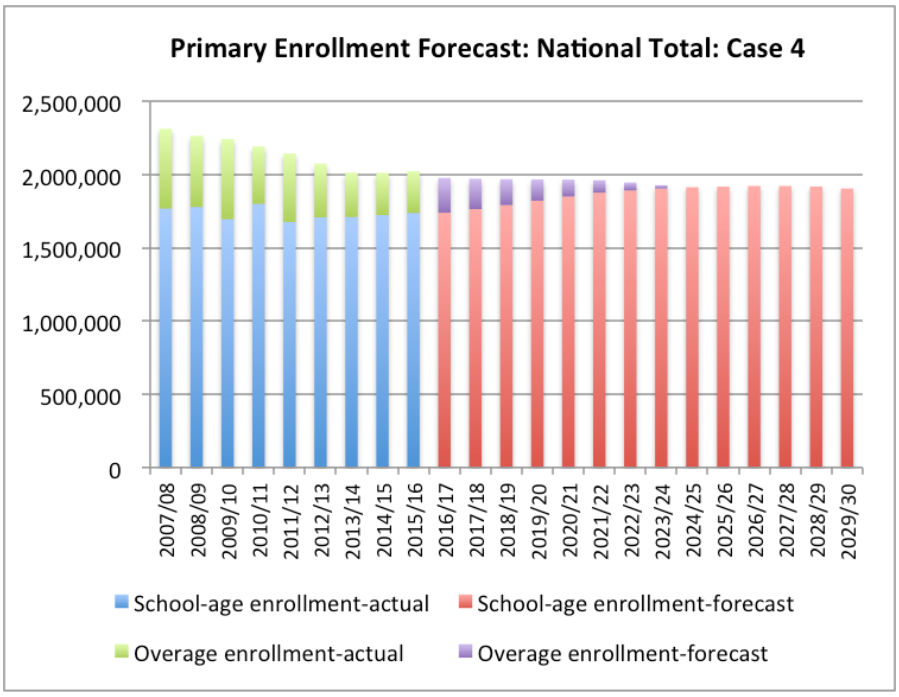


Figure B-3 Breakdown of Primary Enrolment Projection (Case 4)

1.5.2 [Step 2] Projection of primary school teacher demand

Next, teacher demand is projected based on the total enrolment. Generally, pupil-teacher ratio is used to produce teacher demand, but it is not the case in Cambodia, because the majority of primary schools are double-shift schools (76% according to 2016/17 EMIS) and many teachers are supposed to teach in both morning and afternoon classes. The government of Cambodia instead uses the teacher-classroom ratio and pupil-classroom ratio as indicators of teacher allocation. MOEYS directive in 2014 sets the standard of the usage of teaching personnel at educational establishments and teacher training establishments as shown in Table B-2. Teacher Policy Action Plan (January 2015) indicates standards under the new proposal are to be achieved by the first quarter of Year 2020.

Table B-2 Standard of Teaching Personnel

Educational establishments and teacher training establishments	Present		New proposal	
	Classroom standard: teacher	Pupil–classroom ratio	Classroom standard: teacher	Pupil–classroom ratio
Primary education	1:1	50	1:1.1	Grade 1–3 = 35 Grade 4–6 = 40

Source : MOEYS. (2014). Directive on Standard of the Usage of Educational Personnel (May 2014)

One of the assumptions made in teacher demand calculation is that the improvement of the situation is gradual and constant, and therefore, gaps between the actual values and target values in teacher-classroom ratio and pupil-classroom ratio as of 2016/2017 will be equally distributed within the target years.

Two target values for pupil-classroom ratio exist: 35 for Grade 1-3 and 40 for Grade 4-6. There are no data available for grade-wise pupil-classroom ratio in EMIS, the average value of six grades primary education (37.5) is to be applied as a single target value.

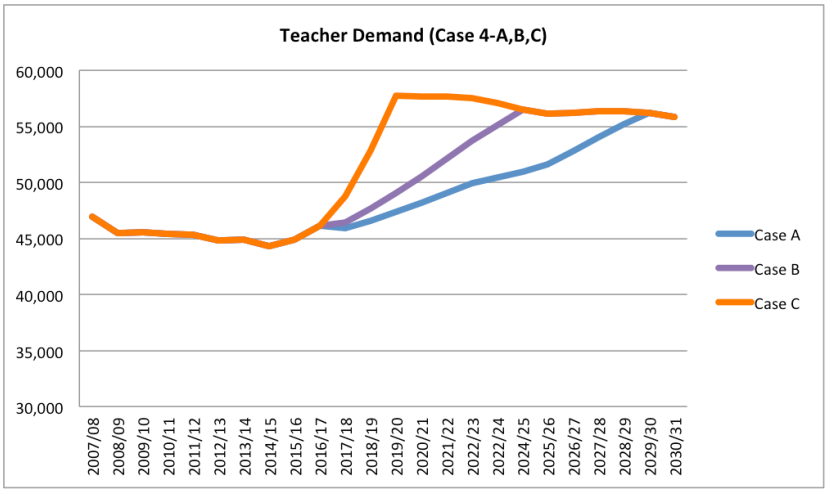
In addition to the target year (AY2019/2020) set in the Teacher Policy Action Plan, other two target years are set: AY2024/25 (achieving the target five years after the original target) and AY2029/30 (achieving the target in ten years' time) as shown in Table B-3.

Table B-3 Different Cases Used in Teacher Demand Projection

	Classroom standard: teacher	Pupil–classroom ratio
Case 4-A	1:1.1 by 2029-30	37.5 by 2029-30 (for all grades) and after
Case 4-B	1:1.1 by 2024-25	37.5 by 2024-25 (for all grades) and after
Case 4-C	1:1.1 by 2019-20	37.5 by 2019-20 (for all grades) and after

Note: Case 4 refers to the Case in Step 1.

Results of the calculation based on the total enrolment (Case 4 of Step 1) are summarized in the following figure and table. Teacher demand in three cases will eventually reach the same figures, but shows the different intensity of teacher demand over years.



Note: Figures of 2007/8-2016/17 are actual and those of 2017/18-2030/31 are projections.

Figure B-4 Teacher Demand Projection (Case 4-A, 4-B, 4-C)

Table B-4 Teacher Demand Projection (Case 4-A, 4-B, 4-C)

Year	Primary Teacher	Primary Teacher Demand Projection		
	Actual	Case 4-A	Case 4-B	Case 4-C
2007/08	46,921	---	---	---
2008/09	45,511	---	---	---
2009/10	45,531	---	---	---
2010/11	45,408	---	---	---
2011/12	45,296	---	---	---
2012/13	44,840	---	---	---
2013/14	44,895	---	---	---
2014/15	44,292	---	---	---
2015/16	44,884	---	---	---
2016/17	46,149	---	---	---
2017/18	---	45,895	46,406	48,749
2018/19	---	46,587	47,651	52,836
2019/20	---	47,364	49,030	57,714
2020/21	---	48,206	50,531	57,674
2021/22	---	49,078	52,121	57,633
2022/23	---	49,901	53,722	57,503
2023/24	---	50,470	55,116	57,050
2024/25	---	50,983	56,515	56,515
2025/26	---	51,629	56,104	56,104
2026/27	---	52,795	56,223	56,223
2027/28	---	54,023	56,359	56,359
2028/29	---	55,163	56,354	56,354
2029/30	---	56,241	56,241	56,241
2030/31	---	55,838	55,838	55,838

1.5.3 [Step 3] Projection of primary school teacher retirement and attrition

The number of existing teachers can be calculated by subtracting (1) retirement and attrition by the end of a school year from (2) the number of existing teachers in the previous year.

(1) Retirement and attrition

Those who leave teaching profession include retirement at the retirement age and attrition due to other reasons such as changing jobs, death, illness, etc. The projection of retirement at the retirement age up to 2030 has been prepared by HRMIS as shown in Table B-5. The number of attrition due to other reasons than retirement age is available only for 2007-2015 from HRMIS as shown in Table B-6. Available data is limited, and annual figures of attrition fluctuate substantially. Therefore, the share of total attrition out of the total number of teachers for the available years (2007-2015) is calculated (1.03%) and is used to estimate the attrition up to 2030/31.

Table B-5 Teacher Retirement-Past Figures and Projection

Year	Number of Retirement	
	Actual	Forecast
2005/06	714	---
2006/07	708	---
2007/08	961	---
2008/09	975	---
2009/10	1,032	---
2010/11	1,361	---
2011/12	980	---
2012/13	1,426	---
2013/14	1,405	---
2014/15	1,518	---
2015/16	1,051	---
2016/17	---	1,029
2017/18	---	969
2018/19	---	967
2019/20	---	738
2020/21	---	714
2021/22	---	301
2022/23	---	310
2023/24	---	257
2024/25	---	336
2025/26	---	541
2026/27	---	820
2027/28	---	826
2028/29	---	1,672
2029/30	---	2,018
2030/31	---	2,498

Source: HRMIS

Table B-6 Teacher Attrition (2007/08-2015/16)

Year	Number of attritions	Number of teaching staff	Attrition %
2007/08	474	46,921	1.01%
2008/09	603	45,511	1.32%
2009/10	628	45,531	1.38%
2010/11	637	45,408	1.40%
2011/12	486	45,296	1.07%
2012/13	425	44,840	0.95%
2013/14	385	44,895	0.86%
2014/15	421	44,292	0.95%
2015/16	129	44,884	0.29%
		Average attrition %	1.03%

Source: HRMIS

(2) Number of teaching staff at primary schools

The number of teaching staff at primary schools is as shown in Table B-7. In EMIS, teaching staff includes school principals and it is not possible to figure out how many school principals teach and how many don't. This analysis, therefore, does not distinguish school principals and other teaching staff.

Table B-7 Number of Teaching Staff at Primary Schools

Year	Number of Teaching Staff
2007/08	46,921
2008/09	45,511
2009/10	45,531
2010/11	45,408
2011/12	45,296
2012/13	44,840
2013/14	44,895
2014/15	44,292
2015/16	44,884
2016/17	46,149

Source: EMIS 2008-2017

Box 2.1 Experiences of Japan, Taiwan, China, and Singapore

When considering Cambodia's current situation, the experiences of other Asian countries and areas, such as Japan, Taiwan, Mainland China, and Singapore in particular, are useful for reference. Their differences in meeting teacher demand with the closed teacher training system are worth studying, while it is not the purpose to compare one country with another. The period when the system was implemented are different for those countries, with Japan employing the system up until 1945, Taiwan until 1994, and China until 2001. It is still in use in Singapore today. For the purposes of this study we will be looking at how each country responded to increases in teacher demand when the closed teacher training system was practiced. For Japan this was from 1900 to 1910 (pre-World War I, when there was no compulsory secondary education, where the student population increased from 3,200 to 13,000 students between 1987-1916), Taiwan 1970 to 1980 (from 0.80 million to 1.07 million students), and China 1990 to 2000 (from 38.68 million to 62.56 million students).

1.5.4 [Step 4] Projection of new primary school teacher intake

Next, the new teacher intake is estimated. Officially appointed teachers are currently all graduating from TEIs, namely PTTCs. Almost all the students who have entered PTTCs complete schooling and are appointed as primary teachers. Therefore, the number of entrants to PTTCs will be treated as the new intake of teachers after two years of schooling.

The Ministry of Education, Youth and Sport announced to accept 1,600 and 1300 students for PTTCs in AY2017-18 and AY2018-19, respectively. The number of entrants to PTTCs after AY2019 are assumed to be same as that of AY2018. However, there are several different scenarios about when the current system will be completely shifted to 12+4. On the other hand, the entrants to TECs are assumed to be 150 each in AY2018 and 250 each after that (Table B-8 and Table B-9).

Table B-8 PTTC Entrants (Actual and Assumption)

Name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Phnom Penh	65	85	90	90	53	86	85	50	50	50	50	50	50	50	50	50	50	50	50	50
Kandal	110	160	170	200	137	81	85	71	71	71	71	71	71	71	71	71	71	71	71	71
Takeo	100	98	115	200	168	70	75	60	60	60	60	60	60	60	60	60	60	60	60	60
Kampong Chhnang	80	100	100	180	63	62	55	45	45	45	45	45	45	45	45	45	45	45	45	45
Kampot	90	75	70	110	107	53	60	49	49	49	49	49	49	49	49	49	49	49	49	49
Kampong Cham	190	220	275	450	157	160	170	170	170	170	170	170	170	170	170	170	170	170	170	170
Kratie	70	60	60	100	42	54	60	54	54	54	54	54	54	54	54	54	54	54	54	54
Stung Treng	160	179	165	160	76	97	105	117	117	117	117	117	117	117	117	117	117	117	117	117
Preah Vihear	110	95	90	80	33	83	85	55	55	55	55	55	55	55	55	55	55	55	55	55
Svay Rieng	60	60	60	80	103	45	50	45	45	45	45	45	45	45	45	45	45	45	45	45
Prey Veng	160	185	180	320	144	110	120	92	92	92	92	92	92	92	92	92	92	92	92	92
Banteay Meanchey	90	105	115	124	71	74	75	65	65	65	65	65	65	65	65	65	65	65	65	65
Battambang	190	218	220	320	113	143	155	80	80	80	80	80	80	80	80	80	80	80	80	80
Pursat	60	67	90	100	45	45	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Kampong Thom	100	115	120	190	84	81	85	75	75	75	75	75	75	75	75	75	75	75	75	75
Preah Sihanouk	50	60	50	30	20	35	35	28	28	28	28	28	28	28	28	28	28	28	28	28
Siem Reap	245	270	290	390	223	181	195	149	149	149	149	149	149	149	149	149	149	149	149	149
Kampong Speu	70	90	90	160	74	53	55	45	45	45	45	45	45	45	45	45	45	45	45	45
PTTC Total	2,000	2,242	2,350	3,284	1,713	1,513	1,600	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Year to start teaching	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**

Note:

1. Figures of AY2011-2017 are actual. Total entrants of AY2018 is based on MOEYS's decree of No. 4509 RYK.BV, but distribution among PTTC is not known. The distribution of PTTC is assumed based on the previous year. Entrants from AY2019-2030 is assumed to be the same as those of AY2018.
2. Phnom Penh PTTC and Battambang PTTC will be reorganized to TEC starting from AY2018, but at least for AY 2018 entrants, 2-year courses will be kept according to MOEYS.

Table B-9 TEC Entrants (Assumption)

Name	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
Phnom Penh	150	250	250	250	250	250	250	250	250	250	250	250	250
Battambang	150	250	250	250	250	250	250	250	250	250	250	250	250
TEC Total	300	500	500	500	500	500	500	500	500	500	500	500	500
Year to start teaching	**2022/23**	**2023/24**	**2024/25**	**2025/26**	**2026/27**	**2027/28**	**2028/29**	**2029/30**	**2030/31**	**2031/32**	**2032/33**	**3033/34**	**2034/35**

1.5.5 [Step 5] Projection of primary school teacher supply

Using the projected figures of retirement, attrition, and new teacher intake, teacher supply is estimated as shown in Table B-10.

Table B-10 Teacher Supply

Year	Teacher supply[1]		Retirement[2]	Attrition[3]		New intake of teachers[4]	
	Continue 12+2 till 2030	Continue 12+2 till 2020		Continue 12+2 till 2030	Continue 12+2 till 2020	Continue 12+2 till 2030	Continue 12+2 till 2020
2016/17	46,149		1,029	475		3,284	
2017/18	47,929		969	494		1,713	
2018/19	48,179		967	496		1,513	
2019/20	48,229		738	497		1,600	
2020/21	48,594		714	501		1,300	
2021/22	48,679		301	501		1,300	
2022/23	49,177		310	505		1,600	
2023/24	49,962		257	512		1,800	500
2024/25	50,993	49,693	336	522	512	1,800	500
2025/26	51,935	49,345	541	530	508	1,800	500
2026/27	52,664	48,796	820	537	503	1,800	500
2027/28	53,107	47,973	826	540	494	1,800	500
2028/29	53,541	47,153	1,672	544	486	1,800	500
2029/30	53,125	45,496	2,018	538	469	1,800	500
2030/31	52,369	43,509	2,498	529	448	1,800	500

Note:

1. Teacher supply (year X) = teacher supply (year X-1) – retirement (year X-1) – attrition (year X-1) + New intake of teachers (year X-1). Teacher supply of 2016/17 is the actual number of teaching staff at primary schools from EMIS.
2. Retirement is the forecast made by HRMIS.
3. Attrition is assumed to be 1.03% of the total teaching staff.
4. Figures are based on the assumptions made in Table B-8 and 9.

1.5.6 [Step 6] Projection of gap between primary school teacher demand and supply

Assuming Case 4 where 100% of NER will be achieved in 2029/30, we consider the following 3 subcases in Table B-4, which are based on the target year to achieve the teacher allocation standard, 1 teacher per 37.5 students and 1.1 teacher per classroom.

- Case 4-A: The target year is set as 2029/30.
- Case 4-B: The target year is set as 2024/25
- Case 4-C: The target year is set as 2019/20.

The gaps between primary teacher demand and supply are shown in

Table B-11 and Table B-12, where:

- Figures in red/parenthesis are negative, indicating teacher shortage.
- The supply-demand gap is equal to the gap between the supply in Year X+1 and the demand in Year X.

As seen in the tables, it is estimated that there will be an acute shortage of teachers even in Case 4-A; it will be in the mid-2020s if 12+2 is terminated in 2020, and in the late 2020s even if it is continued throughout 2020s. The teacher shortage will obviously be much more serious in Cases 4-B and 4-C, irrespective of when 12+2 will be terminated, which cannot be coped with the expansion of

PTTCs and TECs. At the same time, it is not wise to expand the size of TEIs drastically, since the teacher demand will be stabilized in the late 2020s.

Table B-11 Primary Teacher Demand-Supply Gap: Continuing 12+2 till 2030

Year	Teacher Supply	Case 4-A		Case 4-B		Case 4-C	
		Teacher Demand	Supply-Demand Gap	Teacher Demand	Supply-Demand Gap	Teacher Demand	Supply-Demand Gap
2017/18		45,895	2,284	46,406	1,773	48,749	-570
2018/19	48,179	46,587	1,642	47,651	578	52,836	-4,607
2019/20	48,229	47,364	1,230	49,030	-436	57,714	-9,120
2020/21	48,594	48,206	473	50,531	-1,852	57,674	-8,995
2021/22	48,679	49,078	99	52,121	-2,944	57,633	-8,456
2022/23	49,177	49,901	61	53,722	-3,760	57,503	-7,541
2023/24	49,962	50,470	523	55,116	-4,123	57,050	-6,057
2024/25	50,993	50,983	952	56,515	-4,580	56,515	-4,580
2025/26	51,935	51,629	1,035	56,104	-3,440	56,104	-3,440
2026/27	52,664	52,795	312	56,223	-3,116	56,223	-3,116
2027/28	53,107	54,023	-482	56,359	-2,818	56,359	-2,818
2028/29	53,541	55,163	-2,038	56,354	-3,229	56,354	-3,229
2029/30	53,125	56,241	-3,872	56,241	-3,872	56,241	-3,872
2030/31	52,369	55,838		55,838		55,838	

Table B-12 Primary Teacher Demand-Supply Gap: Continuing 12+2 till 2020

Year	Teacher Supply	Case 4-A		Case 4-B		Case 4-C	
		Teacher Demand	Supply-Demand Gap	Teacher Demand	Supply-Demand Gap	Teacher Demand	Supply-Demand Gap
2017/18		45,895	2,284	46,406	1,773	48,749	-570
2018/19	48,179	46,587	1,642	47,651	578	52,836	-4,607
2019/20	48,229	47,364	1,230	49,030	-436	57,714	-9,120
2020/21	48,594	48,206	473	50,531	-1,852	57,674	-8,995
2021/22	48,679	49,078	99	52,121	-2,944	57,633	-8,456
2022/23	49,177	49,901	61	53,722	-3,760	57,503	-7,541
2023/24	49,962	50,470	-777	55,116	-5,423	57,050	-7,357
2024/25	49,693	50,983	-1,638	56,515	-7,170	56,515	-7,170
2025/26	49,345	51,629	-2,833	56,104	-7,308	56,104	-7,308
2026/27	48,796	52,795	-4,822	56,223	-8,250	56,223	-8,250
2027/28	47,973	54,023	-6,870	56,359	-9,206	56,359	-9,206
2028/29	47,153	55,163	-9,667	56,354	-10,858	56,354	-10,858
2029/30	45,496	56,241	-12,732	56,241	-12,732	56,241	-12,732
2030/31	43,509	55,838		55,838		55,838	

Next, without considering the current size of TEIs, the number of new teachers that will actually be needed every year is calculated for Cases 4-A, 4-B and 4-C as in Table B-13,
Table B-14 and Table B-15, respectively. In all three cases, 2016/17-2020/21 figures of the rightest column (New teachers required) are based on the actual values and the ministry's announcement. The figure of attrition will slightly different in each case due to the assumption that it accounts for 1.03% of total teaching staff. It is also noted that:

1. New teachers required up to 2020/21 are based on the plan of MoEYS.
2. Teaching staff in Year X+1 is calculated by the following formula:
   (Teaching staff in Year X) – (Retirement + Attrition in Year X) + (New teacher required in Year X)
3. New teachers required after 2021/22 are calculated by using the following formula:
   (New teachers required in Year X)
   = (Teacher demand in Year X+1) – (Teaching staff in Year X) + (Retirement +Attrition in Year X)

Again, Cases 4-B and 4-C seem not feasible due to acute demand in 2021/22. Another finding is that the required number of teachers fluctuates considerably every year in all cases.

Table B-13 New Teachers Required (Case 4-A)

Year	Expected total teaching staff	Retirement projection	Attrition projection	Estimated teacher demand	New teachers	
					Actual	Required
2016/17	46,149	975	475	-----	3,284	-----
2017/18	47,983	969	494	45,895	1,713	-----
2018/19	48,233	967	497	46,587	1,513	-----
2019/20	48,282	738	497	47,364	1,600	-----
2020/21	48,647	714	501	48,206	1,300	-----
2021/22	48,732	301	502	49,078	-----	1,972
2022/23	49,901	310	514	49,901	-----	1,393
2023/24	50,470	257	520	50,470	-----	1,290
2024/25	50,983	336	525	50,983	-----	1,507
2025/26	51,629	541	532	51,629	-----	2,239
2026/27	52,795	820	544	52,795	-----	2,592
2027/28	54,023	826	556	54,023	-----	2,522
2028/29	55,163	1,672	568	55,163	-----	3,318
2029/30	56,241	2,018	579	56,241	-----	2,194
2030/31	55,838	2,498	575	55,838	-----	-----

Table B-14 New Teachers Required (Case 4-B)

Year	Expected total teaching staff	Retirement projection	Attrition projection	Estimated teacher demand	New teachers	
					Actual	Required
2016/17	46,149	975	475	-----	3,284	-----
2017/18	47,983	969	494	46,406	1,713	-----
2018/19	48,233	967	497	47,651	1,513	-----
2019/20	48,282	738	497	49,030	1,600	-----
2020/21	48,647	714	501	50,531	1,300	-----
2021/22	48,732	301	502	52,121	-----	5,793
2022/23	53,722	310	553	53,722	-----	2,257
2023/24	55,116	257	568	55,116	-----	2,224
2024/25	56,515	336	582	56,515	-----	507
2025/26	56,104	541	578	56,104	-----	1,238
2026/27	56,223	820	579	56,223	-----	1,535
2027/28	56,359	826	580	56,359	-----	1,401
2028/29	56,354	1,672	580	56,354	-----	2,139
2029/30	56,241	2,018	579	56,241	-----	2,194
2030/31	55,838	2,498	575	55,838	-----	-----

Table B-15 New Teachers Required (Case 4-C)

Year	Expected total teaching staff	Retirement projection	Attrition projection	Estimated teacher demand	New teachers	
					Actual	Required
2016/17	46,149	975	475	-----	3,284	-----
2017/18	47,983	969	494	48,749	1,713	-----
2018/19	48,233	967	497	52,836	1,513	-----
2019/20	48,282	738	497	57,714	1,600	-----
2020/21	48,647	714	501	57,674	1,300	-----
2021/22	48,732	301	502	57,633	-----	9,574
2022/23	57,503	310	592	57,503	-----	449
2023/24	57,050	257	588	57,050	-----	310
2024/25	56,515	336	582	56,515	-----	507
2025/26	56,104	541	578	56,104	-----	1,238
2026/27	56,223	820	579	56,223	-----	1,535
2027/28	56,359	826	580	56,359	-----	1,401
2028/29	56,354	1,672	580	56,354	-----	2,139
2029/30	56,241	2,018	579	56,241	-----	2,194
2030/31	55,838	2,498	575	55,838	-----	-----

1.6. Projection at the provincial level

The same procedure that was used for projection at the national level is applied to make projection at the provincial level. Steps 4, 5, 6 are different from the national level analysis because the data of deployment of teachers by province is not available and it is difficult to make forecast as well. Thus, the exact number of new teachers required in each province will be analysed.

1.6.1. [Step 1] Projection of Primary Student Enrolment

The method used in Case 4 of Step 1 at the national level analysis is applied to make a projection of primary school enrolment, where school-age enrolment is projected based on population projection and NER target (100% achievement in 2029/30) and overage enrolment is projected based on the past trend. The result of the projection of primary student enrolment by province is shown in APPENDIX B-2.

Kampong Cham province was divided into two provinces in 2013: Kampong Cham and Tbaung Khmum province, and therefore, the data for these two provinces need to be treated differently from other provinces. Population projection data was published in 2008 and only the data for the total of two provinces are available. First, the population projection up to 2030 is adjusted based on the actual school-age population as of 2016/17, following the same procedure applied to other provinces. Then, the ratio of the actual school-age population of the two provinces in the 2016/17 data is calculated (Kampong Cham accounts for 55.1% of the total of two provinces). This ratio is applied to estimate the school-age population for each province after 2017/18.

Overage enrolment projection is based on the past trend in other provinces, but this is not feasible for these two provinces, since the data after the partition of the province is available only for three years from 2014/15. Thus, the past trend of the overage enrolment at the national level is used to seek the overage enrolment projection in these two provinces.

Table B-16 Summary of Enrolment Projection at National and Provincial Level Analysis

Year	Results of national level analysis			Combined results of provincial level analysis		
	School-age enrolment forecast	Overage enrolment forecast	Total enrolment	School-age enrolment forecast	Overage enrolment forecast	Total enrolment
2017/18	1,738,403	237,635	1,976,038	1,765,070	229,677	1,994,597
2018/19	1,763,510	206,965	1,970,475	1,788,800	195,390	1,983,892
2019/20	1,791,195	176,309	1,967,504	1,815,550	161,618	1,976,725
2020/21	1,820,491	145,669	1,966,160	1,844,657	132,401	1,976,467
2021/22	1,849,745	115,044	1,964,789	1,874,585	106,083	1,979,930
2022/23	1,875,867	84,434	1,960,301	1,902,289	81,916	1,983,312
2023/24	1,891,070	53,839	1,944,909	1,920,048	62,107	1,981,108
2024/25	1,903,382	23,259	1,926,641	1,935,930	47,492	1,982,205
2025/26	1,912,660	0	1,912,660	1,949,766	35,935	1,984,302
2026/27	1,916,708	0	1,916,708	1,959,066	28,501	1,985,970
2027/28	1,921,295	0	1,921,295	1,969,486	20,934	1,988,615
2028/29	1,921,163	0	1,921,163	1,971,370	15,337	1,984,681
2029/30	1,917,297	0	1,917,297	1,977,911	13,818	1,989,473
2030/31	1,903,561	0	1,903,561	1,976,391	12,389	1,986,137

APPENDIX B-2 shows the provincial data, and the following table shows the combined provincial data at the national level and compares with the national level analysis to see the consistency of the two levels of analysis. In general, tendency is the same and discrepancies are small. However, some differences are observed in number of overage enrolments: overage enrolments will disappear in 2024/25 at the national level analysis, while decrease of overage enrolment is slower and overage students will still exist after 2030/31 at the provincial level analysis. This may be due to the difficulty in making reliable projection of overage enrolment forecast using the fluctuating figures in provincial analysis.

1.6.1 [Step 2] Projection of primary school teacher demand

Province-wise teacher demand is projected with use of the same standard and target as in the national level analysis shown in Table B-2. The result of the projection of teacher demand by province is presented in APPENDIX B-3. Among 8 cases in the detailed analysis in APPENDIX B-3, the following two cases for Target 1 of "1.1 teachers per classroom" and Target 2 of "37.5 students per classroom" give more feasible figures than the others:

Case A: If the province has achieved none of these by 2016/17, then the both targets will be slowly achieved by 2029/30.
If the province has achieved one of these targets, then it keeps the achieved value (either more than 1.1 or below 37.5) until 2029/30, and the other target will be slowly achieved by 2029/30.

Case D: If the province has achieved both targets by 2016/17, then it keeps these achieved values (either more than 1.1 or below 37.5) until 2029/30.

The fact that indicators of some provinces exceed the government-set standards means that there are more than enough teachers in those provinces. Therefore, when the government-set standards are applied to those provinces, substantial gaps are observed from the actual number of teachers in 2016/17 and estimated number of teachers after 2017/18, indicating the needs to reduce teachers substantially. It may be difficult to take this option in reality, but the results would provide information for further discussion in setting and applying the standards of teacher allocation.

1.6.2. [Step 3] Projection of existing teachers (projection of teacher retirement and attrition)

Province-wise statistical information about retirement and attrition is not available. The data by province is estimated using the national data. The proportion of the teachers in province to the national total is calculated and then it is used to estimate the retirement and attrition projection, using the figures for the national level analysis.

1.6.3. [Step 4] Projection of new teacher intake
[Step 5] Projection of Teacher Supply
[Step 6] Projection of gap between teacher supply and demand

Currently, the coverage of each PTTC is defined, but the policy of developing TECs will shift the teacher training and appointment from the provincial level to the national level. In the provincial analysis, therefore, a required number of new teachers will be projected, not taking the capacity of teacher education institutions into consideration. The number of new teachers required in each province is presented in APPENDIX B-4. The summary of all provinces is shown in Table B-17 below. As seen in the table, there is a big gap in the sum of newly required teachers up to the year of 2030 between the provincial-level analysis and the national-level analysis in Case 4-A.

Box 2.2. How were teacher demand and supply adjusted? A case of Japan

Before World War II, teachers in Japan were trained in either of two institutions: normal schools (teacher training schools) for primary school teachers and higher normal schools for secondary school teachers under the education system of that time. Even under a "closed" teacher training system, there existed a teaching certificate system that those who passed the exam could obtain a teaching certificated.

Those from normal schools received the certificate when they graduated the school (route A). In other higher education institutions, graduates could receive a teaching certificate by taking a written examination and passing a document screening (route B). If the institution had teacher training courses approved by MOE (Ministry of Education), graduates could get a certification only by document screening without taking written examinations (route C). Thus, in pre-World War II Japan, there were three distinct routes to be a teacher.

In the case of secondary school teachers, however, those who graduated from higher normal schools, which as viewed as an "orthodox" route, only made up around 30% of the total secondary school teacher population, which meant that graduates from the other routes filled the remaining population before around 1920. In the 1930s, MOE-approved institution graduates (route C) took up over 50% of the teacher population, with non-MOE-approved institution graduates dropping to 15% (route B). The pass rate for route C was 80-90%, with some failing during the document screening, while route B accounted for 10%. Therefore, the routes B and C were used to make adjustments in teacher supply in the era when future teacher demands were difficult to estimate.

A major reason for the low number of higher normal schools was that the training courses were provided for free of charge and therefore required a huge budget. During times when the demand of teachers would decrease, it would be troublesome to adjust if all the teachers were produced through normal schools. MOE naturally preferred the route A teachers, or the graduates of 3-year higher normal schools, to the other two. However, due to the difficulties in projecting future school-age children, MOE hesitated over building new higher normal schools. Instead, they took a middle route (A') and built 5-15 temporary teacher training schools during the periods when the teacher demands were particularly high (1902-1907, 1921-1932, and 1940-1945). The government set up temporary teacher training schools affiliated to Tokyo Imperial University and public higher education institutions to cover the shortage of teacher supply. These schools were either the same length as normal schools or shorter, strategically focusing on specific subject areas. However, as the school fee was free, the number of graduates was limited (20-150 per year).

Japan's experiences in the closed teacher training system above can be summarized as: 1) It adopted a teaching certification system under a "closed" teacher training system; 2) The number of teachers from an "orthodox" route was controlled to around 30% of all teachers, and; 3) The majority of teachers were trained in non-teaching specific higher education institutions.

Table B-17 New Teachers Required by Province (selected case)

Province	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	Case used
Banteay Meanchey	8	91	114	158	177	149	128	140	136	140	150	146	188	145	Case A
Battambang	131	170	187	177	178	151	205	208	210	223	240	234	293	177	Case A
Kampong Cham	73	82	85	76	71	43	33	37	61	126	146	151	202	105	Case A
Kampong Chhnang	86	101	87	77	82	100	92	73	74	81	92	94	127	71	Case A
Kampong Speu	17	72	69	126	132	122	122	110	120	138	157	164	213	111	Case A
Kampong Thom	16	42	47	35	39	17	34	73	85	103	122	124	170	127	Case A
Kampot	63	66	58	57	68	54	71	90	100	115	130	5	303	138	Case A
Kandal	104	106	94	93	101	89	109	130	142	159	177	17	390	159	Case A
Kep	1	11	20	20	23	22	25	24	30	32	34	36	41	30	Case D
Koh Kong	20	28	28	28	28	24	23	31	36	37	40	38	49	38	Case D
Kratie	62	72	74	66	67	50	43	43	44	-8	119	65	89	61	Case A
Mondul Kiri	-13	13	17	17	16	15	14	20	22	27	34	34	45	43	Case D
Otdar Meanchey	13	26	36	40	43	35	31	40	61	70	75	74	89	74	Case A
Pailin	14	24	28	29	28	27	23	29	33	34	38	37	41	23	Case A
Phnom Penh	-63	544	562	557	560	512	460	390	349	316	297	263	340	-55	Case A
Preah Sihanouk	67	75	76	74	76	69	66	62	59	71	75	71	85	39	Case A
Preah Vihear	3	9	18	13	17	9	9	19	25	32	41	43	65	66	Case A
Prey Veng	106	104	99	89	97	81	87	91	112	139	167	219	299	204	Case A
Pursat	40	68	77	73	76	61	51	10	100	66	77	74	103	75	Case A
Ratanak Kiri	20	18	17	17	18	10	8	8	13	19	18	17	77	58	Case A
Siemreap	188	185	197	179	177	145	124	194	204	217	240	245	304	136	Case A
Stung Treng	-31	4	12	14	16	11	9	15	24	32	35	36	48	53	Case A
Svay Rieng	17	34	37	30	29	17	14	19	50	72	86	88	122	105	Case A
Takeo	63	56	51	47	111	108	113	108	124	147	170	174	231	192	Case A
Tbaung Khmum	3	69	72	61	61	37	28	30	50	106	122	124	166	85	Case A
Total	**1,008**	**2,070**	**2,162**	**2,153**	**2,291**	**1,958**	**1,922**	**1,994**	**2,264**	**2,494**	**2,882**	**2,573**	**4,080**	**2,260**	**32,111**
Case 4-A (Table B-13)	**3,284**	**1,713**	**1,513**	**1,600**	**1,300**	**1,972**	**1,393**	**1,290**	**1,507**	**2,239**	**2,592**	**2,522**	**3,318**	**2,194**	**28,437**

Note: Case D means the province exceeds the government standard in both indicators (classroom-teacher ratio, classroom-student ratio)

Box 2.3. How were teacher demand and supply adjusted? A case of Taiwan

Before the government switched from a closed to an open system in 1994, teacher training was conducted by three different types of normal schools, or teacher's institutions. The normal schools were designed for 5 years (upper secondary 3 years + 2 years), which were later (around 1980) transformed into "normal colleges" by upgrading the status to a higher education institution. And before 1994, primary school teachers were trained in the normal colleges, and secondary school teachers were trained and educated in normal universities, although this was not a strict division because some primary school teachers were trained in normal universities and vice versa.

After 1994, when general universities, or non-normal institutions, could also offer teacher training courses, some normal colleges were merged into these general universities as a normal college of the mother university, and others were transformed into general universities with adding non-teacher training faculties.

Table 1. Numbers of primary/secondary school children in Taiwan (Unit: thousand)

Year	1970	1975	1980	1985	1990	1995	2000	2005	2010
Primary	2445	2364	2233	2321	2354	1971	1925	1831	1519
L-Sec	799	1036	1075	1062	1160	1156	929	951	919
U-Sec	416	591	696	817	859	989	952	889	902

Table 2. Numbers of full-time teachers by level and year (Unit: thousand)

Year	1970	1975	1980	1985	1990	1995	2000	2005	2010
Primary	59	62	69	72	82	87	101	101	99
L-sec	27	38	44	46	51	55	49	48	51
U-sec	16	22	25	29	33	41	49	49	53

Table 3. Number of graduates from teacher training schools/colleges (Unit: as it is)

Year	1972	1975	1980	1985	1990	1995	2000	2005	2010
Normal schools	3537	3940	2557	-	-	-	-	-	-
Normal colleges	291	869	1098	4876	6202	6783	5313	3245	2674
Normal universities	1750	2084	2004	3213	3097	2519	2981	3020	3551

The years 1970 to 1980 saw a sharp increase in the number of lower secondary students, inflating from 799 thousand students to 1075 thousand students (Table 1). Upper secondary also saw an increase of 280 thousand students. Instead of setting up new institutions to meet this increased demand for teachers, the government increased the student quota of each existing teacher training institution. This produced an increase of 17 thousand new teachers of lower secondary schools (Table 2). Of the three types, graduates from normal colleges increased the most, boosting by 800 during 1972-1980. This trend continued throughout the 1990s (Table 3).

The shifting from a closed to an open system in Taiwan aimed to recruit more competent teachers through competition rather than to cope with demand-supply gaps, which made a teaching job one of the most difficult professions in Taiwan.

2 Analysis of Lower Secondary Teacher Demand and Supply

2.1. Objective of the study

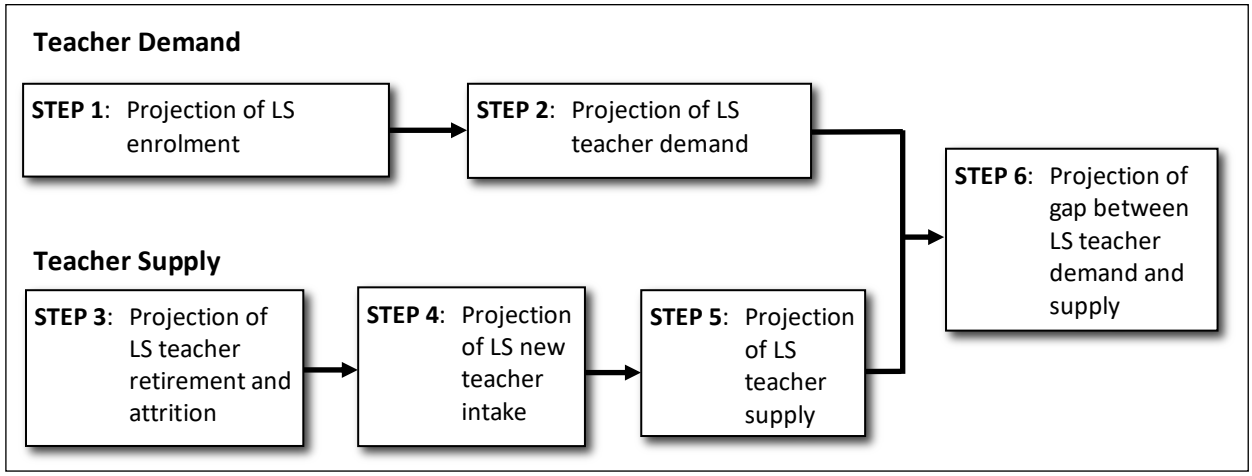
This study aims to forecast teacher demand and supply in lower secondary (LS) education up to AY2030/31 academic year. The current GER in LS education (55.7% in AY2016/17) indicates that there is much room for enrolment increase in the future. Experience in other ASEAN countries shows that the enrolment in LS education will expand fuelled by the country's economic growth after the universal primary education is achieved. It is therefore important to plan ahead for the possible expansion of LS enrolment and to prepare the sufficient as well as qualified teaching force to meet the teacher demand to come.

This study uses two different projections in LS enrolment under different assumptions to seek the teacher demand. The results are expected to serve as the basic information to plan teacher supply by adjusting teacher education and management system.

2.2. Method

In this analysis, teacher demand and supply are separately estimated and compared to see the gap, which equals the number of new teachers required. The projections are made both at the national level and provincial level. The following figure shows the flow of steps taken in the analysis.

Figure B-5 Steps of LS Teacher Demand and Supply Analysis



2.3. Data used

The following data sources were used in this study:

- EMIS of public schools by MoEYS (AY2007/08-2016/17)
- EMIS of private schools by MoEYS (AY2014/15-2016/17)
- Population forecast by Ministry of Planning (MOP) (up to 2030)
- Retirement projection (AY2016/17-2030/31) and attrition data (AY2007/08-2015/16) by HRMIS
- Data of entrants to RTTC provided by MoEYS (AY2011/12-2017/18)

2.4. Limitations of this study

Limitations of this study are as described below.

Subject-wise analysis is not conducted

Teacher demand and supply by subject is *not* conducted due to the limitations of the available data. The combination of subjects that a teacher actually teaches is not strictly followed in the real practice and the information on subjects taught by a teacher in the real practice cannot be gathered from the available HRMIS data. It is, however, possible to suggest how many teachers for which subjects should be produced in the future without consideration of the existing teachers' specialization.

School-age population forecast needs to be examined.

The size of teacher demand depends on how student enrolments are projected. Population projection by MOP, however, shows large discrepancies from the actual population. In this study, the MOP's school-age population projection is revised using proportion of the actual population and MOP's projection as of AY2016/17. The enrolment projection needs to be recalculated in case the updated population projection by MOP becomes available.

Staffing norm is uniformly applied to all provinces

In the provincial-wise analysis, the same standard of teacher-class ratio and pupil-class ratio is applied to all provinces. Provinces with lower population density may need upward adjustment in teacher demand projection.

Additional information of retirement after AY2030/31 will add more accuracy in the projection of new teacher demand

In this analysis, teacher retirement projection up to AY2030/31 is used. Retirements in the late 2020s are projected to increase to around 2,000. If such tendency will continue, the demand of the new teachers may become larger. Further information of retirement after AY2030/31 or teachers' age could add more accuracy in teacher demand of this study.

Teacher demand for private school teachers is not discussed

This study only looks at teacher demand and supply related to public system. Policies of teacher qualification and teacher education for private school teachers are not yet formulated and private education data in EMIS is still limited. Thus, teacher demand for private schools is not estimated in this study, although it is indispensable to count private school enrolments in producing the accurate Gross Enrolment Rate (GER).

2.5. Projection at the national level

2.5.1. [Step 1] Projection of LS student enrolment

Taking availability of data and contexts of education in Cambodia into consideration, the following cases were examined to seek the future enrolment in LS education.

Case 1: Estimate the future enrolment based on the past trend of changes in the total enrolment

- The trend of the past enrolment is used to draw an approximate curve to derive the future enrolment trend.

Case 2: Estimate the future enrolment based on the past trend of changes in school-age enrolment and over-age enrolment respectively

- With the assumption that school-age enrolment (Age 12-14) and overage enrolment (over 14) show different patterns of changes in enrolment, projection for each is made separately using the past data to draw different approximate curves.

Case 3: Estimate the future enrolment using the population forecast and GER forecast based on the past trend of changes in GER

- The trend of the past GER is used to forecast the future GER trend. Then, LS enrolment is derived by multiplying the projected school-age population by the projected GER.

Case 4: Estimate the future enrolment using the population forecast and GER target (Gradually achieving 100% of GER by AY2029/30)

- Annual GER target is determined based on the assumption that 100% of GER will be achieved in AY2029/2030. Multiplying the projected school-age population by the GER target of each year produces the projected LS enrolment.

Case 5: Estimate the future enrolment using the population forecast and GER target (Slowly achieving 100% of GER by AY2034/35)

- Annual GER target is determined based on the assumption that 100% of GER will be achieved in AY2034/2035. Multiplying the projected school-age population by the GER target of each year produces the projected LS enrolment.

Detailed explanation and results of calculation in each case are summarized in APPENDIX B-5.

The following figure and table illustrate the enrolment forecasts in all cases. Enrolments of AY2007/08-AY2016/17 are actual numbers, and those of AY2017/18-AY2030/31 are projected numbers.

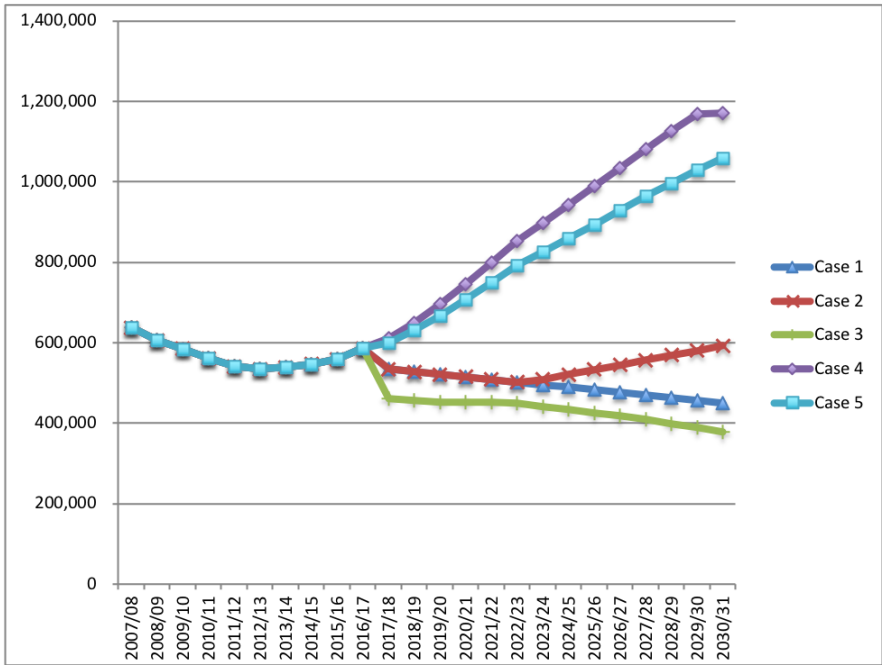


Figure B-6 LS Enrolment Projection (Case 1-Case 5)

Table B-18 LS Enrolment Projections (Cases 1-5)

Year	Enrolment (actual)	Enrolment (Forecast)				
		Case 1	Case 2	Case 3	Case 4	Case 5
2007/08	637,629	-----	-----	-----	-----	-----
2008/09	605,707	-----	-----	-----	-----	-----
2009/10	585,115	-----	-----	-----	-----	-----
2010/11	560,868	-----	-----	-----	-----	-----
2011/12	541,147	-----	-----	-----	-----	-----
2012/13	534,710	-----	-----	-----	-----	-----
2013/14	538,626	-----	-----	-----	-----	-----
2014/15	546,678	-----	-----	-----	-----	-----
2015/16	558,464	-----	-----	-----	-----	-----
2016/17	586,042	-----	-----	-----	-----	-----
2017/18	-----	534,153	534,154	461,850	609,995	600,684
2018/19	-----	527,727	527,728	455,530	649,406	630,613
2019/20	-----	521,301	521,302	452,719	695,112	666,433
2020/21	-----	514,875	514,875	451,826	745,765	706,675
2021/22	-----	508,448	508,449	451,095	799,082	749,085
2022/23	-----	502,022	502,023	449,089	852,581	791,327
2023/24	-----	495,596	508,972	441,543	897,286	825,184
2024/25	-----	489,169	520,905	433,682	942,411	859,300
2025/26	-----	482,743	532,839	425,680	988,307	893,996
2026/27	-----	476,317	544,773	417,432	1,034,744	929,064
2027/28	-----	469,891	556,706	408,730	1,081,151	963,997
2028/29	-----	463,464	568,640	398,918	1,125,540	997,045
2029/30	-----	457,038	580,574	388,462	1,168,793	1,029,028
2030/31	-----	450,612	592,507	377,355	1,171,780	1,059,682

Table B-19 GER Projection of Public Schools (Cases 1-5)

Year	GER (actual)	GER (forecast)				
		Case 1	Case 2	Case 3	Case 4	Case 5
2007/08	63.62%	-----	-----	-----	-----	-----
2008/09	61.60%	-----	-----	-----	-----	-----
2009/10	58.09%	-----	-----	-----	-----	-----
2010/11	58.49%	-----	-----	-----	-----	-----
2011/12	54.96%	-----	-----	-----	-----	-----
2012/13	53.58%	-----	-----	-----	-----	-----
2013/14	53.46%	-----	-----	-----	-----	-----
2014/15	53.34%	-----	-----	-----	-----	-----
2015/16	53.78%	-----	-----	-----	-----	-----
2016/17	55.71%	-----	-----	-----	-----	-----
2017/18	-----	51.62%	51.62%	44.63%	58.95%	58.05%
2018/19	-----	50.53%	50.53%	43.62%	62.18%	60.39%
2019/20	-----	49.06%	49.07%	42.61%	65.42%	62.72%
2020/21	-----	47.40%	47.40%	41.60%	68.66%	65.06%
2021/22	-----	45.75%	45.75%	40.59%	71.90%	67.40%
2022/23	-----	44.25%	44.25%	39.58%	75.14%	69.74%
2023/24	-----	43.29%	44.46%	38.57%	78.38%	72.08%
2024/25	-----	42.37%	45.11%	37.56%	81.62%	74.42%
2025/26	-----	41.45%	45.75%	36.55%	84.86%	76.76%
2026/27	-----	40.55%	46.38%	35.54%	88.10%	79.10%
2027/28	-----	39.70%	47.03%	34.53%	91.34%	81.44%
2028/29	-----	38.94%	47.78%	33.52%	94.58%	83.78%
2029/30	-----	38.25%	48.59%	32.51%	97.82%	86.12%
2030/31	-----	37.62%	49.46%	31.50%	97.82%	88.46%

Table B-18 and Table B-19 show the projection of enrolment in public schools and GER in five cases. The projection in Case 4 and 5 is based on a GER target in which both public and private school enrolment are considered. Thus, public enrolment is calculated by subtracting private school

enrolment (assumed to be 2.18% of the total enrolment) from the total enrolment. That is why Case 4, where the assumption is 100% of GER (combined enrolment of public and private schools) to be achieved in AY 2029/30, does not reach 100% in AY2029/30 with only enrolments in public schools, although these is an unignorable possibility that a private education sector would be enlarged as the country is developed in economic terms. (See APPENDIX B-5 for details.)

From the above five cases, Cases 2 and 4 are used for further analysis in this study. It is firstly because while linear regression measurements are used in Case 1-3, both enrolment and GER in Cases 1 and 3 keep declining in the future, which unlikely to occur under the real situation in Cambodia. The projections yielded R-squared values of 0.336 and 0.690 respectively, indicating that the projections are not sufficiently reasonable. On the other hand, Case 2 shows a slight increase in enrolment, while GER is decreasing due to the increasing trend of school-age population projection. This may underestimate the future enrolment considering the government attention to universal access to LS education, but reflect the current situation of enrolment. R-squared values are 0.832 for school-age population and 0.906 for over-age population indicating that the projection is reasonable.

Cases 4 and 5 show a similar trend. Case 4 shows the steeper increase in enrolment by setting the target of 100% of GER in AY2029/2030 given that universal access to LS education is one of the Sustainable Development Goals (SDGs). The net enrolment ratio of primary schools are getting close to 100% except some provinces, and the expansion of LS enrolment may be expected soon which is fuelled by the country's economic growth. It is therefore useful to have a view of scale in teacher demand of Case 4.

2.5.2. [Step 2] Projection of LS teacher demand

The demand of teachers is projected based on the standards and targets related to the ratios between classroom, teachers and students. The new staffing norm proposed in the MoEYS directive in 2014 is shown in Table B-20 below. They are expected to be achieved by the first quarter of Year 2020 (TPAP 2015).

Table B-20 Standard of Teaching Personnel in lower secondary education

Educational establishments and teacher training establishments	Present		New proposal	
	Classroom standard: teacher	Pupil–classroom ratio	Classroom standard: teacher	Pupil–classroom ratio
- LS education	1:1.7	45	1:1.833	40

Source: MoEYS (2014). Directive on Standard of the Usage of Educational Personnel

Using the enrolment forecast of Cases 2 and 4 projected in Step 1, teacher demand is calculated in the following procedure. Data of numbers of classrooms allocated to LS education are not available in EMIS, and thus the data of classes is used instead. Pupil-classroom ratio in AY2016/17 is 45.649, which is higher than the standard of 40. Assuming that the situation is gradually improving, the gap between 45.649 and 40 is divided by 3 years and added to make the target ratio so that the ratio will be 40 in AY2019/20. Using those target pupil-class ratios, the number of classes are projected.

Classroom-teacher ratio in AY2016/17 is 2.242, which already satisfies the target (1.833). Therefore, 1.833 of class-teacher ratio is applied to all years from AY2017/18 to 2030/31. Number of teachers, then is calculated by multiplying the projected number of classes by the target class-teacher ratio. Table B-21 shows the teacher demand projection in Case 2 and Table B-22 shows the teacher demand projection in Case 4.

Table B-21 Teacher Demand Projection in Case 2

Year	LS Enrolment		No. of classrooms		Pupil-Class Ratio		Class-Teacher Ratio		Teacher Demand	
	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast
2007/08	637,629	---	13,300	---	47.942	---	1.741	---	23,158	---
2008/09	605,707	---	13,281	---	45.607	---	1.775	---	23,576	---
2009/10	585,115	---	13,024	---	44.926	---	1.844	---	24,022	---
2010/11	560,868	---	12,504	---	44.855	---	2.033	---	25,423	---
2011/12	541,147	---	12,251	---	44.172	---	2.209	---	27,067	---
2012/13	534,710	---	12,184	---	43.886	---	2.220	---	27,054	---
2013/14	538,626	---	12,281	---	43.858	---	2.266	---	27,827	---
2014/15	546,678	---	12,390	---	44.123	---	2.243	---	27,793	---
2015/16	558,464	---	12,590	---	44.358	---	2.252	---	28,354	---
2016/17	586,042	---	12,838	---	45.649	---	2.242	---	28,782	---
2017/18	---	534,154	---	12,205	---	43.766	---	1.833	---	22,372
2018/19	---	527,728	---	12,600	---	41.883	---	1.833	---	23,096
2019/20	---	521,302	---	13,033	---	40	---	1.833	---	23,889
2020/21	---	514,875	---	12,872	---	40	---	1.833	---	23,594
2021/22	---	508,449	---	12,711	---	40	---	1.833	---	23,299
2022/23	---	502,023	---	12,551	---	40	---	1.833	---	23,006
2023/24	---	508,972	---	12,724	---	40	---	1.833	---	23,323
2024/25	---	520,905	---	13,023	---	40	---	1.833	---	23,871
2025/26	---	532,839	---	13,321	---	40	---	1.833	---	24,417
2026/27	---	544,773	---	13,619	---	40	---	1.833	---	24,964
2027/28	---	556,706	---	13,918	---	40	---	1.833	---	25,512
2028/29	---	568,640	---	14,216	---	40	---	1.833	---	26,058
2029/30	---	580,574	---	14,514	---	40	---	1.833	---	26,604
2030/31	---	592,507	---	14,813	---	40	---	1.833	---	27,152

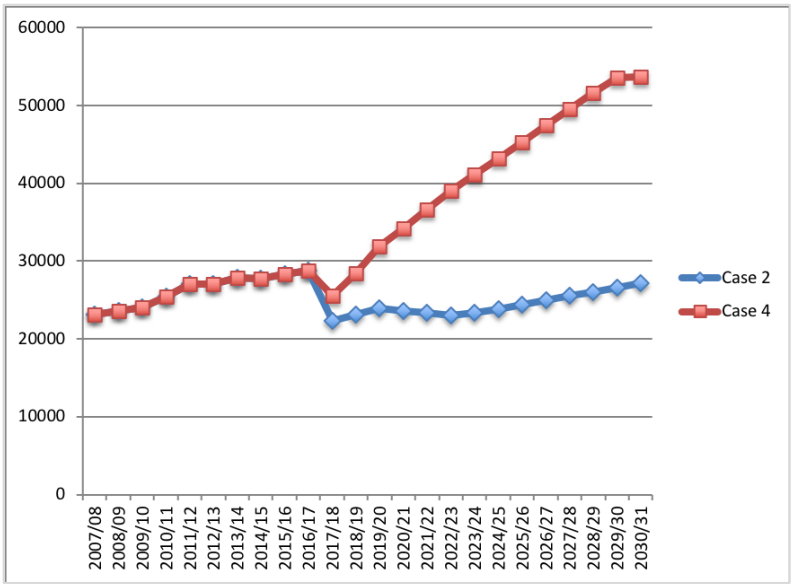
Table B-22 Teacher Demand Projection in Case 4

Year	LS Enrolment		No. of classes		Pupil-Class Ratio		Class-Teacher Ratio		Teacher Demand	
	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast
2007/08	637,629	---	13,300	---	47.942	---	1.741	---	23,158	---
2008/09	605,707	---	13,281	---	45.607	---	1.775	---	23,576	---
2009/10	585,115	---	13,024	---	44.926	---	1.844	---	24,022	---
2010/11	560,868	---	12,504	---	44.855	---	2.033	---	25,423	---
2011/12	541,147	---	12,251	---	44.172	---	2.209	---	27,067	---
2012/13	534,710	---	12,184	---	43.886	---	2.220	---	27,054	---
2013/14	538,626	---	12,281	---	43.858	---	2.266	---	27,827	---
2014/15	546,678	---	12,390	---	44.123	---	2.243	---	27,793	---
2015/16	558,464	---	12,590	---	44.358	---	2.252	---	28,354	---
2016/17	586,042	---	12,838	---	45.649	---	2.242	---	28,782	---
2017/18	---	609,995	---	13,938	---	43.766	---	1.833	---	25,548
2018/19	---	649,406	---	15,506	---	41.883	---	1.833	---	28,422
2019/20	---	695,112	---	17,378	---	40.000	---	1.833	---	31,854
2020/21	---	745,765	---	18,645	---	40.000	---	1.833	---	34,176
2021/22	---	800,490	---	19,978	---	40.000	---	1.833	---	36,620
2022/23	---	854,463	---	21,315	---	40.000	---	1.833	---	39,070
2023/24	---	897,286	---	22,433	---	40.000	---	1.833	---	41,120
2024/25	---	942,411	---	23,561	---	40.000	---	1.833	---	43,187
2025/26	---	988,307	---	24,708	---	40.000	---	1.833	---	45,290
2026/27	---	1,034,744	---	25,869	---	40.000	---	1.833	---	47,418
2027/28	---	1,081,151	---	27,029	---	40.000	---	1.833	---	49,544
2028/29	---	1,125,540	---	28,139	---	40.000	---	1.833	---	51,579
2029/30	---	1,168,793	---	29,220	---	40.000	---	1.833	---	53,560
2030/31	---	1,171,780	---	29,295	---	40.000	---	1.833	---	53,698

Figure B-7 shows teacher demand projection in both cases. The decline in teacher demand in AY2017/18 is due to application of standard class-teacher ratio of 1.833 from AY2017/18 while the

actual class-teacher ratio of AY2016/17 was 2.242. It is not realistic to make big reduction in number of teachers who are already in service and thus the numbers of reduction shown here are rather theoretical.

Figure B-7 LS Teacher Demand Projection (Case 2 and Case 4)



Note: Figures from AY2007/08 to AY2016/17 are actual and those from AY2017/18 to AY2030/31 are projection.

2.5.3. [Step 3] Projection of LS teacher retirement and attrition

Those who leave teaching profession include retirement at the retirement age and attrition due to other reasons such as changing jobs, death, illness, etc. Projection of teacher retirement at the retirement age up to AY2030/31 was prepared by HRMIS as shown in Table B-23.

Table B-23 LS Teacher Retirement Projection

Year	Forecast
2016/17	293
2017/18	219
2018/19	130
2019/20	64
2020/21	59
2021/22	27
2022/23	34
2023/24	38
2024/25	61
2025/26	111
2026/27	244
2027/28	552
2028/29	1,052
2029/30	1,375
2030/31	2,040

Source: HRMIS

The information on teacher attrition on the other hand is limited to past data by HRMIS as shown in Table B-24. Annual figures of attrition fluctuate considerably. Thus, 0.89%, the share of total attrition

out of the total number of teachers for nine years (AY2007/8-2015/16) is applied to estimate the attrition up to AY 2030/31.

Table B-24 LS Teacher Attrition

Year	Number of attritions	Number of teaching staff	Attrition %
2007/08	192	23,158	0.83%
2008/09	282	23,576	1.20%
2009/10	283	24,022	1.18%
2010/11	326	25,423	1.28%
2011/12	243	27,067	0.90%
2012/13	218	27,054	0.81%
2013/14	185	27,827	0.66%
2014/15	258	27,793	0.93%
2015/16	65	28,354	0.23%
		Average attrition %	**0.88%**

Source: HRMIS

2.5.4. [Step 4] Projection of new LS teacher intake

Next, the new teacher intake is estimated. While lower secondary teachers have been produced through RTTCs, almost all the students who have entered RTTCs complete schooling under the present circumstance to be appointed as LS teachers. Therefore, the number of entrants to RTTCs will be treated as the new intake of teachers after two years of schooling. The government has upgraded Phnom Penh RTTC and Battambang RTTC to 4-year TECs in November 2018. Each TEC accepts 100 students for a lower secondary teacher preparation programme in 2018, and will keep 2-year LS course in parallel at least for AY2018/19, although the plan after AY2018/19 is not yet clear. While there are several different scenarios, this report assumes that each RTTC will have 100 students in 2018 and 150 students from 2019 onwards. In addition, as in the discussion on primary teachers, it examines 2 cases that MoEYS continues 12+2 (i) throughout 2020s, and (ii) till 2020 to completely move to 12+4. In the former case, the number of entrants to RTTCs from 2019 onwards are assumed to be 480 based on the 2018's figure. In the latter case, therefore, the new teachers will be supplied only from TECs from 2023. The projections are as shown in Table B-25, Table B-26 and Table B-27.

Table B-25 RTTC Entrants (Actual and Assumption)

Name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Phnom Penh	223	187	120	96	0	112	96	75	80	80	80	80	80	80	80	80	80	80	80	80
Battambang	349	326	228	196	0	190	141	86	80	80	80	80	80	80	80	80	80	80	80	80
Kandal	245	227	180	155	0	78	52	65	80	80	80	80	80	80	80	80	80	80	80	80
Takeo	199	176	138	88	0	145	119	84	80	80	80	80	80	80	80	80	80	80	80	80
Prey Veng	178	159	116	100	0	69	51	67	80	80	80	80	80	80	80	80	80	80	80	80
Kampong Cham	237	213	178	165	0	174	141	99	80	80	80	80	80	80	80	80	80	80	80	80
RTTC Total	**1,431**	**1,288**	**960**	**800**	**0**	**768**	**600**	**476**	**480**	**480**	**480**	**480**	**480**	**480**	**480**	**480**	**480**	**480**	**480**	**480**
Year to start teaching	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032

Source: MOEYS for figures of 2011/12-2018/19

Note:

- Figures of 2011/12-2016/17 are actual, and those of 2017/18-18/19 are based on the MoEYS announcement. Those of 2019/20-2030/31 are based on the assumption that the same level of new intake will continue in all the 6 RTTCs.

Table B-26 TEC Entrants for LS teachers (Assumption)

Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Phnom Penh TEC	100	150	150	150	150	150	150	150	150	150	150	150	150
Battambang TEC	100	150	150	150	150	150	150	150	150	150	150	150	150
TEC Total	200	300	300	300	300	300	300	300	300	300	300	300	300
Year to start teaching	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034

Note: Figures of 2018/19 is planned capacity decided by MOEYS in September 2018. Figures for other years are assumptions.

Table B-27 Total new intake of LS teachers (Assumption)

Year to start teaching	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total new intake:													
(i) Continuing 12+2 till 2030	768	600	476	480	680	780	780	780	780	780	780	780	780
(ii) Continuing 12+2 till 2020	768	600	476	480	680	300	300	300	300	300	300	300	300

2.5.5. [Step 5] Projection of LS teacher supply

Using the projected figures of retirement, attrition, and new teacher intake, teacher supply is estimated as shown in Table B-28.

Table B-28 Lower Secondary Teacher Supply

Year	Teacher supply[1]		Retirement[2]	Attrition[3]		New intake of teachers[4]	
	Continue 12+2 till 2030	Continue 12+2 till 2020		Continue 12+2 till 2030	Continue 12+2 till 2020	Continue 12+2 till 2030	Continue 12+2 till 2020
2016/17	28,782		293	253		800	
2017/18	29,036		219	256		0	
2018/19	28,561		130	251		768	
2019/20	28,948		64	255		600	
2020/21	29,229		59	257		476	
2021/22	29,389		27	259		480	
2022/23	29,583		34	260		680	
2023/24	29,969		38	264		780	300
2024/25	30,447	29,967	61	268	264	780	300
2025/26	30,898	29,943	111	272	263	780	300
2026/27	31,295	29,868	244	275	263	780	300
2027/28	31,556	29,661	552	278	261	780	300
2028/29	31,506	29,148	1,052	277	257	780	300
2029/30	30,957	28,140	1,375	272	248	780	300
2030/31	30,090	26,817	2,040	265	236	780	300

Note:

1. Teacher supply (year X) = teacher supply (year X-1) – retirement (year X-1) – attrition (year X-1) + New intake of teachers (year X-1). Teacher supply of 2016/17 is the actual number of teaching staff at primary schools from EMIS.
2. Retirement is the forecast made by HRMIS (Table B-23).
3. Attrition is assumed to be 0.88% of the total teaching staff.
4. New intake of teachers is based on the assumption made in Table B-27.

2.5.6. [Step 6] Projection of gap between LS teacher demand and supply

The following tables show how the teacher supply meets teacher demand in Case 2 and Case 4, under the assumptions that 12+2 will continue till 2030 (Table B-29) and till 2020 (Table B-30). Figures in red are negative, indicating teacher shortage. In Case 2, where the GER of lower secondary students will be gradually increased based on the past trend (i.e., not setting any numerical target about GER), there will be sufficient number of lower secondary teachers until 2030 whether 12+2 will be continued or terminated. However, in Case 4, which aims to achieve 100% GRE by 2030, an acute shortage of lower secondary teachers will emerge around 2020, and become more serious year after year, which will reach 20,000 in the late 2020s in both scenarios. In order to balance the lower secondary teacher demand and supply at the year of 2030 in Case 4, MoEYS is required to produce at least 2,000 new teachers every year from 2020 to 2030, although it is far beyond the capacity of RTTCs and TECs.

Table B-29 LS Teacher Supply-Demand Gap: Continuing 12+2 till 2030

Year	Teacher Supply	Case 2		Case 4	
		Teacher Demand	Supply-Demand Gap	Teacher Demand	Supply-Demand Gap
2017/18	29,036	22,372	6,664	25,548	3,488
2018/19	28,561	23,096	5,465	28,422	139
2019/20	28,948	23,889	5,059	31,854	-2,906
2020/21	29,229	23,594	5,635	34,176	-4,947
2021/22	29,389	23,299	6,090	36,620	-7,231
2022/23	29,583	23,006	6,577	39,070	-9,487
2023/24	29,969	23,323	6,646	41,120	-11,151
2024/25	30,447	23,871	6,576	43,187	-12,740
2025/26	30,898	24,417	6,481	45,290	-14,392
2026/27	31,295	24,964	6,331	47,418	-16,123
2027/28	31,556	25,512	6,044	49,544	-17,988
2028/29	31,506	26,058	5,448	51,579	-20,073
2029/30	30,957	26,604	4,353	53,560	-22,603
2030/31	30,090	27,152	2,938	53,698	-23,608

Table B-30 LS Teacher Supply-Demand Gap: Continuing 12+2 till 2020

Year	Teacher Supply	Case 2		Case 4	
		Teacher Demand	Supply-Demand Gap	Teacher Demand	Supply-Demand Gap
2017/18	29,036	22,372	6,661	25,548	3,488
2018/19	28,561	23,096	5,457	28,422	139
2019/20	28,948	23,889	5,049	31,854	-2,906
2020/21	29,229	23,594	5,623	34,176	-4,947
2021/22	29,389	23,299	6,073	36,620	-7,231
2022/23	29,583	23,006	6,560	39,070	-9,487
2023/24	29,969	23,323	6,624	41,120	-11,151
2024/25	29,967	23,871	6,073	43,187	-13,220
2025/26	29,943	24,417	5,499	45,290	-15,347
2026/27	29,868	24,964	4,874	47,418	-17,550
2027/28	29,661	25,512	4,118	49,544	-19,883
2028/29	29,148	26,058	3,057	51,579	-22,431
2029/30	28,140	26,604	1,497	53,560	-25,420
2030/31	26,817	27,152	-375	53,698	-26,881

Next, putting aside the current capacity of TEIs, the number of new teachers required every year is calculated in Table B-31 and Table B-32 for Case 2 and Case 4, respectively, applying the following rules.

1. Total teaching staff of AY2017/18 is based on EMIS2018, but that of AY2018/19 onwards is calculated by the following formula:
   (Total teaching staff in Year X+1)
   = (Total teaching staff in Year X) – (Retirement in Year X) – (Attrition in Year X) + (New teachers in Year X)
2. The attrition in Year X is assumed to be 0.89% of the total teaching staff in Year X.
3. The number of actual new teachers is assumed to be equal to the number of RTTC entrants of 2 years up to AY2018/19.
4. The number of new teachers required is calculated by the following formula:
   (The number of new teachers required in Year X)
   = (Teacher demand in Year X+1) – {(Total teaching staff in Year X) – (Retirement in Year X) – (Attrition in Year X)}
   The number of new teachers required is 0 (zero) if the above value is negative.

Table B-31 New LS Teachers Required in Case 2

Year	Expected total teaching staff[1]	Retirement projection	Attrition projection[2]	Estimated teacher demand	New teachers	
					Actual[3]	Required[4]
2017/18	28,291	219	248	22,372	0	0
2018/19	27,824	130	244	23,096	768	0
2019/20	28,218	64	248	23,889	600	0
2020/21	28,506	59	250	23,594	476	0
2021/22	28,673	27	252	23,299	----	0
2022/23	28,394	34	249	23,006	----	0
2023/24	28,111	38	247	23,323	----	0
2024/25	27,826	61	244	23,871	----	0
2025/26	27,521	111	242	24,417	----	0
2026/27	27,168	244	239	24,964	----	0
2027/28	26,685	552	234	25,512	----	159
2028/29	26,058	1,052	229	26,058	----	1,827
2029/30	26,604	1,375	234	26,604	----	2,157
2030/31	27,152	2,040	238	27,152	----	----
				Total	**1,844**	**4,143**

Table B-32 New LS Teachers Required in Case 4

Year	Expected total teaching staff[1]	Retirement projection	Attrition projection[2]	Estimated teacher demand	New teachers	
					Actual[3]	Required[4]
2017/18	28,291	219	248	25,548	0	----
2018/19	27,824	130	244	28,422	768	----
2019/20	28,218	64	248	31,854	600	----
2020/21	28,506	59	250	34,176	476	----
2021/22	28,673	27	252	36,620	----	10,676
2022/23	39,070	34	343	39,070	----	2,427
2023/24	41,120	38	361	41,120	----	2,466
2024/25	43,187	61	380	43,187	----	2,544
2025/26	45,290	111	398	45,290	----	2,637
2026/27	47,418	244	417	47,418	----	2,787
2027/28	49,544	552	435	49,544	----	3,022
2028/29	51,579	1,052	453	51,579	----	3,486
2029/30	53,560	1,375	471	53,560	----	1,984
2030/31	53,698	2,040	472	53,698	----	----
				Total	**1,844**	**32,029**

In Case 2, new teachers will not be needed until AY2027/28, and it will be sufficient if 450-500 new teachers are produced every year. However, the large supply of new teachers will be necessary afterwards. In Case 4, on the other hand, more than 2,500-3,000 new teachers will be required every year. The demand of new teachers in 2021/22 is significantly large, because in this scenario teacher shortage has already started in 2019/20, and the number of new teachers to be required in 2021/22 is calculated by accumulating the figures of 3 years from 2019 to 2021.

The above figures show exact numbers of new teachers required to meet the teacher demand of each year, however, these numbers are obviously not realistic. It is not possible to close TEIs for several years nor suddenly increase the capacity of TEIs. Instead, constant or gradual changes in teacher supply needs to be considered for efficient management of TEIs and for ensuring well-balanced age distribution of teachers in service as well.

The fluctuated figures of newly required teachers for Case 2 and Case 4, which are shown in Table B-31 and Table B-32, are averaged as in Table B-33 and Table B-34, respectively, in a way that the same number of teachers will be supplied every year to close the supply-demand gap in AY2030/31.

It is noted that positive figures in these tables mean oversupply, and negative figures mean undersupply of teachers.

Table B-33 Adjusted New Teachers Intake in Case 2

Year	Total teaching staff	Retirement projection	Attrition projection	Teacher Demand	Adjusted New teachers Intake	Supply-demand gap
2021/22	28,659	27	252	23,299	500	5,360
2022/23	28,377	34	250	23,006	500	5,869
2023/24	28,090	38	247	23,323	500	5,759
2024/25	27,802	61	245	23,871	500	5,413
2025/26	27,494	111	242	24,417	500	5,038
2026/27	27,138	244	239	24,964	500	4,608
2027/28	26,653	552	235	25,512	500	4,041
2028/29	26,058	1,052	229	26,058	500	3,165
2029/30	26,604	1,375	234	26,604	500	1,790
2030/31	27,152	2,040	239	27,152	500	95

Table B-34 Adjusted New Teachers Intake in Case 4

Year	Total teaching staff	Retirement projection	Attrition projection	Teacher Demand	Adjusted New teachers Intake	Supply-demand gap
2021/22	28,670	27	252	36,620	3,600	-7,950
2022/23	39,070	34	344	39,070	3,600	-7,079
2023/24	41,120	38	362	41,120	3,600	-5,907
2024/25	43,187	61	380	43,187	3,600	-4,774
2025/26	45,290	111	399	45,290	3,600	-3,718
2026/27	47,418	244	417	47,418	3,600	-2,756
2027/28	49,544	552	436	49,544	3,600	-1,943
2028/29	51,579	1,052	454	51,579	3,600	-1,366
2029/30	53,560	1,375	471	53,560	3,600	-1,253
2030/31	53,698	2,040	473	53,698	3,600	363

In Case 2, it is suggested that 500 new teachers will satisfy teacher demand in all years as the national level analysis. The situation of over-supply of teachers will continue until AY2029/2030 but to cope with the large size of retirement in the late 2020s, constant teacher supply should be kept. If the size of teacher retirement is larger than 500 after AY2031/32, more teachers will have to be supplied.

In Case 4, the supply of approximately 3,600 teachers are suggested every year throughout the 2020s. After that the enrolment is expected to increase less and later to decrease, and therefore, the size of teacher supply should be smaller.

In Case 2, the current capacity of RTTC will be sufficient even after it is reorganized to four-year TECs. Case 4, on the other hand, requires a special but temporary measure to cope with the huge demand of teachers for limited number of years.

For many provinces, achieving 100% of GER by AY2029/30 is a big challenge. Teacher demand in Case 5 of enrolment projection (achieving 100% of GER by AY2034/35) is analysed as a reference. Approximately 2,900 new teachers need to be recruited in Case 5. (See APPENDIX B-6 for detailed information.)

2.6. Projection at the provincial level

The same procedure of the national level analysis is applied to make projection by province; however, Steps 4, 5 and 6 are slightly different. The data about the number of teachers deployed to each province is not available and it is difficult to make forecast of the distribution. Thus, the exact number of new teachers required in each province for Case 2 and Case 4 will be analysed after Step 3.

2.6.1. [Step 1] Projection of LS enrolment

The assumption made in Cases 2 and 4 of Step 1 at the national level analysis is applied to make projection of LS enrolments by province. Results of the projection in two cases are summarized in APPENDIX B-7. Enrolments in Cases 2 and 4 show big differences in most of the provinces, but some provinces with higher GER shows smaller differences, such as Kampong Cham, Preah Vihear, Prey Veng, Ratana Kiri, and Tbaung Khmum.

It should be noted that the Kampong Cham province was divided into two provinces in 2013: Kampong Cham and Tbaung Khmum, and therefore, the data for these two provinces need to be treated differently from other provinces. Population projection was published in 2008 and only the data for the total of two provinces are available. First, the population projection up to 2030 is adjusted based on the actual school-age population as of 2016/2017, following the same procedure applied to other provinces. Then, the ratio of the actual school-age population of the two provinces in AY2016/17 data is calculated (Kampong Cham accounts for 55.12% of the total of two provinces). This ratio is applied to estimate the school-age population for each province after AY2017/18.

2.6.2. [Step 2] Projection of LS teacher demand

Teacher demand is projected based on the same standard and target applied in the national level analysis: classroom-pupil-teacher ratio is 1:40:1.833. in both Cases 2 and 4, the assumption is made that the staffing standard will be achieved by AY2019/20. It is also assumed that the improvement of the situation is gradual and constant, and gaps between the actual and target values in the ratios of 2016/2017 is equally divided and added to three years (AY2017/18-AY2019/20). When a province already exceeded the standard, the standard teacher-class or pupil-class ratio is applied to all years. In such cases, decline in teacher demand in AY2017/18 is observed. Readers are reminded that they are theoretical values since it is not realistic to make big reduction in number of teachers who are already in service. The result of the projection of teacher demand by province is presented in APPENDIX B-8.

2.6.3. [Step 3] Projection of LS teacher retirement and attrition

Teacher retirement projection by province is available by HRMIS. For attrition, only the past data is available, and the number of attritions fluctuates substantially annually and by province. Thus, the average number of attritions in each province in the past is used as the projected attrition. (See APPENDIX B-9 for results).

2.6.4. [Step 4] Projection of new LS teacher required

Using the information of teacher demand, retirement, and attrition, the number of annual new LS teacher requirement is calculated by province. The analysis is made without consideration of new LS teachers intake produced through RTTCs.

Table B-35 below shows an example of the Banteay Meanchey province. As in the national level analysis, when the number of teachers in service exceeds teacher demand, no new teachers are required and "Teachers newly required for the next AY" is considered as zero.

Table B-35 Demand for New Teachers (Banteay Meanchey)

Year	Case 2					Case 4				
	Teacher Demand	Total teaching staff	Retirement	Attrition	New teachers required	Teacher Demand	Total teaching staff	Retirement	Attrition	New teachers required
2016/17	---	1,165	10	9	0	---	1,165	10	9	22
2017/18	893	1,146	8	9	0	1,124	1,146	8	9	147
2018/19	897	1,129	4	9	0	1,298	1,129	4	9	192
2019/20	943	1,116	2	9	0	1,477	1,116	2	9	145
2020/21	961	1,105	2	9	0	1,611	1,105	2	9	158
2021/22	977	1,094	3	9	0	1,758	1,094	3	9	160
2022/23	994	1,082	1	9	0	1,906	1,906	1	9	137
2023/24	1,010	1,072	1	9	0	2,033	2,033	1	9	171
2024/25	1,027	1,062	2	9	0	2,194	2,194	2	9	167
2025/26	1,043	1,051	0	9	18	2,350	2,350	0	9	163
2026/27	1,060	1,060	5	9	32	2,504	2,504	5	9	168
2027/28	1,078	1,078	7	9	33	2,658	2,658	7	9	162
2028/29	1,095	1,095	23	9	48	2,804	2,804	23	9	183
2029/30	1,111	1,111	41	9	67	2,955	2,955	41	9	72
2030/31	1,128	1,128	73	9	----	2,977	2,977	73	9	----

Note:

1. New teachers required for the next AY (year X)
   = (Teacher Demand in Year X+1) – (Total teaching staff in Year X) + (Retirement and Attrition in Year X)
2. When total teaching staff exceeds teacher demand, the number of new teachers required is set zero.

Demands of the new teachers for other provinces are calculated in the same way and summarized in APPENDIX B-9. Table B-36 and Table B-37 below show the summary of annual requirement of new LS teachers to meet the demand under Cases 2 and 4, respectively. Deployment information from 2016/17 to 2017/18 is not taken into consideration in this table.

It is worth pointing out that:

- In Case 2, Table B-31 and Table B-36 show that the total number of teachers required between 2016/17 and 2029/30 at the provincial level is 1.4 times larger than the figure of the national level, which seems natural if we consider the gaps between provinces, but

In Case 4,

- Table B-32 and Table B-37 shows that the total number of teachers required between 2016/17 and 2029/30 at the provincial level is almost equivalent to the figure of the national level, although the waves of change in teacher demand are different.

Further analysis to find out what causes this somewhat unexpected result would be necessary.

Table B-36 New Teacher Required by Province in Case 2

Province	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	TOTAL
Banteay Meanchey	0	0	0	0	0	0	0	0	0	18	32	33	48	67	**198**
Battambang	0	0	0	0	0	0	0	0	0	0	0	59	134	135	**328**
Kampong Cham	0	0	25	51	51	45	52	50	51	52	66	111	149	188	**891**
Kampong Chhnang	0	0	0	10	6	5	5	5	25	30	37	42	55	73	**293**
Kampong Speu	0	0	103	28	23	23	55	74	73	76	84	104	123	135	**901**
Kampong Thom	0	0	0	0	0	0	0	0	34	49	59	78	104	110	**434**
Kampot	0	0	0	0	0	0	0	0	0	0	0	0	6	95	**101**
Kandal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Kep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Koh Kong	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Kratie	0	0	0	0	0	0	0	0	0	0	0	0	0	31	**31**
Mondul Kiri	0	0	0	0	0	5	6	8	7	8	9	7	8	9	**67**
Otdar Meanchey	0	30	35	11	13	13	11	13	11	13	12	22	25	27	**236**
Pailin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Phnom Penh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Preah Sihanouk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Preah Vihear	0	0	0	0	0	0	0	0	0	5	16	16	23	23	**83**
Prey Veng	8	137	139	32	30	28	38	86	86	87	92	144	215	259	**1,381**
Pursat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Ratanak Kiri	0	0	3	17	33	0	17	17	16	17	18	41	0	20	**199**
Siemreap	0	138	186	39	42	39	41	38	38	41	44	61	68	102	**877**
Stung Treng	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Svay Rieng	0	0	0	0	0	0	0	0	0	0	54	55	65	108	**282**
Takeo	0	0	11	0	0	0	0	46	51	58	73	80	137	148	**604**
Tbaung Khmum	171	211	251	73	153	0	68	73	75	72	77	77	94	111	**1,506**
TOTAL															**8,412**
2016/17-2020/21	**179**	**516**	**753**	**261**	**351**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**2,060**
2021/22-2029/30	**---**	**---**	**---**	**---**	**---**	**158**	**293**	**410**	**467**	**526**	**673**	**930**	**1,254**	**1,641**	**6,352**

Table B-37 New Teacher Required by Province in Case 4

Province	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	TOTAL
Banteay Meanchey	22	147	192	145	158	160	137	171	167	163	168	162	183	72	**2,025**
Battambang	0	198	302	267	283	276	243	274	274	285	295	293	343	139	**3,472**
Kampong Cham	0	17	188	107	93	71	39	47	51	59	75	122	166	126	**1,161**
Kampong Chhnang	23	113	169	126	135	133	115	78	75	71	77	81	86	39	**1,321**
Kampong Speu	0	80	273	123	123	126	118	79	84	92	107	125	143	69	**1,542**
Kampong Thom	0	128	164	82	76	65	43	53	59	66	79	102	135	77	**1,129**
Kampot	0	0	8	62	71	82	79	58	70	89	88	108	125	101	**941**
Kandal	0	0	90	259	279	267	209	228	224	225	227	230	276	119	**2,633**
Kep	0	0	0	0	0	0	0	6	16	19	19	23	22	14	**119**
Koh Kong	0	0	0	16	38	39	39	38	39	41	42	43	46	14	**395**
Kratie	0	0	92	92	93	91	77	82	78	76	82	99	102	34	**998**
Mondul Kiri	0	0	1	13	10	10	8	12	14	16	15	17	19	9	**144**
Otdar Meanchey	43	68	64	44	24	31	30	44	51	59	60	60	65	27	**670**
Pailin	0	0	0	0	25	34	27	37	37	39	40	38	39	14	**330**
Phnom Penh	0	0	0	126	670	713	662	607	581	547	512	488	442	187	**5,535**
Preah Sihanouk	0	0	3	63	72	78	74	72	73	76	74	72	80	32	**769**
Preah Vihear	0	0	0	0	0	0	0	0	0	3	20	23	30	18	**94**
Prey Veng	173	206	223	7	179	78	64	57	68	82	104	172	259	231	**1,903**
Pursat	0	0	18	84	82	81	68	73	77	83	86	91	114	60	**917**
Ratanak Kiri	0	12	46	17	9	8	7	10	16	23	25	29	36	14	**252**
Siemreap	156	299	357	211	231	224	186	195	181	173	172	179	180	65	**2,809**
Stung Treng	0	0	0	0	0	11	15	20	25	32	37	53	66	80	**339**
Svay Rieng	0	0	66	46	40	33	19	28	34	40	54	65	81	91	**597**
Takeo	0	136	152	70	71	70	62	42	58	79	106	127	190	152	**1,315**
Tbaung Khmum	181	245	386	0	84	70	45	49	51	56	63	60	81	24	**1,395**
TOTAL															**32,805**
2016/17-2020/21	**576**	**1,649**	**2,794**	**1,960**	**2,846**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**9,825**
2021/22-2029/30	**---**	**---**	**---**	**---**	**---**	**2,751**	**2,366**	**2,360**	**2,403**	**2,494**	**2,627**	**2,862**	**3,309**	**1,808**	**22,980**

2.7 Demand of new teachers by subjects

Teacher demand by subject cannot be accurately estimated as explained in "2.4. Limitation." It is, however, possible to suggest the ideal proportions of teachers by subject in the future based on the new LS curriculum framework.

The left two columns: [a] and [b] in Table B-38 show the subjects and the number of lessons to be taught per week specified in the LS curriculum framework. The column [c] is the assumption of which teacher will teach which subject. The assumptions include:

- English and ICT will be taught by the same teacher;
- Physical Education and Health Education will be taught by the same teacher; and
- Local life skills will be taught by any subject teachers based on the needs of the schools and localities.

Next, the number of lessons to be taught [d] is estimated, taking into consideration that the minimum weekly lesson periods by one single teacher is 18 according to the staffing norm in 2014. If all teachers except PE and Art teachers are responsible of 3 or 4 classes, they will teach approximately 21 or 24 lessons per week. For example, a Khmer teacher who is responsible for all the lessons in 3 classes will teach (7 lessons/week * 3 classes =) 21 lessons per week as in the table. Science, however, needs to be further examined because a group of teachers of 4 different science subjects (Physics, Chemistry, Biology, and Earth Science) work together to teach one subject "Science" and so the workload of each teacher will be less than other subjects.

On the other hand, if a PE teacher is responsible for 8 classes, he/she will be in charge of total 24 lessons. An Art teacher, on the other hand, needs to be responsible of 18 classes if the minimum requirement is to be satisfied. Those teachers who teach many classes may need to teach in several schools, which requires travel (cost) between schools.

Table B-38 Assumption of Subjects and Number of Lessons in Charge

Subject [a]	Number of lessons per week [b]	Teachers in charge [c]	Number of classes in charge [d]	Number of lessons per week [e]	Total numbers of lessons per week [f]
Khmer Language	7	Khmer Language	3	21	21
Foreign Languages	6	English Language /ICT	3	18	24
ICT	2		3	6	
Mathematics	7	Mathematics	3	21	21
Science	6	Science	4	24	24
Social Studies	7	Social Studies	3	21	21
Physical Education	2	Physical and Health Education	8	16	24
Health Education	1		8	8	
Arts Education	1	Arts Education	18	18	18
Local Life Skills	1	Taught by the above teachers	3	3	0

Note:

1. The number of lessons per week [b] is based on MoEYS (2015) *Curriculum Framework of General Education and Technical Education* (the left two columns).
2. Columns [c] and [d] are assumptions for this study.

Table B-39 Teacher Requirement by Subject in Lower Secondary Schools in Case 2

Year	Projection from Table B-21			Khmer Language	English / ICT	Math	Science	Social Studies	Physical / health Education	Arts Education	[B] Total number of teachers	Gap [B]-[A]
	Enrolment	[A] Teacher demand	Number of Classes									
2017/18	534,154	22,371	12,205	4,068	4,068	4,068	3,051	4,068	1,526	678	21,528	-843
2018/19	527,728	23,096	12,600	4,200	4,200	4,200	3,150	4,200	1,575	700	22,225	-871
2019/20	521,302	23,889	13,033	4,344	4,344	4,344	3,258	4,344	1,629	724	22,988	-901
2020/21	514,875	23,594	12,872	4,291	4,291	4,291	3,218	4,291	1,609	715	22,705	-890
2021/22	508,449	23,300	12,711	4,237	4,237	4,237	3,178	4,237	1,589	706	22,421	-878
2022/23	502,023	23,005	12,551	4,184	4,184	4,184	3,138	4,184	1,569	697	22,138	-867
2023/24	508,972	23,324	12,724	4,241	4,241	4,241	3,181	4,241	1,591	707	22,444	-879
2024/25	520,905	23,870	13,023	4,341	4,341	4,341	3,256	4,341	1,628	723	22,970	-900
2025/26	532,839	24,417	13,321	4,440	4,440	4,440	3,330	4,440	1,665	740	23,497	-921
2026/27	544,773	24,964	13,619	4,540	4,540	4,540	3,405	4,540	1,702	757	24,023	-941
2027/28	556,706	25,511	13,918	4,639	4,639	4,639	3,479	4,639	1,740	773	24,549	-962
2028/29	568,640	26,058	14,216	4,739	4,739	4,739	3,554	4,739	1,777	790	25,075	-982
2029/30	580,574	26,605	14,514	4,838	4,838	4,838	3,629	4,838	1,814	806	25,602	-1,003
2030/31	592,507	27,152	14,813	4,938	4,938	4,938	3,703	4,938	1,852	823	26,128	-1,024

The number of teachers by subject is estimated based on the total number of classes in lower secondary schools and the number of classes that each teacher is supposed to take charge (Column [d] of Table B-38). For example, the number of Khmer Language teachers in 2017/18 is estimated by:

(The total number of classes in LS schools) / (the number of classes one Khmer teacher teaches)
= 12,205 / 3
= 4,068

As shown in Table B-39, there is a big gap between teacher demand and supply every year, and this gap would be even larger if the number of teachers in service is given subject-wise, although such detailed information is not available from the HRMIS data.

The proportion of required teachers by subject is then calculated using numbers of teachers by subjects calculated in Table B-39. As indicated in Table B-40, each of Khmer language, English/ICT, Math, and Social Studies teachers needs to account for 18.9% total teachers. The share of Science teachers should be 14.17%, Physical/health education should be 7.09% and Art teachers should be 3.15%

Table B-40 Proportion of required teachers by subject

Subject	Proportion of required teachers
Khmer Language	18.90%
English / ICT	18.90%
Math	18.90%
Science	14.17%
Social Studies	18.90%
Physical / health Education	7.09%
Arts Education	3.15%
Total	**100.00%**

As indicated in Table B-39, the teacher demand projected in Step 2 (Column [a] of the table) is larger than the total of the required number of teachers by subject (Column [b] of the table), which is shown as negative figures in red in the rightmost column of the table. The discrepancies may indicate there is room for other subject teachers, which are not discussed in this analysis, such as French Language. If additional information regarding how many teachers (with certificates) teach what subjects becomes available, the requirement of future subject teachers can be more accurately calculated.

Box 2.4. How were teacher demand and supply adjusted? A case of China

There was a rapid increase of lower secondary school students from 1990 to 2000, increasing from 38.68 million to 62.56 million students (Table 1). In response, the country increased the number of lower secondary school teachers by 810 thousand (Table 2). However, the strategy the government took was not to increase the number of teacher's institutions or raise enrolment numbers. Rather, the number of normal universities, higher normal schools, and secondary normal schools diminished in the 1990s (Table 3). In the wide-reaching reform, teacher training institutions started offering non-teacher training courses, and general universities opened teacher training courses. Furthermore, the Ministry of Education made a policy change to increase the percentage of teachers with higher qualification (i.e. college level education), and the number of secondary normal schools drastically dropped.

Table 1. Number of Primary and Secondary school students in China (Unit: Million)

Year	1980	1985	1990	1995	2000	2005	2010	2015
Primary	146.27	133.70	122.41	131.95	130.13	108.64	99.40	96.92
L-Sec	41.44	41.16	38.68	47.27	62.56	62.14	52.79	43.11

Table 2. Number of full-time teachers (Unit: Million)

Year	1980	1985	1990	1995	2000	2005	2010	2015
Primary	5.499	5.413	5.581	5.664	5.860	5.592	5.617	5.685
L-Sec	2.449	2.239	2.470	2.828	3.286	3.492	3.525	3.475

Table 3. Number of teacher training schools/ universities (Unit: as it is)

Year	1980	1985	1990	1995	2000	2005	2010	2015
Normal university	186	253	265	76	138	80	107	116
Higher normal school			257	161	221	182	36	65
Secondary normal school	1017	1028	1026	897	683	244	141	125

The number of teachers is adjusted through pass/fail rates of teacher recruitment examinations. As no region's situations are the same, the decision was left to each local government. Those wishing to be teachers have to sit for both the teacher qualification examination and recruitment examination. The number of those successfully recruited as full-time teachers are much smaller than those who have obtained teaching certification, much like the case in Japan.

Table 4. Number of educational institutions for teachers (Unit: thousand)

Year	2000	2001	2002	2003	2004	2005
Number of schools	138	122	103	103	83	80
Number of graduates	62.5	55.2	76.5	76.5	111.8	77.7

Another important factor in adjustment of teacher supply in China is the additional function given to teacher training institutions serving as internship providers. China's tertiary educational institutions are categorised into two types: general day institutions and adult education institutions. The in-service teacher training institutions were examples of the latter. This adult education institution also functioned as teacher training institutions from 1996 to 2006. Making use of these adult educational institutions to train new teachers helped fill the gap between supply and demand (Table 4).

Box 2.5. How were teacher demand and supply adjusted? A case of Singapore

Ever since Singapore gained its independence in 1965, it has operated under the closed teacher training system. All teachers are trained at National Institute of Education (NIE), which is made up of three programs. They are the 4-year first degree program, the post-graduate diploma program (for 16 months in most subjects from December 2016 intake), and the 2-year education diploma program for those who have finished polytechnic education. Secondary school teachers are trained either in the 4-year first degree program or the post-graduate diploma program.

The total number of students at NIE is about 2000. Around 500 students are of the first-degree course (for both primary and secondary school teacher training), 300 to 400 students are of the post-graduate primary school teacher training, and 600 to 700 students are of the post-graduate secondary school teacher training. The majority of secondary school teacher training students are in the post-graduate diploma course.

Table 1. The number of primary and secondary school students in Singapore (Unit: thousand)

Year	1970	1980	1990	2000	2010
Primary	362	291	257	305	263
Secondary	133	155	160	175	214

Table 2. The number of full-time primary and secondary school teachers (Unit: thousand)

Year	1970	1980	1990	2000	2010
Primary	12	10	10	11	13
Secondary	6	7	7	9	13

As shown in Table 1 above, Singapore experienced an increase of 40,000 secondary school students from 2000 to 2010. At the same time the country increased its number of secondary teachers by 4000 (Table 9). The increase of teachers was created by taking in more students in the post graduate diploma course.

Since Singapore is a city state, it is relatively easier to estimate the teacher demand. Additionally, the fact that a single teacher training institution supplies all of the new teachers makes it easier to adjust numbers. The expected number of new teachers can easily be altered by adjusting the number of new students of NIE, who would go on directly after training to become new teachers. In particular, secondary school teachers are mainly from the post-degree diploma course which makes the planning even smoother (e.g. the NIE recruits a certain number of new students by the estimated number of teachers to be needed in the next year).

3. Summary of Findings and Suggestions in Part B

3.1. Primary teacher demand-supply

- In the national level projection, the scenario Case 4-A that assumes that primary schools will meet the staffing norm and achieve 100% NER by AY2029/30 would be more feasible than others although this scenario also requires around 2,000 new teachers per year.
- The province-wise analysis indicates the possibility that the necessary number of teachers would be larger than the national-level projection. Thus, if teachers are supplied based on the national-level projection, it would lead to undersupply at the provincial level.
- There is a lot of provincial variation in teacher demand. Three provinces have already met the both standards and about half provinces have met either of the standard. It may be useful to set the realistic provincial target while taking measures to balance excess and deficiency of teachers among provinces.
- The province-wise projection will be more precise if the statistical data of retirement and attrition is available at each province.

3.2. Lower secondary teacher demand-supply

- Results have shown that if LS enrolment follows the Case 2 projection (the increment of enrolment is similar to the past trend), the demand of teachers will be kept relatively low: the number of new teachers required will be 450-500 per year from the national level analysis. The existing capacity of TECs and RTTCs will be sufficient to meet the demand in the future, although the gaps between subjects and between provinces are not taken into consideration, and attention needs to be paid to the increasing number of LS teachers to be retired.
- If LS enrolment expands rapidly by the government's initiatives to achieve 100% GER by AY2030/31, the large increase in teacher demand will be expected: new teachers required will be at least 3,500 per year from the national level analysis.
- The province-wise projection indicates that there is a huge gap in the required number of LS teachers between the national and provincial level analysis. While more detailed province-wise figures are necessary for accurate projection, it is highly likely that the LS teacher demand is much higher than the estimation in the national-level analysis.
- In addition, the subject-wise projection shows the undersupply of LS teachers even in Case 2, which always show the oversupply of teachers in the national and provincial level analysis. This indicates the necessity of statistical information about how many teachers have received pedagogical training on what subject in each province.
- The expansion of lower secondary education, boosted by the economic growth, is expected to be happen in the next decade, and so the number of LS students will be larger than the figure estimated in Case 2, and may fall in between Case 2 and Case 4. It would be thus necessary to proactively establish a mechanism to prepare for this increase.

3.3. Common suggestions related to teacher demand-supply

- In both primary and lower secondary school analysis, the required number of new teachers fluctuates considerably every year. This does not mean that TEIs need to change the number of intakes every year. Rather, the number of entrants to TEIs need to be stable or with gradual changes so that TEIs can improve the quality of education based on medium and long-term plans in terms of facility, teaching staff, and management.

- In this analysis, teacher demand in private schools was not examined. The role played by private schools in primary education, however, is not negligible: about 90,000 students commute to private primary schools where 4,500 teachers are working. Qualifications of teachers as well as other standards will need to be defined in the near future. Since primary education is compulsory, the qualification of private school teachers may be regarded as the same as that of public-school teachers. If so, public TEIs can also be conducive to producing private school teachers.

- The experiences of other countries in the Boxes above provide suggestions for the future of Cambodia. All the countries and an area covered above have their own social backgrounds, but a commonly observed approach is to produce a bare minimum number of teachers through state-connected teacher training institutions and to cope with fluctuations in teacher demand by temporary measures. Although it may be impossible to introduce this method directly to the Cambodian current system, it seems to be worth studying for reference. If so, the first thing is to establish the teaching certification system with province-wise teacher selection examinations (and/or interviews) so that there is a pool of teaching certification holders, which enables not only to cope with small fluctuation in teacher demand because MoEYS can utilise those unemployed certificate holders to fill the gap when teacher demand exceeds teacher supply, but also to select better students from a larger number of candidates when they graduate TEIs.

Part C. Policy, strategy and actions for teacher qualification upgrade

1. Teacher qualification upgrade in the next decade

Although the piloting of degree-level PRESET starts in TEC Phnom Penh and Battambang in the 2018-19 academic year, a policy, strategy and actions to upgrade the qualification of primary and lower secondary teachers are still under discussion. Based on the analysis made in the previous sections of this report, this part will put forward a proposal to upgrade teacher qualification to a degree level through a combination of PRESET and INSET programmes. Further discussions and planning are required within the MoEYS, and it is expected that this report would be used as springboard to facilitate such further discussions.

The discussions in Part C assume that:

(i) In primary, 100% NER is supposed to be achieved gradually by 2030.
(ii) In lower secondary, 100% GER is supposed to be achieved by 2030.
(iii) The staffing norms in 2014 for primary and lower secondary schools will be achieved by 2030.
(iv) Double-shift schools will be gradually abolished by 2030.
(v) In lower secondary, the gaps between provinces and between subjects are ignored.

It should be noted that while the assumptions (i) to (iv) above are policy targets, the assumption (v) is associated with the lack of capacity to collect detailed information at the school, district, and provincial levels. The required number of teachers will significantly differ under different assumptions, and the improvement in (v) will immediately lead to more precise projection in the number of lower secondary teachers. Thus, the figures used in Part C have to be treated and interpreted with caution.

1.1. Projections of primary and lower secondary teachers

Firstly, we examine the number of new TECs necessary to upgrade teacher qualification to BA from the demand side, putting aside the limitations related to financial and human resources.

Table C-1 Projection of primary teachers up to 2030

Year	Case 4-A		
	Teacher Demand	Teacher supply	
		Actual	Required
2017/18	45,895	1,713	-----
2018/19	46,587	1,513	-----
2019/20	47,364	1,600	-----
2020/21	48,206	1,300	-----
2021/22	49,078	-----	1,972
2022/23	49,901	-----	1,393
2023/24	50,470	-----	1,290
2024/25	50,983	-----	1,507
2025/26	51,629	-----	2,239
2026/27	52,795	-----	2,592
2027/28	54,023	-----	2,522
2028/29	55,163	-----	3,318
2029/30	56,241	-----	2,194
2030/31	55,838	-----	-----

Assumptions for Case 4-A (Most modest case):

- **Achieving 100% NER by 2030,**
- **Achieving the staffing norm by 2030** (i.e., 1.1 teacher per classroom and 37.5 students per classroom in average of 35 for Gr.1-3 and 40 for Gr.4-6, to be achieved by 2020)
- Ignoring infrastructural aspects for schools,
- Using the figures available by the mid-2017 to estimate the number of teachers and students.

Table C-2 Projection of lower secondary teachers up to 2030

Year	Case 2 (Table B-31): Natural GER increase			Case 4 (Table B-32) Achieving 100% GER by 2030		
	Teacher demand	Teacher supply		Teacher demand	Teacher supply	
		Actual	Required		Actual	Required
2017/18	28,291	0	0	28,291	0	----
2018/19	27,824	768	0	27,824	768	----
2019/20	28,218	600	0	28,218	600	----
2020/21	28,506	476	0	28,506	476	
2021/22	28,673	----	0	28,673	----	10,676
2022/23	28,394	----	0	39,070	----	2,427
2023/24	28,111	----	0	41,120	----	2,466
2024/25	27,826	----	0	43,187	----	2,544
2025/26	27,521	----	0	45,290	----	2,637
2026/27	27,168	----	0	47,418	----	2,787
2027/28	26,685	----	159	49,544	----	3,022
2028/29	26,058	----	1,827	51,579	----	3,486
2029/30	26,604	----	2,157	53,560	----	1,984
2030/31	27,152	----	----	53,698	----	----

Common assumptions for Cases 2 and 4
(Two different modest cases):

- **Achieving the staffing norm by 2030** (i.e., 1.833 teacher per classroom and 40 students per classroom to be achieved by 2020),
- **Ignoring the gaps between provinces and subjects** (so many 0s appear in Case 2.)
- Ignoring infrastructural aspects for schools,
- Using the figures available by the mid-2017 to estimate the number of teachers and students.

(A) Primary teachers

As discussed in Part B, if MoEYS is planning to achieve 100% net enrolment ratio and the staffing norm (2014) by 2030, the number of newly required teachers is as shown in Table C-1. As seen in the table, the primary education subsector, under the assumptions above, will yearly require 1300 to 3300 teachers in the next decade. If all these teachers are supposed to study in TECs and have a bachelor's degree, the number of TECs to be newly established will be at least 8 so that 10 TECs in total can produce at least 2,500 new 12+4 teachers every year.

(B) Lower secondary teachers

Among those examined in Part B, this analysis takes more realistic scenarios, Case 2 and Case 4, to think about the number of TECs in the future. Table C-2 shows the projection of the number of newly required teachers up to the year 2030. Both cases ignore the gaps between provinces and subjects (and thus many 0s are observed in Case 2 projection), and assume that MoEYS will make every effort to achieve the staffing norm 2014 by the year 2030. It should be noted that the huge demand of new teachers observed in AY2020/21 in Case 4 is due to the accumulation of teacher shortages until AY2019/20.

As seen in the table, the lower secondary education subsector, under the above assumptions for Case 4 and even except for the year 2020/21, will yearly require 2,000 to 3,500 teachers in the next decade. If (i) all these teachers shall have a bachelor's degree through a 12+4 programme, (ii) if they shall study in TECs, and (iii) if each TEC has the same capacity with Phnom Penh and Battambang TECs, the number of TECs to be additionally established is more than 20. Although a real figure may

fall in between Case 2 and Case 4, MoEYS will have to make a significant investment to cope with the increase of lower secondary students that we are likely to face in the near future.

1.2. Previously planned strategies

In Education Strategic Plan (ESP) 2014-18, MoEYS announced a policy that

- **From 2020, pre-service training for pre-school, primary school, and lower secondary school teachers will follow formula 12+4 or BA+1.** Pre-service training for higher education teachers will be changed from BA+1 to MA+1, and
- **From 2020, all newly recruited teacher holding at least a bachelor's degree.**

(5.1.2.2. Policy Objectives in ESP 2014-2018)

This teacher qualification upgrade policy in ESP 2014-18 was followed by TPAP (2015) as in Table C-3 below.

Table C-3 Teacher qualification upgrade in TPAP

	Programme		Activities	Deadline
3.1.3	Introduce upgraded PRESET programs based on TEPS	3.1.3.1	Pilot B.Ed. (12+4) PRESET at two RTTCs with technical support from HEIs	2018 Q3
		3.1.3.2	**Pilot BA+1 PRESET at two RTTCs with technical support from HEIs**	2018 Q3
6.1.1	INSET development and implementation	6.1.1.4	**Establish new INSET structure within TECs** (in policy called Center for Teacher Development)	2018 Q2
		6.1.1.5	**Carry out teacher INSET … to receive the certificate/degrees** equivalent to upper secondary school, BA or MA	2015-20

Source: MoEYS 2015

While 2 TECs are launched in Phnom Penh and Battambang in 2018 as planned in TPAP, it does not seem that the overall process of upgrading teacher qualification has been successful. For example, the preparation for providing 12+4 PRESET to produce basic education teachers from 2020 has not been even started, and the BA+1 programme to accelerate qualification upgrade has not yet been even discussed in MoEYS. Therefore, these planned strategies need significant revisions for the next decade based on the actual capacity of MoEYS and the statistical data and information, and those revisions should be reflected in ESP 2019-2023.

1.3. Availability of qualified teacher educators for TEC

In the current strategies and situations, Phnom Penh and Battambang TECs are a sole 12+4 PRESET providers, and both are preparing managerial documents, course syllabus and materials, and teacher educators for their opening in November 2018. However, these two TECs have faced a problem in recruiting qualified lecturers who have a master's degree in the subject they teach, required years of teaching experience, and proficiency in English sufficient for conducting research using foreign academic books.

The information about the vacancy, applicants, and successful candidates for TEC lecturers in 2018 is show in Table C-4 below. What we can found in the tables are: the number of those who passed the

selection was below the vacancy in both TECs; even so PTEC got more applicants than the vacancy; and the number of applicants for BTEC was even less than the vacancy and no applicants in math and science subjects.

Table C-4 Status of applicants for TEC lecturers

		PTEC			BTEC		
	Subject	**Vacancy**	**Applicants**	**Passed**	**Vacancy**	**Applicants**	**Passed**
1	Ed. Philosophy	0	0	0	2	4	1
2	Ed. Psychology	2	1	0	3	1	1
3	Khmer	2	2	2	0	0	0
4	English	3	7	3	4	3	3
5	French	1	0	0	1	0	0
6	Mathematics	4	9	4	2	1	0
7	Physics	1	1	0	1	0	0
8	Chemistry	1	9	1	1	0	0
9	Biology	1	1	1	1	0	0
10	Earth Science	1	3	1	1	0	0
11	History	1	2	1	1	1	1
12	Geography	1	2	1	1	0	0
13	ICT	1	1	0	1	2	1
14	PE & Sport	2	0	0	2	0	0
	Total	**21**	**38**	**13**	**21**	**13**	**7**

Source: ETEC and TTD

It was expected that many school teachers having a master's degree, most of whom are currently working in upper secondary schools, would apply for TEC lecturers to upgrade their status.

Table C-5 below shows the number of MA or Ph.D holders working in schools in 25 provinces with the information about the coverage of TECs. As seen in the table, more than 40 primary and 210 (lower or upper) secondary teachers have MA or Ph.D in the neighbouring provinces of Battambang (No.1-6 in the table); however, only a limited number of people applied to Battambang TEC in the 2018 lecturer selection.

There may be several reasons, such as applicants' lack of information about the status, salary and allowances, accommodation for those from other provinces, and the roles and responsibility of TEC lecturers. Given that both TECs will have to employ almost the same number of lecturers for the next 3 years, MoEYS is required to review and elaborate a strategy to attract qualified individuals to TECs as teacher educators within a few months before the next cycle of lecturer selection will start around April 2019.

In addition, these selection results indicate that it is highly unlikely to open some more TECs in provincial areas under the situation where there is not a sufficient number of applicants even for 2 TECs. It should be also noted that one deputy director position of BTEC is still vacant due to a lack of qualified applicants who are willing to work in Battambang, although most applicants are eager to work in Phnom Penh.

The discussion above implies the necessity to modify the MoEYS's strategy for teacher qualification upgrade from "creating more TECs" to "enhancing 2 TECs". Although this change will lead to the decrease in the number of newly-recruited BA teachers in the next decade, the quality of teacher education will not be sacrificed for the immediate, nationwide teacher qualification upgrade.

On the other hand, stopping the expansion of TECs in number means (i) continuing a 12+2 PRESET model for the meantime, and (ii) preparing other devices to produce BA teachers for primary and

lower secondary schools. But introducing BA+1 and upgrading INSET are among the limited options available for MoEYS, which will be discussed later.

Table C-5 Status of teacher qualifications and the coverage of TECs

	Province	Primary teachers		Secondary teachers		Responsible TEC (2018-19)			
		Post Graduate	Ph.D	Post Graduate	Ph.D	Pri.		L.Sec.	
1	Banteay Meanchey	7	0	42	0	BTEC	---	BTEC	---
2	Battambang	13	0	71	1	BTEC	---	BTEC	---
3	Otdar Meanchey	1	0	6	0	BTEC	---	BTEC	---
4	Pailin	2	0	0	0	BTEC	---	BTEC	---
5	Pursat	1	0	27	0	BTEC	---	BTEC	---
6	Siemreap	19	0	66	1	BTEC	---	BTEC	---
7	Kampong Chhnang	2	0	26	0	---	PTEC	BTEC	---
8	Kampong Thom	6	0	49	0	---	PTEC	BTEC	---
9	Mondul Kiri	0	0	1	0	---	PTEC	BTEC	---
10	Preah Vihear	1	0	7	0	---	PTEC	BTEC	---
11	Ratanak Kiri	0	0	2	0	---	PTEC	BTEC	---
12	Stung Treng	0	0	1	0	---	PTEC	BTEC	---
13	Kampong Cham	0	0	20	0	---	PTEC	---	PTEC
14	Kampong Speu	6	0	32	0	---	PTEC	---	PTEC
15	Kampot	8	0	40	0	---	PTEC	---	PTEC
16	Kandal	5	0	116	0	---	PTEC	---	PTEC
17	Kep	0	0	4	0	---	PTEC	---	PTEC
18	Koh Kong	0	0	0	0	---	PTEC	---	PTEC
19	Kratie	1	0	2	0	---	PTEC	---	PTEC
20	Phnom Penh	40	0	356	1	---	PTEC	---	PTEC
21	Preah Sihanouk	3	0	25	0	---	PTEC	---	PTEC
22	Prey Veng	1	0	19	0	---	PTEC	---	PTEC
23	Svay Rieng	2	0	29	0	---	PTEC	---	PTEC
24	Takeo	6	0	48	0	---	PTEC	---	PTEC
25	Tbaung Khmum	5	1	15	1	---	PTEC	---	PTEC
	Total	**129**	**1**	**1004**	**4**	**6**	**19**	**12**	**13**

Source: EMIS 2017/18, Information obtained from TTD

1.4. Teachers with BA in public primary and lower secondary schools

Table C-6 shows the number of public primary teachers with a bachelor's or higher degrees in 5 years between 2013-14 and 2017/18 school years. As seen in the table, the proportion of BA holders in primary teachers has been increasing, and reached to 10% in the school year 2017/18. However, we can also observe a widening gap in the BA ratio between urban and rural areas. This is mostly because well-motivated 12+2 primary teachers often study in a nearby university in weekends to get BA, and universities are normally located in urban areas.

On the other hand, the same kind of statistical information for lower secondary teachers is not available in EMIS because the number of BA holders in lower and upper secondary teachers is aggregated in EMIS (e.g., Table 21 in EMIS 2017/18). But a research implies that more than 20% of more than 2,000 lower secondary teachers with 12+2 have received a bachelor's degree through a regular BA programme in several universities (Chhinh, Khieu & Rath 2015). Thus, the proportion of BA holders in lower secondary teachers is likely to be higher than primary.

Table C-6 The number of public primary teachers with BA or higher degrees

	Year	Teaching staff	BA teachers	BA %		Area	Teaching staff	BA by area	MA by area	PhD by area	Subtotal	BA% by area
Actual	2014	44,895	1,869	4.16%	Urban-Rural area-wise data	Urban	10,020	695	15	0	710	7.09%
						Rural	34,875	1,137	22	0	1,159	3.32%
	2015	44,292	2,440	5.51%		Urban	9,925	843	29	0	872	8.79%
						Rural	34,367	1,542	25	1	1,568	4.56%
	2016	44,884	3,105	6.92%		Urban	9,712	1,024	50	0	1,074	11.06%
						Rural	35,172	2,003	28	0	2,031	5.77%
	2017	46,149	3,683	7.98%		Urban	9,784	1,185	54	0	1,239	12.66%
						Rural	36,365	2,400	41	3	2,444	6.72%
	2018	46,157	4,610	9.99%		Urban	9,702	1,384	76	0	1,460	15.05%
						Rural	36,455	3,096	53	1	3,150	8.64%

Source: EMIS 2014-2018

2. Policy for teacher qualification upgrade in the next decade

2.1. Policy target: Setting concrete numerical targets

While MoEYS has an idea to enhance the capacity of 2 TECs up to 1000 students per year[3] rather than to increase the number of TECs, any numerical targets related to the proportion of BA holders in primary and lower secondary teachers are not officially set. Also, ESP 2014-18 says "From 2020, all newly recruited teacher holding at least a bachelor's degree"; however, the demand-supply analysis implies that it is extremely difficult to make this idea happen. It should be noted that 2 TECs only contribute to increasing at most 1% of 12+4 P&LS teachers per year.

Thus, as shown in Figure C-1, it is necessary for MoEYS and DPs to firstly set policy targets, such as "x% of primary and lower secondary teachers have BA by the year 20xx", secondly develop strategies, mechanisms, and programmes that contribute to achieving the targets, and thirdly raise and allocate resources needed for those planned activities.

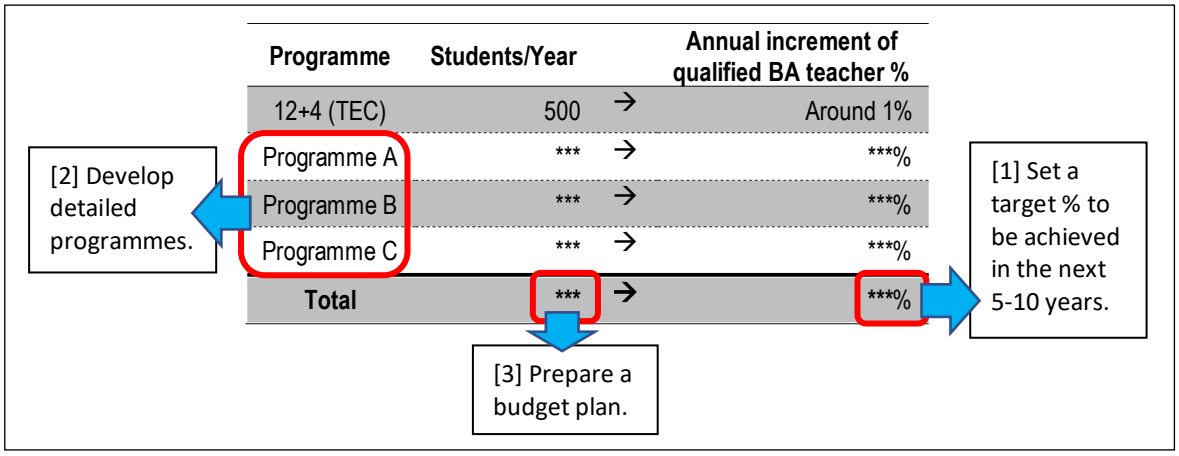


Figure C-1 Necessity of setting policy targets for teacher qualification upgrade

[3] According to the statement of the Minister of Education in the meeting between JICA and MoEYS on 11 October 2018.

For example, consider the case that the number of students in each of 2 TECs is gradually increased up to 1000 as follows:

(1) 1st cohort (2018-22): 150 in primary and 100 in lower secondary (i.e., TEC total = 500)
(2) 2nd to 4th cohorts: 250 in primary and 100 in lower secondary (i.e., TEC total = 700)
(3) 5th cohort onwards: 350 in primary and 150 in lower secondary (i.e., TEC total = 1000)

Then the increase in the proportion of TEC graduates in primary and lower secondary teaches will be as shown in Table C-7 and Table C-8, respectively. These tables show that the proportion of TEC graduates increases only 1% per year in primary, and around 0.5% in lower secondary schools, which indicates that, if 2TECs alone produce 12+4 teachers, we will have to wait for several decades until a vast majority of teachers have BA.

Table C-7 Increase in the ratio of new BA teachers in primary schools

	[A]	[B]	[C]	[D]	
Year	**Teacher demand (Case 4-A)**	**New BA teachers from TEC**	**Accumulation of [B]**	**Ratio of [B] to [A]**	**Note**
2022/23	49,901	300	300	0.60%	TEC 1st cohort (= 150*2)
2023/24	50,470	500	800	1.59%	500 (= 250*2) primary teacher candidates in the 2nd-4th cohorts of 2 TECs
2024/25	50,983	500	1300	2.55%	
2025/26	51,629	500	1800	3.49%	
2026/27	52,795	700	2500	4.74%	700 (= 350*2) primary teacher candidates from the 5th cohort of TECs
2027/28	54,023	700	3200	5.92%	
2028/29	55,163	700	3900	7.07%	
2029/30	56,241	700	4600	8.18%	
2030/31	55,838	700	5300	9.49%	

Table C-8 Increase in the ratio of new BA teachers in lower secondary schools

	[A]	[B]	[C]	[D]	
Year	**Teacher demand (Case 4)**	**New BA teachers from TEC**	**Accumulation of [B]**	**Ratio of [B] to [A]**	**Note**
2022/23	39,070	200	200	0.51%	TEC 1st cohort (= 100*2)
2023/24	41,120	200	400	0.97%	200 (= 100*2) lower secondary teacher candidates in the TEC 2nd-4th cohorts
2024/25	43,187	200	600	1.39%	
2025/26	45,290	200	800	1.77%	
2026/27	47,418	300	1,100	2.32%	300 (= 150*2) lower secondary teacher candidates from the 5th cohort of TECs
2027/28	49,544	300	1,400	2.83%	
2028/29	51,579	300	1,700	3.30%	
2029/30	53,560	300	2,000	3.73%	
2030/31	53,698	300	2,300	4.28%	

2.1.1. Who are "qualified" BA teachers?

In the case where the qualification can be upgraded to BA through various channels, such as BA+1, TUP, CPD, etc., there will be a problem about the equivalence between the programmes because there does not seem a clear-cut definition for "qualified" teachers. For example, let us consider the following question:

Question: Are all the following teachers equally "qualified"?

(A) 12+4 in TEC
(B) 12+2 in TTC + [BA in a private university]
(C) 12+2 in TTC + TUP
(D) 12+2 in TTC + CPD (by accumulating credits)
(E) BA+1

Among those, (A) has just started; (B) type of teachers already exist in schools; (C) is being conducted by RUPP; but (D) and (E) are yet to be started.

In comparison with (A) of TEC, (B) type of teachers have earned a fewer number of credits in the field(s) related to pedagogy (e.g., education studies, subject education, practicum[4], etc.), although they have studied more in certain disciplines, such as mathematics. Also, (C) type of teachers have studied both pedagogy and a certain discipline, the coherence with (A) in terms of the contents is yet to be examined. It is easily anticipated that the situation will be more complicated when (D) and (E) are introduced.

Therefore, the term "qualified" should be clearly defined so that all the BA teachers have similar learning experience at the same standards. Particularly for type (B) teachers, there should be careful consideration about what pedagogy-related modules they have to additionally study, through short-term CPD programme, to be equated to 12+4 graduates. This report recommends defining "qualified" teachers as "certified" teachers who have certain teaching certificates after satisfying the requirements about the number of credits earned in each of predetermined fields of study. The introduction of a "credit-based" teaching certificate system will be discussed later in this part.

The "BA teachers" in the discussion below always indicate "qualified" teachers in the sense above.

2.1.2. A scenario for teacher qualification upgrade in primary education

The discussion above implies the necessity of setting concrete numerical targets and preparing the devices to achieve it other than PRESET in TECs. This section thus puts forward a sample scenario to accelerate teacher qualification upgrade up to 2028, which is the end year of the ESP after next.

For the sake of discussion, we assume that the teacher demand increases according to Case 4-A discussed in Part B.

We tentatively set numerical policy targets for primary teachers as follows.

[Target 1] 7% of primary teachers have BA by 2023
[Target 2] 22% of primary teachers have BA by 2028

These means that the ratio of BA teachers increases by 2% up to 2023, and 3% from 2023 to 2028.

There are only a few options to increase the number of "qualified" BA teachers in primary education, which are:

(1) BA fast track programme for 12+2 primary teachers,
(2) Short-term CPD programme for 12+2 primary teachers with BA from private universities,
(3) Long-term CPD programme for 12+2 primary teachers.

[4] Some may argue that practicum is not necessary for those BA teachers because they are already teachers in service; however, on the contrary, conducting practicum would be more important for teachers in service in Cambodia. Those teachers who have been teaching for many years are likely to have been repeating the same practice every year in a classroom, which is often easy and convenient for them, without noticing that it may not be pedagogically appropriate or outdated due to a lack of teachers' self-study and technical supports to them. Thus, conducting practicum will provide an opportunity for the teachers in service to review, renew, and update their teaching.

In the option (3) above, those who accumulate credits through various CPD programmes can upgrade their qualification to BA when they have earned the number of credits in the predetermined fields of study. However, the length of time to earn the necessary number of credits, which is supposed to be 60, in all the areas differs greatly in individuals, which makes difficult to include the above option (3) in the yearly target of BA teachers. Therefore, it seems that a fast track INSET programme in the option (1) and short-term CPD in the option (2) above would be only options to upgrade 12+2 primary teachers to 12+4 in a planned manner.

Table C-9 combines the above tables, assumptions and targets, in which the figures in Columns (E) and (F) are calculated so as to achieve the target in every 5 years. The options here exclude BA+1 PRESET, because primary teachers teach all the subjects and 1-year pedagogical training is not sufficient to cover all the subjects. In addition to these, there is one more option

Table C-9 Estimation of the number of "qualified" BA primary teachers up to 2028

		[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
	Year	Teacher demand (Case 4-A)	Target	Target BA teachers	12+4 in TEC	BA fast track	Short-term CPD	Accumulation of [D] and [E]	Gap b/w [F] and [C]
Projection	2019	46,587	0%	0	0	0	0	0	0
	2020	47,364	0%	0	0	0	0	0	0
	2021	48,206	3%	1,446	0	300	800	1100	-346
	2022	49,078	5%	2,454	0	300	800	2200	-254
	2023	**49,901**	**7%**	**3,493**	**300**	**300**	**800**	**3600**	**107**
	2024	50,470	10%	5,047	500	500	800	5400	353
	2025	50,983	13%	6,628	500	500	800	7,200	572
	2026	51,629	16%	8,261	500	500	800	9,000	739
	2027	52,795	19%	10,031	700	500	800	11,000	969
	2028	**54,023**	**22%**	**11,885**	**700**	**500**	**800**	**13,000**	**1,115**

In order to start those 2 programmes above for 12+2 primary teachers in service, MoEYS needs to consider the following interrelated issues:

1. Target group: Who should be selected based on what criteria?
2. Contents and method: What contents should be chosen from the 12+4 PRESET curriculum based on what criteria? How can those contents be delivered?
3. Lecturers and venue: Who will be responsible for a BA fast track programme? Only TECs? Or Can other 16 TTCs be utilised for some modules, such as practicum?
4. Schedule: If it is to be launched in the 4th quarter of 2019, when should course design, participant selection, and other preparatory works be completed? When and how many days will the participants come to the venue?
5. Budget: In each of the above cases, how much will it cost to conduct the above programme for the above-mentioned number of teachers?

2.1.3. A scenario for teacher qualification upgrade in lower secondary education

We assume that the teacher demand increases according to Case 4 discussed in Part B, and set numerical policy targets for lower secondary teachers as follows.

[Target 1] 15% of lower secondary teachers have BA by 2023

[Target 2] 30% of lower secondary teachers have BA by 2028

These means that the ratio of BA teachers increases by 3% every year from 2018.

Other than 12+4, there are a few options to increase the number of BA teachers in lower secondary education, which include one PRESET and two INSET programmes, such as:

(1) BA+1 PRESET for those who have studied a specific subject in a university,
(2) BA fast track programme for 12+2 lower secondary teachers, and
(3) Short-term CPD programme for 12+2 lower secondary teachers with BA from private universities,
(4) Long-term CPD programme for 12+2 lower secondary teachers.

Unlike primary teacher education, the option (1) BA+1 PRESET will be a powerful means to prepare BA-equivalent lower secondary teachers, as many other countries have experienced. The BA+1 programme also helps to cope with (fluctuated) urgent teacher demands by adjusting the quota, which can be reduced or stopped if BA teachers are not urgently needed in the future.

Table C-10 combines the above tables, assumptions and targets, in which the figures in Columns (E) through (G) are just calculated so as to achieve the target in every 5 years. If the teacher demand is less than this projection, and the qualified BA teachers are produced as in this table, then the achievement will of course much exceed the targets.

Table C-10 Estimation of the number of "qualified" BA lower secondary teachers up to 2028

		[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]
	Year	Teacher demand	Target	Target BA teachers	12+4 in TEC	BA+1	BA fast track	Short-term CPD	Accumu-lation of [D]-[G]	Gap b/w [C] and [H]
Projection	2019	28,422	3%	853	0	0	2,000	0	2,000	1,147
	2020	31,854	6%	1,911	0	0		0	2,000	89
	2021	34,176	9%	3,076	0	0		1,000	3,000	-76
	2022	36,620	12%	4,394	0	0		1,000	4,000	-394
	2023	**39,070**	**15%**	**5,861**	**200**	**400**	**500**	**1,000**	**5,900**	**40**
	2024	41,120	18%	7,402	200	400	500	800	7,600	198
	2025	43,187	21%	9,069	200	400	500	800	9,300	231
	2026	45,290	24%	10,870	200	600	500	800	11,200	330
	2027	47,418	27%	12,803	300	800	500	800	13,300	497
	2028	**49,544**	**30%**	**14,863**	**300**	**1,000**	**500**	**800**	**15,600**	**737**

Note: Column [F] includes the number of teachers who have complete the TUP programme by 2022.

In a long run, lower secondary teachers can utilise short training programmes to accumulate credits in certain areas through the option (4). However, again, the length of time to earn the necessary number of credits in all the fields of study differs greatly in individuals, which makes difficult to include the above option (4) in the yearly target of BA teachers.

This plan introduces BA+1 in 2022 on a pilot basis so as to study the feasibility of a programme and the capacity of responsible HEIs, and produces around 2,000 new BA holders every year from 2023 through either TUP or BA+1 or short-term CPD to achieve the 2028 target. while we assume that the number of students to TECs will be increased up to 1,000 from the 2022 intake, it is anticipated that TEC will not have sufficient capacity to accept more PRE/INSET students from then unless MoEYS construct additional buildings and hire additional teaching staff.

If MoEYS will achieve the above targets, it needs to consider the following interrelated issues, some of which are the same with primary:

1. Target group: Who should be selected based on what criteria?
2. Contents and method: How should the contents of TUP be revised to make it consistent with TEC? Based on what criteria should the 12+4 PRESET curriculum be reorganised for BA+1 and CPD?
3. Lecturers and venue: Who will be responsible for those programmes? TECs or HEIs? Or Can other 4 RTTCs be utilised for some modules, such as practicum? How about the roles of other HEIs?
4. Schedule: When to start these programmes actually? When should course design, participant selection, and other preparatory works be completed?
5. Budget: How much will it cost to conduct the above programmes?

2.2. Creating a virtuous circle for sustainable, self-reliant teacher education development

Given that most of other ASEAN countries have already introduced or is planning to introduce a 12+4 PRESET model in primary and lower secondary teacher preparation, teacher qualification upgrade is one of the urgent tasks in the education sector of Cambodia so as not to lag behind in the region in terms of human resource development.

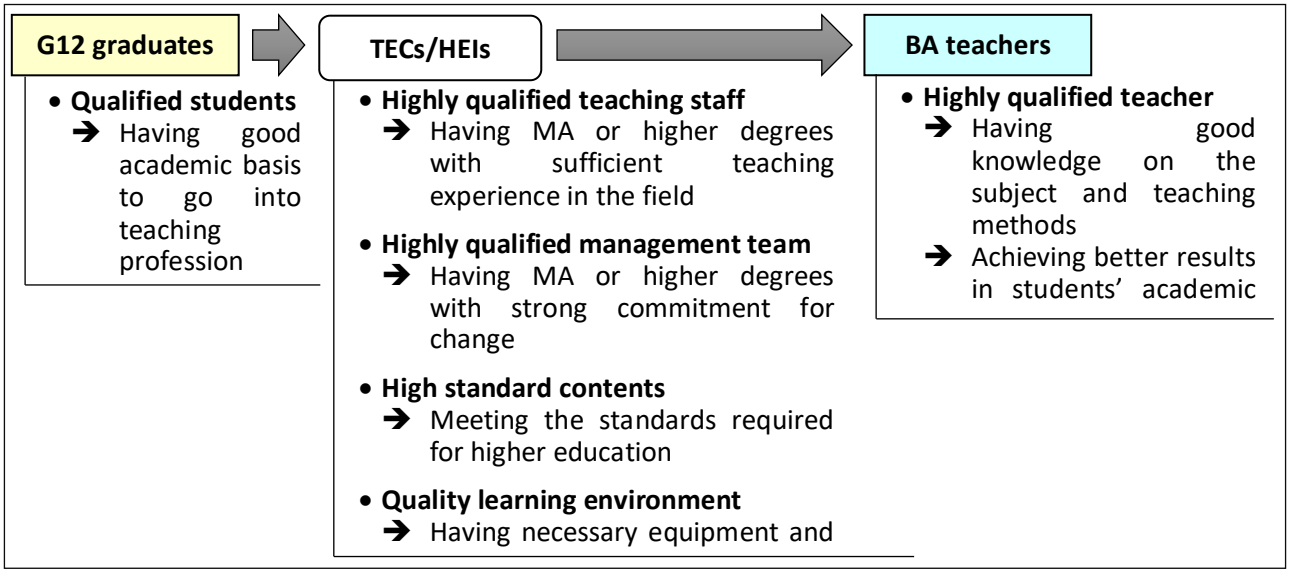


Figure C-2 Improving the quality of teaching through teacher qualification upgrade

Figure C-2 shows a successful example that teacher qualification upgrade leads to students' better performance: Good grade 12 graduates go through BA level teacher education and become good teachers. While a number of technical inputs go to teacher education itself at the middle of this figure, what are equally important are the quality of students and the status of BA teachers: if under qualified students, such as those getting D or E in the grade 12 national exam, come to TECs, then most of time would be spent to review the contents of secondary education as observed in TTCs, which brings down the standard of teacher education to the secondary levels; and if the status of BA teachers is not attractive enough, then many good students are unlikely to choose teaching profession.

The improved knowledge and skills of primary and lower secondary teachers will also improve the academic level of upper secondary students, which in turn upgrade the quality of TEC applicants. To create this virtuous circle would be the basis for sustainable and self-reliant teacher education development, which is a recommended fundamental policy for teacher education to be achieved by 2030.

On the other hand, one of the critical problems in the human resource development in Cambodia is the absence of a mechanism that produce teacher educators, which requires a HEI to hire a wide range of academic specialists from educational sciences (e.g., philosophy, history, psychology, sociology, pedagogy, policy, management, curriculum, and various theories of learning) to subject education (e.g., teaching and learning theories on languages, math, sciences, social studies, physical education, art, etc.). This has not only resulted in the current reliance on scholarship programmes for the supply of qualified human resources, but also hampered the smooth transition from 12+2 to 12+4 teacher education.

Thus, the achievement of the fundamental policy of establishing sustainable and self-reliant teacher education system theoretically requires a new faculty specialised in producing qualified teacher educators at the MA level. Currently the Faculty of Education in RUPP and the National Institute of Education seem to have a potential although their strong commitment to teacher education and DPs' long-term technical support to provide scholarship and overseas training programmes are indispensable. The proposed mechanism to produce qualified teacher educators is as shown in Figure C-3 below. This will be discussed in detail in Section 3.3.

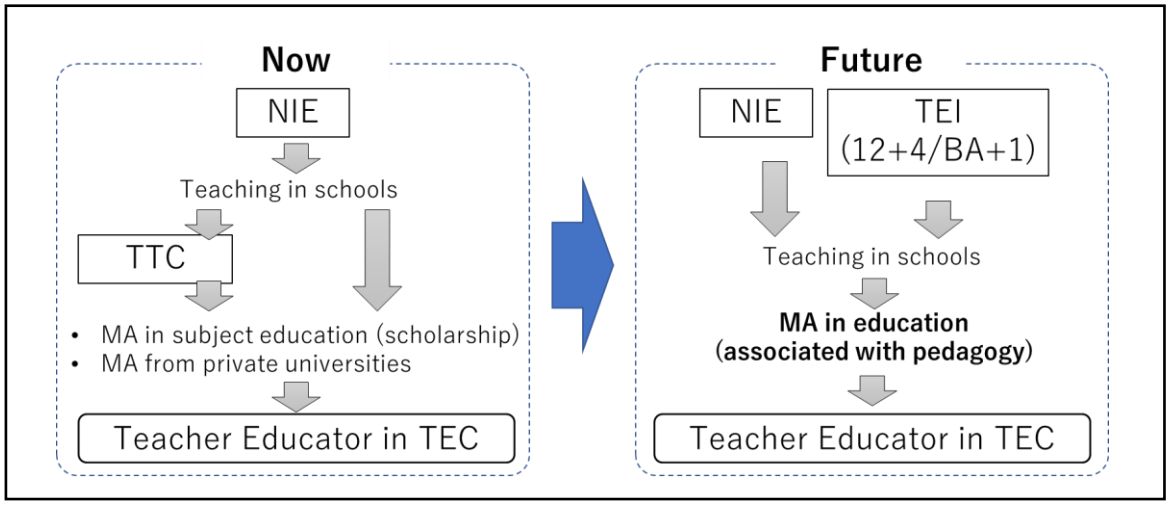


Figure C-3: Proposed mechanism to produce qualified teacher educators

3. Strategy for teacher qualification upgrade in the next decade

3.1. Recommended strategies

Under the fundamental policy and policy targets proposed in the previous section, this report recommends the following strategies to achieve those targets.

It should be noted that, as described above, teacher qualification upgrade cannot be sustainable and self-reliant without establishing a circular process. However, an issue of significantly undersupplied teacher educators has emerged as a bottleneck in establishing 2 TECs.

The Teacher Education Provider Standards, or TEPS, stipulate the following conditions that the teaching staff of each teacher education provider satisfy:

- Those who hold a qualification at least equal to the program they wish to teach (BA, MA, PhD) and have at least 5 years of teaching experience, must not exceed 50 per cent of the teachers teaching the programme,
- Those who hold a qualification at least one level higher than the programme they wish to teach (MA, PhD) and have at least 3 years of teaching experience, must constitute at least 50% of the total teaching force in the programme, and
- Those who hold a qualification at least equal to the program they wish to teach (BA, MA, PhD) and have teaching experience of less than 5 years can be assigned as assistant teachers.

There was an optimistic expectation that MA holders working in schools, the number of which was not less than 800 at the time of estimation, would apply to TECs, but in reality, the preceding 2 TECs faced a critical staffing problem to satisfy the above TEPS requirements. Therefore, the increase of BA teachers is synonymous with the increase of qualified teacher educators who have a master's degree or higher.

[Recommendation] Strategies for Teacher Qualification Upgrade in the Next Decade

(1) Introducing a "credit-based teaching certificate system":
Defining a set of common rules by a Ministerial Ordinance that stipulates what level (primary/LS/US) of teachers have to earn how many credits in what area of study to become BA teachers, which ensures consistency between teacher qualification upgrade programmes.

(2) Combining various modalities for qualification upgrade:
Supplementing 12+4 PRESET with upgrading INSET and CPD programmes as well as with BA+1 in lower secondary, to achieve the policy targets related to the proportion of BA teachers.

(3) Expanding TECs in a phased manner:
Firstly making 2 TECs take off, secondly upgrading selected TTCs to new generation TTCs staffed by qualified lecturers, and finally upgrading those TTCs to TECs, by strategically increasing qualified lecturers.

(4) Establishing new MA courses in HEIs:
Strengthening selected HEIs to supply teacher educators in pedagogy and subject education within the country without relying on foreign aid.

3.1.1. Strategy 1: Introducing a "credit-based teaching certificate system"

A "credit-based teaching certificate system" is a mechanism that only those who have earnt the necessary number of credits in specific areas of study will receive a certain teaching certificate. This system is a basis for the quality control of teachers, and normally stipulated by law[5]. To introduce the credit-based teaching certificate system will help:

(1) Teachers design their own CPD plan by taking the modules necessary to complement already-received credits/modules for qualification upgrade,
(2) MoEYS ensure consistency across PRESET and INSET/CPD programmes by applying a common legal framework, and
(3) MoEYS prevent primary and lower secondary teachers from moving upward to upper secondary teachers without learning sufficient specialized knowledge and skills required at the upper secondary level.

In addition, a teaching certificate system also introduces paper-based certificates that prove how many credits of what contents they have learned in teacher education institutions, and show the link with their class (Kropkhan) in the teacher salary scale.

Table C-11 proposes the types of teaching certificates, supposing that TEC graduates come into Class A in the salary scale. In this table, the teaching certificates are divided into 3 levels, "Standard", "Basic", and "Special"; the certificates for secondary teachers are issued subject-wise (e.g., "Teaching certificate for lower secondary education in Mathematics") to clarify their specialties; and primary and lower secondary teachers can upgrade their class (not across but) within their school category, which encourages their further study. In the future, "Advanced" teaching certificate can be added for qualified MA+1 teachers.

In a long run, the credit-based teaching certificate system will help MoEYS flexibly cope with fluctuating teacher demand by producing certificate holders more than required, and having local bodies (e.g., POEs) use those certificate holders to fill the demand-supply gap at the provincial level.

Table C-11 Proposed teaching certificates

Types of teaching certificate	Level of education	School category
Standard teaching certificate		
• For upper secondary education in "(subject)"	BA+1	• Upper secondary
• For lower secondary education in "(subject)"	BA (12+4)	• Lower secondary
• For primary education	BA (12+4)	• Primary
Basic teaching certificate		
• For lower secondary education in "(subject)"	RTTC (12+2)	• Lower secondary
• For primary education	PTTC (12+2)	• Primary
• For pre-school education	PSTTC (12+2)	• Pre-school
Special teaching certificate		
• For primary education	PTTC (9+2)	• Primary
• For pre-school education	Contract teachers	• Pre-school

[5] For example, in Japan, it is outlined in "Education Personnel Certification Act" and this Act is elaborated in the ministerial "Ordinance for Enforcement of Education Personnel Certification Act". China also established a similar legal structure in 1980s-90s.

3.1.2. Strategy 2: Combining various modalities for qualification upgrade

While TPAP 2015 has planned to start 12+4 and BA+1 by 2018, the implementation of BA+1 is still nowhere in sight due to a lack of clear vision. However, considering the capacity of 2 preceding TECs, the difficulties in establishing other TECs, and the demand of BA teachers in lower secondary education, the introduction of BA+1 with use of HEIs would be one of the very few options to achieve the proposed policy targets listed above. As it is ensured that TECs starts in 2018, it appears to be the right time to start discussion about how BA+1 should be introduced in collaboration with other HEIs.

Another way for the planned increase of "qualified" BA teachers is to implement INSET for teacher upgrade purposes, like TUP that RUPP has been conducting for lower secondary teachers with financial support of the World Bank. Also, CPD programmes for a few months can be conducted for those 12+2 teachers receiving BA from private universities to earn additional modules that they are yet to study in comparison with TEC graduates. However, it is extremely costly for the government to conduct state-funded INSET for all these teachers even by 2030. The options that MoEYS can take are to prioritize the teachers in remote areas so as to encourage teacher redeployment and to introduce "self-pay" (even partly) in-service teacher upgrading programmes for the teachers in urban areas.

Shown in Figure C-4 are the proposed paths to be a qualified BA teacher, or a "standard teaching certificate" holder, after graduating an upper secondary school. The establishment of this mechanism requires strengthening TEIs, including TECs, TTCs and other HEIs involved in teacher education, so that teacher education programmes are provided at the same standard in different institutions throughout the county.

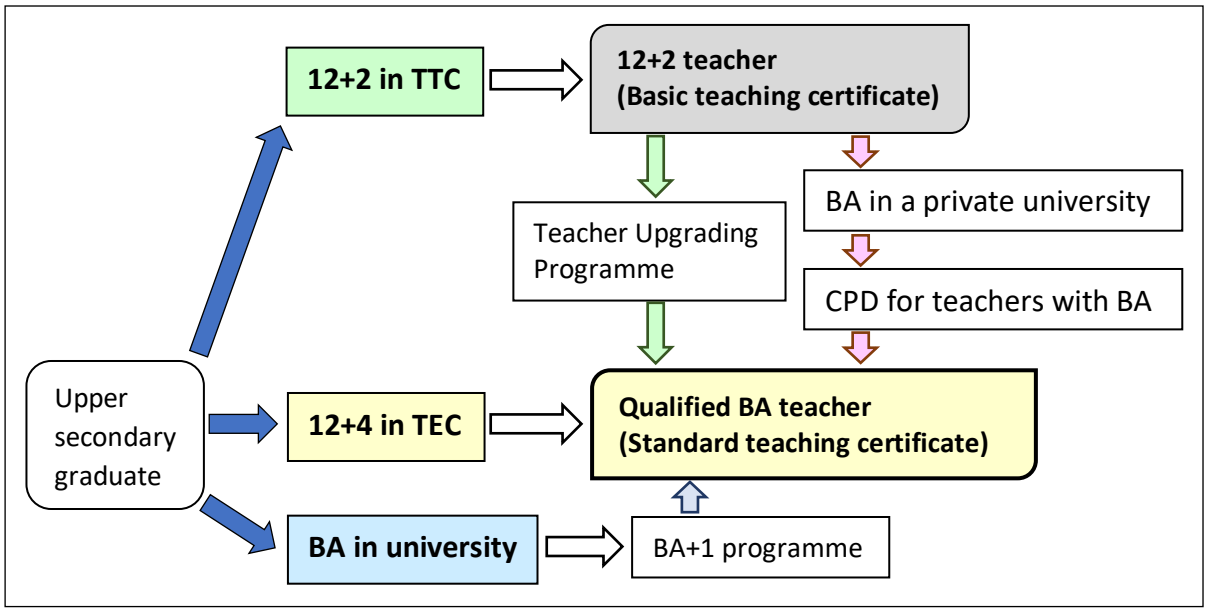


Figure C-4 Proposed paths to be qualified BA teachers

3.1.3. Strategy 3: Expanding TECs through a phased process

The limited supply of qualified teacher educators slow down the process of upgrading the remaining TTCs to TECs. This report puts forward a recommendation to create "new generation TTCs" as a bridge between TTCs and TECs. The new generation TTCs are supposed to provide 12+2 PRESET but

have more than 50% of teaching staff with relevant MA and deal with the contents of education at the same quality standard with those in TECs.

The following 2-step upgrade from TTCs and TECs would facilitate the TEC establishment process:

Step 1: Upgrading the quality of education → the level of teaching staff and contents, and
Step 2: Expanding the capacity → the number of teaching staff, classrooms and equipment.

Phase 1 above corresponds to the upgrade of selected TTCs to "new generation" TTCs, while Phase 2 means the transformation from new generation TTCs into TECs. Those "new generation" TTCs should be recognised as higher education institutions specialised in teacher education. They will be transformed to TECs when all the necessary conditions are met.

Those new generation TTCs are expected to make a significant contribution to achieving the policy targets through implementing BA+1 PRESET and upgrading INSET, which the existing TTCs are unable to do due to the lack of qualified teaching staff. This Strategy 3 will be elaborated later in Section 3.2.

3.2. Process of upgrading TTCs to TECs

Related to Strategy 3, this section discusses in detail the future of remaining 16 PTTCs and 4 RTTCs. Table C-12 shows the stages that "well-motivated" TTCs go through to become "new generation" TTCs and then TECs. As in the table, it will take years of time to upgrade TTCs to TECs because it requires more than 50% of MA holders in more than 100 lecturers. However, if all the TTCs remain in the same level and status, then the achievement of teacher qualification upgrade will be significantly delayed as the capacity of TECs and the number of potential HEIs for teacher education are limited.

Among the stages listed in Table C-12, Stage A-1 indicates the current status that TTCs are not considered as HEIs and continue 12+2 programmes, but they can support 2 TECs as the "satellite campuses" where practical, non-academic subjects, such as practicum, can be conducted in accordance with TEC practicum guidelines. This approach benefits student teachers as they can do practicum in their hometown in most cases and realise how things really are in their home province. In addition, TTCs can provide short CDP training programmes for the teachers in service, although those may be limited to some courses that are not academic and used not for qualification upgrade but as part of teacher evaluation for promotion.

Table C-12 Future options of TTCs

Timeframe	Status of TTCs	Stages of TTC upgrade	Possible roles
2018 ↓ ↓ ↓	A) TTCs remain in the same status (not HEI).	A-1) Keep a 12+2 system	• 12+2 PRESET provider • Satellite campus of 2 TECs for non-academic modules (e.g., practicum) • CPD (short training) provider
2025 ↓ ↓ ↓ ↓	B) TTCs are upgraded to HEIs specialised in teacher education	B-1) Transform TTCs to "new generation" TTCs	• 12+2 and BA+1 PRESET provider • Upgrade INSET provider • Satellite campus of 2 TECs (e.g., for the 3rd and 4th years) • CPD (short training) provider
2030 ↓ ↓		B-2) Gradually transform TTCs to TECs	• 12+4 & BA+1 PRESET provider • Upgrade INSET provider • CPD provider

Stage B-1 to establish "new generation" TTCs would be the next stage of TTC development. After (even some selected) TTCs are fully staffed with qualified lecturers with MA to satisfy TEPS, they will be authorised as HEIs that can offer associate degrees. The only difference between these TTCs and TECs is the duration of training. By not expanding TTCs to TECs at one stretch, each TTC can

implement teacher education within the existing infrastructure capacity. Although the existing underqualified teaching staff will have to be gradually replaced with qualified ones, the necessary number of MA holders will be a half of TECs, which will be around 25 per TTC. In this stage, TTCs will be expected to play a broader and more active role in teacher education: they can conduct BA+1 PRESET, teacher upgrading (INSET) programmes for 12+2 teachers, and some academic and practical modules as the satellite campuses of 2 TECs.

Option B-2 is the final stage to transform those "new generation" TTCs into TECs. This is a distant goal and likely to be completed in the 2030s. The number of TTCs to be upgraded can be determined based on the situation at the time of the next-next ESP 2024-28. Whether the "new generation" TTCs can be immediately upgraded to TECs or continue 12+2 for years, are dependent on the resources available at that time.

One of the criteria to upgrade to "new generation" TTCs would be the teacher demand of that province or region. The below Table C-13 is a ranking of provinces that show the highest primary teacher demand in the next decade according to the projection in the previous part. As in the table, all of the six provinces with RTTC are included in the top 10 provinces. From the viewpoint of human resource management, it is obviously efficient if primary and lower secondary teacher training courses are opened together within the same administration of a "new generation" TTC. Thus, if we take a geographical balance into consideration, then Prey Veng, Takeo, and Kampong Cham are the candidates, while those TTCs may use the existing PTTC and RTTC campuses, and "qualified" lecturers commonly work in both TTCs.

Table C-13 Primary teacher demand ranking

	Province	PTTC	RTTC	Note
1	Battambang	√	√	Already upgraded to TEC
2	Siemreap	√		
3	Kandal	√	√	
4	Prey Veng	√	√	
5	Phnom Penh	√	√	Already upgraded to TEC
6	Kampong Speu	√		
7	Takeo	√	√	
8	Banteay Meanchey	√		
9	Kampong Cham	√	√	
10	Kampot	√		

Table C-14 Steps for TTC upgrade

Step	Action	Outcome
0. Preparation	Having consultation with TTCs.	All the stakeholders are well-informed about the process
1. Identification of gaps	Assessing TTCs to identify the gaps with TEPS.	Both human resources and facilities are assessed based on objectively measurable information
2. Preparation of TTC development plan	Planning how to upgrade TTCs to meet TEPS.	A strategic development plan to fill the above gaps is prepared by each TTC.
3. Implementation of the plan	Taking the actions listed in the plan on time.	Necessary documents are prepared, school facilities are equipped, and qualified teaching staff are hired and training, according to the plan.
4. Launch of new generation TTCs	Starting new training programmes	New programmes, such as BA+1, upgrading INSET, and academic and practical modules (as a satellite of the preceded 2 TECs) are successfully implemented.
5. Transformation into TECs	Starting 12+4 PRESET	A 12+4 PRESET programme is successfully conducted at the same standard with the preceded 2 TECs.

Described in Table C-14 are the expected steps that the TTCs need to go through to be "new generation" TTCs and then to TECs. They can learn from the experience of Phnom Penh and Battambang TECs.

3.3. Process of supplying qualified teacher educators

This section elaborates Strategy 4. As seen in Table C-4 before, the number of qualified (selected) teaching staff for 2 TECs did not reach the quota, and the number of applicants to BTEC was even under the quota. In addition, one deputy director post in BTEC has been vacant for 1 year.

There are several reasons behind this small number of applicants, such as:

- The status of TEC lecturers was not attractive enough for potential candidates or MA holders working in schools;
- The information of the vacancy was not sufficiently disseminated to education institutions throughout the country;
- The work places were simply very far from the place of residence;
- The position was attractive, but it was difficult to move to Battambang or Phnom Penh with their family, or one's qualification did not meet the prerequisites, or one was not confident enough for the duties as TEC lecturers, and so on.

Taking this situation into consideration, it does not seem to be realistic to rapidly increase the number of TECs, because it requires recruiting hundreds of relevant MA holders within a few years for rural provinces. Around 10 scholarship students currently studying in Hiroshima university will be appointed to P/BTEC on a priority basis, but the undersupply of TEC lecturers will remain even after the appointment of those 10 people. In these circumstances, how can we find new lecturers to other TECs, particularly in rural provinces?

It is estimated that, as shown in Table C-15, more than 100 MA holders will be necessary to implement the 4-year TEC primary teacher course where 250 students are supposed to be registered every year. The necessary number of lecturers exceeds 150 to conduct 12+4 primary and lower secondary course where 100 students will study every year in several different subjects. On the other hand, there are a limited number of relevant MA holders in the existing TTC trainers, and highly educated individuals are unlikely to work in rural provinces without any special incentives.

Table C-15 Estimated lecturer needs for the TEC primary teacher training

	General Edu. Studies	Edu. Psycho.	Khmer	English	French	Math	Science	Social Studies	ICT	PE	Art	Music	Total
Y1 Total	2	2	2	3	---	4	2	4	1	2	0	0	**22**
Y2 Total	2	2	3	3	---	4	3	4	2	2	6	6	**37**
Y3 Total	1	2	2	2	---	4	2	2	0	2	6	6	**29**
Y4 Total	2	0	3	6	---	5	3	0	0	5	0	0	**24**
Subject-wise Primary Total	7	6	10	14	---	17	10	10	3	11	12	12	**112**

Source: Calculated by ETEC project, under the assumption that 250 students enter TEC per year.

To increase the number of TEC lecturers, MoEYS needs to take a multifaceted approach involving scholarship programmes, overseas training programmes, and the establishment of MA programmes for subject education in selected HEIs.

Table C-16 shows a rough plan to develop human resources in the field of teacher education:

(1) a MA+1 programme is for the existing MA holders in schools and teacher education institutions to acquire comprehensive pedagogical knowledge and skills through 1-year overseas training, and the graduates will be firstly appointed to TECs and then "new generation" TTCs to satisfy TEPS to be HEIs;
(2) a scholarship programme is for BA holders to get a master's degree on subject education until the vacancy of TECs are fulfilled, and then MA holders to get a doctoral degree as part of launching MA programmes within the country; and
(3) a domestic MA programme on subject education is to sustainably prepare teacher educators in domestic selected HEIs without relying on uncertain scholarship programmes of development partners, starting by BA+1 by MA lecturers, which will be followed by MA programmes when PhD lecturers are adequately staffed.

The expected flow of development and supply of teacher educators is as summarised in Figure C-5. A sustainable and self-reliant system will be established when those selected HEIs are fully staffed with qualified (MA and Ph.D.) lecturers of teacher education subjects.

From a viewpoint of HEIs, this requires them a long-term commitment in teacher education. As summarised in Figure C-6 that takes the Faculty of Education, RUPP, as an example, it is likely, at least, to take 10 years to establish a mechanism to develop and supply teacher educators without heavily relying on foreign aid.

Table C-16 Plan to develop human resources in teacher education

Programme	Short term (1 to 3 years)	Medium term (3 to 5 years)	Long term (5 to 10 years)
(1) MA+1 overseas training programme ➔ *To meet the immediate needs of TECs and TTCs.*	• To study abroad for 1 year as research students.	• To continue the programme.	• To start supplying "MA+1" lecturers to "new generation" TTCs to satisfy TEPS.
(2) Scholarship programme for MA and PhD ➔ *To meet the needs of TECs and HEIs.*	• To study abroad for 2 years as MA course students.	• To continue the programme. • To start shifting to a PhD programme	• To complete the shift to a PhD programme.
[Note]	• These teachers above will be mandatorily appointed as TEC lecturers after the programmes. • The supply of teaching staff through these programmes will be completed within 5 years.		• The PhD holders will be appointed to HEIs to start MA programmes on subject education.
(3) Domestic MA programmes on subject education ➔ *To prepare a sustainable system.*	• To encourage selected HEIs to prepare a faculty and human resource development plan	• To use overseas MA scholarship programmes to increase the number of lecturers.	• To start BA+1 PRESET with use of MA lecturers. • To start MA in subject education.

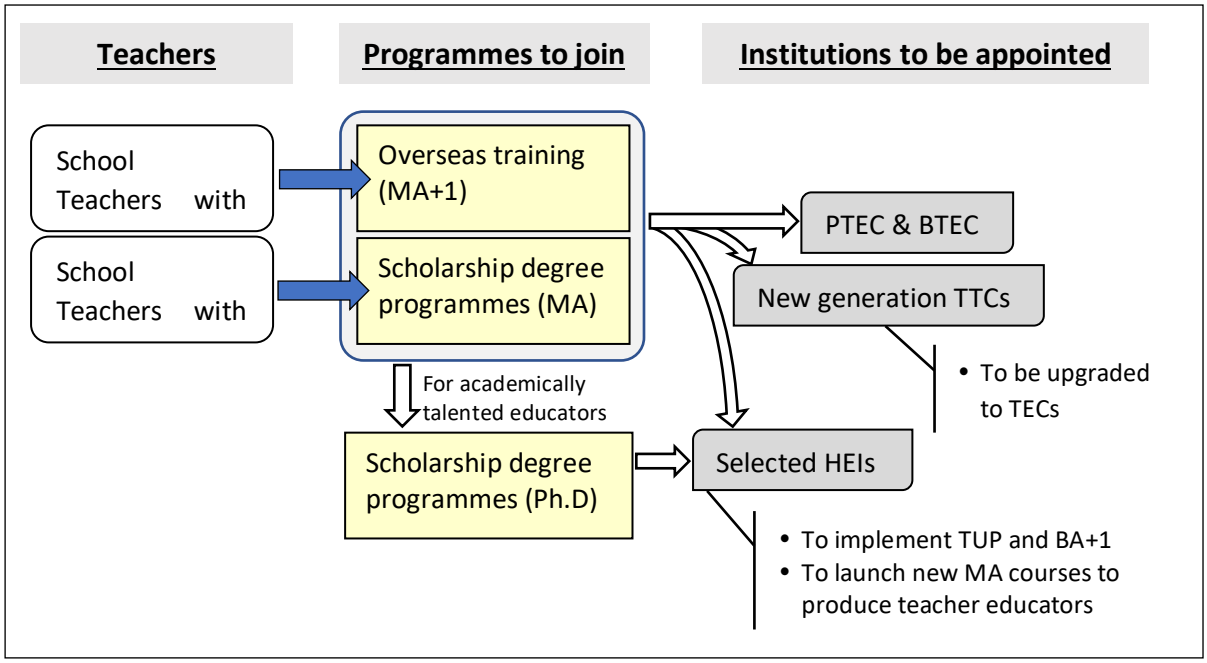


Figure C-5 Chart to develop and supply teacher educators

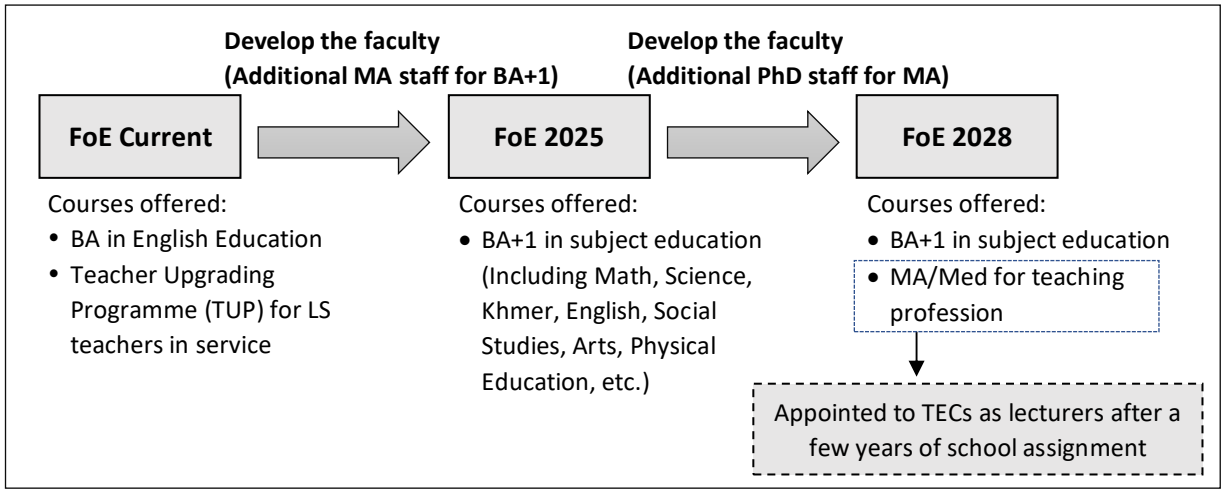


Figure C-6 Long-term faculty development for sustainable teacher education

Table C-17 Actions to be taken for teacher qualification upgrade by 2023

Category	Description	Activities	Time frame	Responsible institutions
Category 1:	Formulating a strategic plan for teacher qualification upgrade.	(i) To set concrete numerical targets based on statistical analysis.	2019 Q1	MoEYS / DPs (Consultant)
		(ii) To figure out strategies to achieve the target.	2019 Q1	MoEYS / DPs (Consultant)
		(iii) To prepare a plan (schedule, venue, educator, budget, etc.) to implement the programmes.	2019 Q1	MoEYS / DPs
		(iv) To prepare teaching staff according to the above plan.	2019-2023	MoEYS / DPs (Scholarship, training overseas)
		(v) To prepare for a BA+1 programme in some selected HEIs on a pilot basis.	2019-2023	RUPP and other HEIs
Category 2:	Formulating a legal framework for a credit-based teaching certificate system.	(i) To examine the current legal documents related to teacher education	2019 Q1	MoEYS / DPs (Consultant)
		(ii) To prepare a Prakas to stipulate the necessary number of credits in certain areas of study to keep consistency between PRESET and INSET/CPD programmes.	2019 Q2	MoEYS / DPs (Consultant)
Category 3:	Implementing upgrading programmes.	(i) To develop/revise the curriculum for teacher qualification upgrading programmes, involving 12+4 PRESET, BA+1 PRESET, TUP, and other CPD programmes, based on the above Prakas.	2019 Q2 onwards	MoEYS / DPs (Consultant)
		(ii) To implement and improve 12+4 PRESET in 2 TECs.	2018 Q3 onwards	TECs / DPs
		(iii) To add necessary facilities to strengthen the capacity of TECs to accept at least 1,000 students per year in 2 TECs.	2019-2022	MoEYS / DPs
		(iv) To implement and improve TUP with the support of WB.	2018-2021	RUPP / DPs
		(v) To implement INSET for qualification upgrade (incl. TUP)	2021-2023	MoEYS / DPs
		(vi) To design BA+1 PRESET, including discussion about venues, implementers, schedule, and budget as well as the status of BA+1 teachers.	2019 Q3 onwards	MoEYS / DPs
		(vii) To implement pilot BA+1 PRESET	2022 Q4-2023 Q3	MoEYS / DPs
External Factor	Revising teacher salary scale.	To negotiate with MEF and MCS to equalise the status of teachers having the same educational qualifications.	2019-2021	MoEYS

4. Actions to be taken for teacher qualification upgrade

The actions that MoEYS can take by 2023 with the technical and financial support of development partners can be classified into the three categories plus one "external factor" as in Table C-17. It should be noted that Category 3 is what most DPs are interested and involved in, and so that the importance of achieving the targets in other categories are often overlooked in the discussion of DPs and other stakeholders.

Category 1: Formulating a strategic plan for teacher qualification upgrade

This category includes (i) setting concrete numerical targets based on statistical analysis as discussed earlier; (ii) preparing the strategies to achieve those targets; (iii) preparing a plan (schedule, venue, educator, budget, etc.) to implement the programmes; (iv) hiring and appointing teaching staff according to the above plan; and (v) preparing for a BA+1 programme in some selected HEIs on a pilot basis. While the activities (i) to (iii) are the groundwork for the next 10 years to be completed at the earliest possible opportunities, the activities (iv) and (v) are the preparation for the next 5 years after 2023. The details of (iv) and (v) will be described in the following section.

Category 2: Formulating a legal framework for a credit-based teaching certificate system

A "credit-based teaching certificate system" is a mechanism that only those who have earnt the necessary number of credits in specific areas of study will receive a certain teaching certificate. The activities included in this category are (i) examining the current legal documents related to teacher education, and (ii) preparing a Prakas to stipulate the necessary number of credits in certain areas of study to keep consistency between PRESET and INSET/CPD programmes. These tasks require the legal experts so as to prepare regulations without overlaps and gaps.

Category 3: Implementing upgrading programmes

This category involves a number of activities, involving 12+4 PRESET, BA+1 PRESET, TUP, and other CPD programmes. While the implementation of BA+1 PRESET is listed in TPAP 2015, this option has not yet been discussed sufficiently because MoEYS has prioritized establishing 12+4 PRESET or TECs. Now that TEC is launched, it is a right time to start discussion about how MoEYS will increase the number of BA teachers by combining the above limited options. These programmes are supposed to be implemented in different timeframes: 12+4 starts in 2018 at 2 TECs; TUP started in 2018 by RUPP; BA+1 has not yet started; and other CPD programmes will be conducted when the budget is available. As discussed, BA+1 and upgrading INSET programmes require a number of additional teacher educators, there is not a clear vision about the "planned increase" of those qualified individuals.

5. External factor: Revising teacher salary scale

In addition to these strategies above, a reform in teacher salary scale remains untouched as one of the most critical issues in teacher qualification upgrade. Although this is the central issue in teacher education reform, it requires a tough, time-consuming negotiation with the Ministry of Economy and Finance and the Ministry of Civil Services because it affects not only school teachers but also other government employees in different ministries. Although teacher salary has been significantly increased in the past 5 years, the status of primary and lower secondary teachers in the existing salary scale remains in Classes, or "kropkhan", C and B, respectively, which motivate those teachers

to get BA in private universities, followed by studying in NIE to become upper secondary teachers, the status of which is in Class A.

The current situation has brought about, and will lead to negative outcomes, such as: capable teachers in primary and lower secondary schools (i.e., TTC graduates) would move to upper secondary; talented upper secondary graduates would not be attracted by TECs and choose other universities; even TEC graduates in the future may apply to NIE for their qualification upgrade; and those who could not pass HEI/TEC/RTTC exams, or who want to stay in their home provinces would be primary teachers. All of these outcomes would be the factors that are likely to deteriorate the quality of basic education.

Given that TEC launches in 2018, the salary scale reform is an urgent issue to be solved within the next few years before the 1st batch of TEC students graduate. Otherwise competent individuals would come away from TECs, and low achievers who have so far applied to TTCs would come to study in TECs instead.

One of the models for teacher salary reform is as shown in the table below. What should be noted are:

- It does not change the salary scale of current 12+2 teachers.
- Those BA or BA+1 teachers who have earned necessary number of credits in certain areas of study will be upgraded to Cadre A.

The second point means that "12+2 plus BA in private universities" is not a satisfactory condition for upgrade, because they may not have studied necessary contents in terms of both the number of credits and the field of study.

The advantages of this model include not only encouraging 12+2 teachers and successful grade 12 graduates to get BA or entre TECs to be primary or lower secondary teachers, but also stopping a rapid, unregulated increase in the personnel expenditure of MoEYS by not allowing all the BA holders to upgrade.

Table C-18 Proposed model of primary and lower secondary teacher salary

Cadre	Basic teaching certificate (12+2, 12+2+Private universities)	Standard teaching certificate (BA in TEC, BA+1, TUP of MoEYS, 12+2+BA+CPD)
A	-----	Lower secondary Primary
B	Lower secondary teacher	-----
C	Primary teacher	-----
Note	• 12+2 Teachers remain in the existing system. • 12+2+"BA in private universities" will <u>not</u> automatically entre Cadre A because they may not have necessary credits.	• TEC graduates and BA+1 are classified into Cadre A. • 12+2+"TUP" will upgrade the cadre to A within the same school category.

6. Remaining Issues

6.1. Introduction of an "open" system

While this report has so far discussed the strategy for teacher qualification upgrade within the existing settings, introducing an "open" system to teacher preparation is another option to increase the number of BA teachers. An "open system" means that any HEIs who satisfy certain conditions, such as TEPS in Cambodia, can offer teacher education programmes, and that the graduates of those programmes will receive teaching certificates according to the programme they have taken. Some HEIs may offer many courses to prepare primary and lower secondary education, while others may offer only one course, such as, "lower secondary mathematics teacher course", "lower secondary physical education teacher course", or "primary teacher course", according to their capacity.

As discussed in Table A-2 in Part A, the introduction of the open system is expected to (1) reduce the government budget[6] and workload for teacher education as the role of the government in the open system is an administrator of the system, but not an implementor as in the closed system; (2) increase flexibility in teacher supply that helps immediately respond to a fluctuated teacher demand; and (3) upgrade the quality of teachers through promoting competition among teacher candidates.

It seems worth reviewing the case of China in 1980-90's to think about how Cambodia shifts to the open system. China made drastic changes in its teacher education policy in 1990's by introducing an open system, which are implemented in parallel with a closed system. While all the successful graduates of teacher education institutions were, like current Cambodia, appointed automatically to primary and secondary schools until the mid-1980's, Chinese school teachers became required to receive some test certificates related to teaching from 1986, and later to satisfy the conditions given in the Teacher's Law (1993) and the Regulations on the Qualifications of Teachers (1995) as a supplement to the Teacher's Law. As in many other open-system countries, teacher selection for Chinese primary and lower secondary schools is conducted at the county-level local governments.

Whilst a number of countries, particularly those who have HEIs that can offer teacher education programmes, has shifted from a closed to open system in a short period of time, it is unlikely to happen immediately in Cambodia due to a lack of HEIs that have a capacity to offer courses specialised in primary education or subject education. In the discussion above, this report proposes an option to enhance TECs to produce BA teachers through both PRESET and INSET programmes; however,

(i) The number of teachers required in lower secondary will exceed the capacity of the existing TECs and TTCs in the middle of 2020's, if the lower secondary GER will be "successfully" improved.
(ii) The excessive expansion of the capacity of TECs, on the other hand, will lead to a problem of redundant teaching staff and classrooms in the next-next decades when the teacher demand will be shrunken due to the decrease in the number of children.

These imply the necessity of introducing the open system and using it as a "buffer" to adjust teacher supply and demand. For example, as depicted in Figure C-7, TECs continuously produce the same number of teachers (Quota A) every year within their capacity, and qualified HEIs offer teacher

[6] In many OECD countries except France and some others, it is the aspirant teachers that have to bear the whole cost of his teacher initial education (Musset 2010).

education programmes for the remaining quota (Quota B), the number of which changes every year. As in other countries, students in the open system are supposed to bear all the cost to complete the teacher education programme in their HEIs.

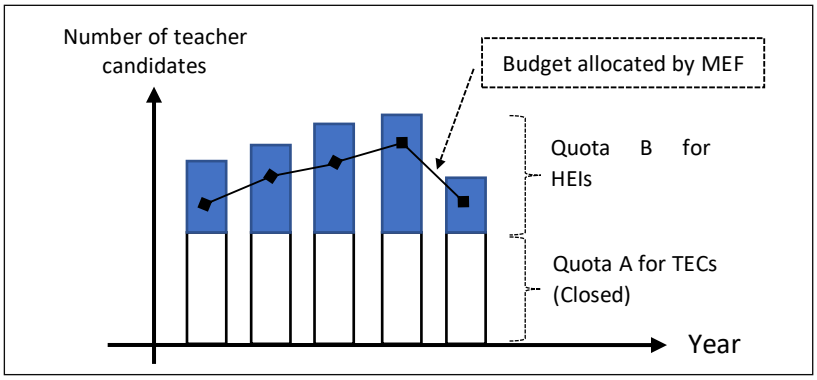


Figure C-7 Teacher education through open and closed systems

As indicated in the figure, the budget for teacher salaries allocated by the Ministry of Economy and Finance is always below the sum of Quota A and Quota B, which means that there will be a competition among the Quota B candidates at the provincial teacher selection process.

On the other hand, an open system requires (1) a decentralised teacher selection system for the Quota B candidates, and (2) a teaching certificate system to separate the graduation of teacher education programmes from the appointment of teachers in each province. Through these mechanisms, even when the Quota B candidates fail in the provincial selection exam, they still have a teaching certificate associated with the course they have taken, so they can apply for a teaching job in the succeeding years. It is worth noting that, as shown in Table C-19, most countries have a mechanism of recruiting secondary teachers at the local levels or below.

Table C-19 Level of Responsibility for Recruitment of Secondary Teachers in ASEAN+6

Level	Country
Central/National level	Cambodia, Malaysia, Myanmar, Singapore
Central/National or local level	China
Local (e.g. provincial/district) level	Indonesia, Japan, Lao PDR, Republic of Korea, Thailand, Viet Nam
School level	Philippines
Local and/or school level	Australia

Source: UNESCO (2014), pp.38

Table C-20 is a rough plan to introduce an open system. The most critical issue is how to prepare HEIs for PRESET programmes which requires a number of additional teaching staff specialised in subject education. One of the feasible options is to enhance the capacity of the Faculty of Education in Royal University of Phnom Penh. While the goal is to offer MA courses in primary education and all the subject education, the initial step is to equip FoE with the capacity to offer initial teacher education programmes, for which it needs to prepare a faculty development plan including the information about the number of teaching staff in each subject education, the schedule to prepare those staff using scholarship and overseas training programmes, and the development of facilities for teacher education. The next step is to establish MA courses on subject education, which helps to

supply teacher educators to TECs. Then the human resource development in teacher education will be sustainable and no longer subject to donor-driven scholarship and training programmes.

Table C-20 Plan to introduce an open system to PRESET in 2028

Timeline	Actions	Prerequisite	Note	System
2019	To introduce a teaching certificate system	Analysis on the existing system	• Applied to all the PRE/INSET programmes.	Closed system
2019-27	To encourage HEIs to prepare for introducing the open system (e.g., Establishing MA courses in subject education)	Additional teaching staff	• Apply the open model firstly to BA+1 for LS.	
2023 onwards	To deconcentrate teacher selection to the provincial level within the closed system (Venues may be TECs/TTCs at the initial stage)	Additional staff to POE personnel offices	• Deconcentrate teacher selection tasks. • Encourage competition at the provincial level.	
Between 2025-28 onwards	To open lower secondary teacher education to HEIs (BA+1)	Capacity of teacher selection exams at each province	• Start by selected HEIs. • Set a quota for TECs & HEIs	Open + closed system
2028 onwards	To open primary teacher education to HEIs (12+4)			

6.2. Problem in teacher deployment: Gap in lower secondary teacher supply and demand

Currently, the number of students to entre each PRESET course is not determined based on the precise data of teacher demand in each subject and province, and there is also a huge gap between the number of teachers requested from the schools throughout the country and the number of student teachers approved by the Ministry of Economy and Finance. Since students are expected to work in the province of their origin at graduation, it is crucial to plan PRESET based on the actual demand. It is already known that LS teachers are not fairly distributed and there is a large disparity between provinces and subjects. To improve the situation, targeted PRESET is crucial.

Every year Department of Personnel, MoEYS, calculates teacher surplus and shortage at each school level, which is aggregated per province. Analysis of their data shows that LS teacher shortage is concentrated in specific subjects and areas while surplus is found in other subjects and areas. The below Table C-21 shows aggregated data for 2014-2015.

Key findings are:

- Overall, there is significant surplus of LS teachers.
- There is, however, a wide disparity between provinces and subjects as below:

	Surplus	Shortage
Provinces	Phnom Penh (1187), Pursat (440)	Takeo (-291), Tbong Khmum (-265)
Subjects	Khmer (1109), History (733)	IT (-882), PE (-718)

- Most of the shortages are concentrated in Takeo and Tbong Khmum provinces and IT and PE subjects.

- The largest surplus is Math teachers in Phnom Penh (252).
- Only Phnom Penh has surplus of IT teachers (58) while all the other provinces have shortage.

It should be noted that

- This survey allows to enter one subject per teacher although most of the teachers are trained in and actually teach two (or more) subjects, which results in the undersupply of the 2nd subject.
- Art subject teachers, which is likely to be undersupplied, are not included in the survey.

Table C-21 The estimation of LS teacher surplus and shortage in 2014-15

No.	Province	Khmer	History	Math	Physics	Biology	Geography	Foreign Language	Chemistry	Home Economics	Earth Science	Moral Civics	Physical Education	IT	Total
1	Phnom Penh	193	116	252	84	59	59	95	81	65	60	54	11	58	1187
2	Pursat	178	47	76	54	32	23	55	15	6	3	14	-24	-39	440
3	Kmapong Speu	116	42	36	32	25	31	9	19	16	12	2	-21	-46	273
4	Kampong Chhnang	60	39	38	22	30	13	36	34	21	16	13	-45	-32	245
5	Kratie	52	23	41	31	22	7	22	17	18	14	13	-24	-9	227
6	Svay Rieng	58	57	20	24	27	8	27	15	20	9	-8	-54	-23	180
7	Preah Sihanouk	29	24	33	17	11	9	12	10	18	6	1	0	-16	154
8	Battambang	89	31	30	24	20	11	26	8	24	3	7	-71	-75	127
9	Kampot	42	35	14	23	6	18	1	17	3	0	9	24	-69	123
10	Stung Treng	14	15	8	12	17	6	22	7	8	11	4	4	-5	123
11	Pailin	24	18	21	19	13	4	12	1	4	1	3	4	-6	118
12	Banteay Meanchey	57	28	29	40	22	6	3	14	12	15	7	-69	-55	109
13	Kandal	55	50	26	17	11	46	2	1	8	1	7	-39	-98	87
14	Preah Vihear	11	19	3	26	23	13	1	5	0	3	2	-10	-11	85
15	Koh Kong	2	10	3	9	10	5	2	4	6	3	2	8	-10	54
16	Kep	6	5	4	4	1	3	14	3	3	1	2	8	0	54
17	Rattanakiri	8	14	0	6	7	5	0	6	11	1	1	2	-9	52
18	Kampong Thom	16	29	12	21	9	7	-1	0	11	-8	0	-39	-12	45
19	Mondulkiri	5	4	1	5	8	2	-1	1	0	0	1	5	-3	28
20	Uddar Meanchey	12	11	9	4	10	1	-16	6	6	8	2	-13	-13	27
21	Prey Veng	86	38	30	16	16	11	-8	-14	8	5	2	-87	-104	-1
22	Kampong Cham	31	28	65	13	7	34	-21	4	2	-3	6	-77	-91	-2
23	Siem Reap	12	23	41	20	10	1	22	0	0	3	-29	-96	-86	-79
24	Tbong Khmum	-13	6	-35	13	-14	-5	-31	-2	-8	-19	-42	-67	-48	-265
25	Takeo	-34	21	-60	-10	0	2	-21	9	-34	-1	-35	-48	-80	-291
TOTAL		1109	733	697	526	382	320	262	261	228	144	38	-718	-882	3100

Source: Calculated based on the information collected from DoPer, MoEYS

These gaps between subjects and provinces would imply the necessity of other teacher education providers specified in certain subjects, such as music, art, physical education, and IT. Innovative strategies (e.g., Temporarily carrying out short PRESET for relevant BA holders with the support of NGOs) may be required for these subjects. In particular, the qualification upgrade and the increase in the number of lower secondary physical education teachers are urgent issues as in the table above. While NIPES is planning to upgrade itself to be a 12+4 institution like TECs, it would be necessary to examine if NIPES alone will not only cope with this shortage but also upgrade existing physical education teachers. If not, it will also have to think about how to distribute a sufficient number of physical education teachers throughout the country.

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