REVIEWS OF EDUCATIONAL CONTENTS, PEDAGOGIES AND CONNECTIVITY OF CURRICULUM AND ITS RELEVANCE TO ECONOMIC DEVELOPMENT IN CAMBODIA

A Focus on Khmer, Mathematics, and Science for Grades 9 and 12

Chealy CHET, Chanrith NGIN, Sitha CHHINH, Samsideth DY, David FORD

Royal University of Phnom Penh

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EXECUTIVE SUMMARY

This study examined the following questions: (1) What knowledge, skills and attitudes are demanded by the Cambodian economy in order to move from a low-income country to an upper middle-income country by 2030?; (2) How do Cambodian school curricula of Khmer, math and science subjects prepare students to have the knowledge, skills and attitudes required by an upper middle-income economy?; and (3) What are the constraints to effective delivery of the curricula of these subjects at the classroom level? The methodology comprised a critical literature review, a textbook analysis, interviews with textbook authors and users/teachers, and a teacher survey.

Skills, Knowledge, and Attitudes: Implications of Cambodia Becoming an Upper-Middle Income Country

Cambodia is facing both a skill shortage and a skill mismatch. The country's growth strategy is based on the upgrading of existing industries, garments and footwear, light manufacturing, tourism, and milled rice exports. Cambodian IDP 2014-24 (draft) promotes new industries that include; machinery assembly and assembly of electrical appliances and transportation equipment; agro-processing industry through modernization of processing techniques, technology, packaging and strengthening of the value chains; and promoting strategic industries such as energy and heavy industries, water supplies and green-based technology. Given the current status, in order to move out of the lower-middle income category by 2030, the following should be considered:

- A large low-skilled workforce is needed for tourism and emerging sectors i.e. light manufacturing.
- In the short-term, the labor market does not need a large high-skilled workforce, except the tourism sector, but rather a medium-skilled workforce.
- All priority export sectors seemingly need the same category of workforce e.g. specialized workers, mechanics, technicians and engineers.
- Strong foundation/lower-order cognitive skills i.e. basic literacy and numeracy are needed in all export sectors, a point stressed by employers.
- Common higher-order cognitive skills: language, communication skills, and problem solving are need for middle and higher positions, and so are common socio-emotional skills: common sense, cross-cultural understanding, maturity, teamwork, and initiative.

Attention should also be paid to the middle-income trap when Cambodia enters the upper-middle income category. Innovation should be promoted further so that the country can grow fast enough to reach a high-income level by 2050. Depending on the current growth strategies, it is very likely that the country will be trapped in the upper-middle income level. Recalling that Cambodian growth is more resource-based, there is also a good lesson to be learnt from the case of Korea, where the promotion of R&D was the center of its growth policy.

Do Cambodian school curricular of Khmer, math and science subjects prepare students to have the knowledge, skills and attitudes required by an upper middle-income economy?

Cambodia's future economic development will require human resources with a wide range of hard and soft skills. The lack of high-order, socio-emotional and technical skills in the present graduates from the school system has been widely reported already. This research has attempted to identify the causes of these deficiencies and this section has looked specifically at the textbooks that all students and teachers depend on; in Cambodia with only one set of approved

textbooks, the textbooks *are* the effective *written* curriculum. *To what extent are the textbooks used in Cambodian schools responsible for these deficiencies?*

The following summary of the analysis of the grade 9 and 12 textbooks of Mathematics, Khmer language, and Science, classified into the three domains, Knowledge, Skills and Attitudes, can perhaps provide some of the answers.

1. Knowledge

- Content generally difficult, fragmented, not well explained and sometimes wrong, but only memorization required
- Most factual information is described very theoretically (abstract/unreal) not practically.
- The substance in each lesson is not sufficient for students to build a strong foundation for thinking towards higher cognitive levels.
- Levels of difficulty are inconsistent, with some content in grade 9 considered to be at university level.
- Sequence of concepts often does not follow a logical constructive order.
- Even though content in the textbooks is generally insufficient, MoEYS has instructed that some chapters are not required to be taught.
- Disconnection with everyday life, society and the environment.
- Disconnection between fields of science; not integrated 'as-experienced'.
- Language confusion over the use of technical words and symbols in French and English.

2. Skills

- Emphasis on remembering, understanding and applying facts. Questions of "how" and "why" are sometimes observed, but learners are only required to memorize and answer from the written texts, not from their own thinking skills.
- The process of science is not shown and not experienced through practical work.
- Missing higher order thinking skills; Posing questions, Formulating hypothesis, Defining problems, Generating possibilities, Predicting, Observing, Using apparatus and equipment, Comparing, Classifying, Inferring, Analyzing, Evaluating, Verifying, Communicating.

3. Attitudes

- Memorization without understanding produces passive learners
- Being forced to learn difficult, fragmented, poorly explained and sometimes wrong, information makes students bored and frustrated, unlike the stated hope of the text book committee, that the text book will become "an unfailing good friend" (Preface, Grade 9 Science).
- Presenting facts without explanation or logical reasoning discourages rational thinking
- Disconnection with everyday life creates perception that learning at school is irrelevant
- Students, who are not encouraged to question or think by themselves, lose interest in learning.

Recommendations

Short term

1. The extent of problems raised by this initial analysis of the curriculum indicates the necessity of continuing to review the entire curriculum in all its aspects, especially the *taught* curriculum, what teachers actually teach.
2. In particular, this review has identified the importance of making immediate corrections to the existing textbooks. Firstly, a list of official corrections should be circulated to all schools and teachers. Included in the corrections should be additional experiments and exercises at higher cognitive levels for each chapter. This should be carried out by qualified people who are paid adequately for the task.
3. Include questions about practical aspects and exercises of higher level cognitive levels in the national exams.
4. In order to assess the *Learned* curriculum it is suggested that MoEYS use the Program for International Student Assessment (PISA) to "assess to what extent students at the end of compulsory education, can apply their knowledge to real-life situations and be equipped for full participation in society".

Longer term

1. Prepare a new curriculum and text books by processes that avoid the current problems.
2. Change the operating rationale of the Printing and Distribution House from profit to service.
3. Change the way that the curriculum is delivered to more student-centered, active pedagogies.
4. Translate and adapt complete foreign texts rather than "borrow" and mix from different texts.
5. Retrain teachers on how to teach the new curriculum.

What are the constraints to effective delivery of the curricular of these subjects at the classroom level?

In addressing the quality issues, MoEYS has put forwards various policy options in its series of policies such as upgrading academic qualifications of teachers, incentivizing teachers to continue further study through scholarships, providing financial support to teachers, improving classroom conditions and teaching-learning materials, revising the national curriculum and textbooks and upgrading teaching-learning methodologies (VSO, 2011). However, teachers still have low capacity to carry out their tasks; to deliver knowledge, skills and attitudes to their students and change student behaviors towards becoming responsible and productive citizens. Their low capacity has various causes that include the lack of effective mechanisms to systematically support teacher professional development.

Given the following facts:

- The content of the Cambodian written curriculum is not of comparable difficulty with that of Singapore;
- The content of the lessons from one lesson to another of the same grade and from one grade to another are not systematically and appropriately structured;
- Teachers are selected from poor teachers candidates;
- Teachers undertake a short period of pre-service with just only 12 years of general education and 2 years of pre-service except upper secondary school teachers (BA + 1);

- Unsystematic teacher support through induction and professional development;

It can be concluded that Cambodian school teachers mostly only teach the content of the textbooks to students. Therefore, they are not implementing the curriculum as it is intended.

The following recommendations are made to ensure that the teaching force effectively serves the education system in the country:

1. Teachers, as well as officials in education and other ministries, treat their current meager salary from the government as an excuse for them not to fulfill their duties attentively, ethically or professionally. Any potential salary increase must be linked to strengthening of performance and improved professional conduct of every individual following guideline documents such as Career Pathways and Teacher Standards.
2. Cambodian teachers today are responsible for delivering only the content written in the textbooks and rarely use materials from other sources to share with their students. Students learn from teachers and textbooks mainly just the knowledge content rather than skills, attitudes and behaviors. The national curriculum and school textbooks and teachers' manuals need to be revised against the theories of student learning outcomes, core abilities and social relevance.
3. Upon appointment to schools, teachers should not be expected to work right away independently. They need caring and support. Every school must run institutionalized induction program for new teachers.
4. A part from school or cluster-based professional development programs, teachers must identify their own individual needs for professional upgrading in training workshop and academic conferences.
5. Such self-initiated professional practices by teachers will happen only when MoEYS applies a performance management approach in its education reform strategy. This approach can be implemented in various ways through accountability mechanisms.
6. Above all, the effective management of public expenditure and the promotion of accountability in education are keys to ensuring better performance of educational entities at all levels, especially at schools. The outcomes of ensured accountability will result in lower dropout rates, higher retention rates, lower repetition rates and better learning outcomes.

Conclusion and Recommendations

Cambodia's economy has sustained rapid growth for more than two decades, which has been essentially propelled by low-skill workers in garments, agriculture, tourism, and construction. To become an upper-middle income country by 2030, the country needs to ensure an average annual economic growth of 7 percent (RGC, 2014). To achieve this target, Cambodia needs to enhance its key growth-supporting factors and boost the competitive advantage in the present sectors while expanding into new industries. This means diversifying and upgrading its productive and absorptive capabilities to unleash growth potential by moving toward higher value and more technologically advanced products and services for export in the medium and long terms.

The intended curriculum of the Cambodian education system is strategically situated, particularly in synchrony with the economic growth roadmap in the long run. Refinement of competitiveness and innovation of the workforce is on top of reform agendas of the key sectors, especially in the education realm. However, in actuality the workforce is unable to respond to the

knowledge and skills demanded by the private sector, as evidenced by the present skill shortage and mismatch. Employers have great difficulty recruiting staff for senior management positions and workers with higher-order cognitive skills (such as work attitudes, decision-making skills, critical-thinking skills, communication skills, and problem-solving skills). Further to industry-specific technical skills, these soft skills are paramount if Cambodia is to move up the industrialization ladder as envisioned.

Thus, what is causing the low quality of these key components in Cambodia? While there are many intertwined contributing factors, this study sheds some light on the shortcomings of the written and taught curriculums. Our textbook review of the three subjects crystalizes the disarrayed and technically-erroneous contents in many chapters of the textbooks. Also, the contents are abstractly explained and dictate memorization, and are irrelevant to daily practicality and market demand. Compared with the Singaporean curriculum, the grade and subject substance is inappropriate and inadequate. Consequently, the contents culminate in concentration on remembering, understanding and applying facts, and discourage higher-order thinking skills. This mode of presenting knowledge produces passive and indifferent learners without rational and critical thinking traits and attitudes to reality. This is in stark contrast with the Singaporean curriculum which emphasizes a practical view of knowledge, daily occurrences, and student-focused, inquiry-based pedagogies.

On the taught curriculum, the teachers' survey reveals that teachers merely practice content citation in their teaching by delivering only the content knowledge written in the textbooks. Thus, students learn from the teachers and textbooks only the content of knowledge rather than skills, attitudes and behaviors. The survey also finds that teacher support through induction and professional development is unsystematic, which may exacerbate the low teaching quality.

Precisely, our findings pinpoint that the contents of the textbooks do not contain the tailor-made and sufficient knowledge as intended in the curriculum of general education. The presentation, demonstration and transferring of the contents does not lend to production of the needed skills and attitudes. This deficit is reflected in the current labour force unprepared for the economy presently and in the future.

In conclusion, to reach upper-middle income status by 2030 Cambodia needs to refine its human capital to excel in productivity and value of products and services in the current key industries as well as in the emerging ones. To do so, general education must ensure the right and quality knowledge, skills and attitudes (KSA) required for further education and demanded by the evolving economy. This study suggests a comprehensive and in-depth revamp of the written and taught curriculums so that the wanted KSA are produced in accordance with the intended curriculum and the economic growth pathway.

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CHAPTER I: INTRODUCTION

I. Background

The Cambodian economy is growing rapidly and changing structurally, moving towards more manufacturing particularly light industries. The average gross domestic product (GDP) growth rate during 1996-2013 was about 7.7 percent, with growth of 7.5 percent in 2013 (ADB Key Indicators 2014). Gradually, the sources of growth have relied less on agriculture and more on the industrial and services sectors. During the same period, agriculture grew only 4.2 percent on average whereas industry grew 12.1 percent and services grew 8.2 percent. In 2013, Cambodia's per capita income reached 1,036 USD, which is on the verge of becoming a lower middle-income country. It is envisioned to become an upper middle-income economy by 2030 and a high-income nation by 2050 (RGC, 2013). To achieve this vision, Cambodia needs to refine its human capital to supply the type of workforce demanded by the economy in the secondary sector for reaching a middle-income country and in the tertiary sector for becoming a high-income country.

Experiences of countries stuck in the middle-income trap and unable to move to a high-income status (such as Thailand, the Philippines and Indonesia) verify that education systems that produce a skilled and innovative workforce are needed by the private sector (Ohno, 2009). Economies able to lift themselves to advanced countries (such as Singapore, Hong Kong, Taiwan and Korea) have moved to knowledge-intensive, technology-based industries that require highly-skilled human resources. These countries have substantially invested in research and development (R&D) and innovation in addition to general education as revealed by their STEM (science, technology, engineering and math) education and training.

The Cambodian education system has failed to produce the relevant and qualified workforce required by the economy, as evidenced by the skill mismatch and shortage in the labour market (RGC, 2013). The government's Rectangular Strategy Phase III stresses the development of high quality and capable human resources with high standards of work ethics as a key to nurturing economic growth and long-term competitiveness of the country (ibid). This is even more significant given the more integrated regionalization (such as the ASEAN Economic Community commencing in 2015) that Cambodia is embracing.

II. Research Problem and Rationale

The insufficient quality and skills mismatch of the workforce indicates the necessity for educational reforms in various dimensions and at different levels. Enhancement of the quality of learning and teaching is the first of eight reform areas in the education system (MoEYS, 2014a). On top of the reform priorities, a curriculum review of general (K-12) education is of utmost importance at the current stage of development in Cambodia. An effective general education would provide the firm foundation for skill development needed by the growth sectors of the economy, and a solid link to higher education that would produce an advanced skilled workforce. The fact that only 25 percent of students passed the first round of the grade 12 high school exam and 18 percent passing the second exam in 2014 (MoEYS, 2014b), rings a thundering alarm about the relevance and quality of general education.

Curriculum review of the Cambodian education system has been patchy and fragmented by grade and field of study. This research attempted to holistically and systematically examine the curriculum of general education by emphasizing its relevance to economic development.

This study identified the knowledge, skills and attitudes demanded by the economy currently and in the medium and long terms. Then, it reviewed the existing legislation and policies related to the curriculum of general education by examining the goals and objectives of education and

policy factors that have shaped them. The third step of the study involved an analysis of textbooks vis-à-vis the knowledge, skills and attitudes demanded by the economy. The study also examined constraints to effective delivery of the curriculum at the classroom level. Finally, the linkage between the educational curriculum and economic development was discussed to draw pertinent policy implications.

III. Scope and Limitation

The purpose of this study is to review the curriculum of the whole education system, covering 15 years of general education starting from 3 years of early childhood education, 6 years of primary education, 3 years of lower secondary education, and 3 years of upper secondary education.

However, such a study will be divided into several phases. In this first phase, the study focused only on Khmer, Mathematics and Science subjects at grades 9 and 12. This was mainly because of the weak performance of students in these subjects at the grade 9 and 12 exams in 2014.[1] But they are also important since they represent the core subjects at two milestones in the education system; grade 9 being the end of basic education and grade 12 being the end of secondary education.

IV. Research Questions

Premised on the research problem indicated above, this study addressed the following questions:

1. What knowledge, skills and attitudes are demanded by the Cambodian economy in order to move from a low-income country to an upper middle-income country by 2030?

2. How do Cambodian school curricular of Khmer, math and science subjects prepare students to have the knowledge, skills and attitudes required by an upper middle-income economy?

3. What are the constraints to effective delivery of the curricular of these subjects at the classroom level?

V. Methodology

This study employed a mixed qualitative and quantitative method. First, to answer research question one, we critically reviewed, among other relevant material, the National Development Plans and Strategies, Industrial Development Policy, Human Capital Roadmap, labour force surveys, and employer/industry studies. Second, to answer research question two, we identified technical errors, relevance, flow and connectivity of lessons of the student textbooks; and then we analyzed the contents of the textbooks in terms of knowledge, skills and attitudes by using Bloom's taxonomy. After that, we did a comparative analysis of learning outcomes of these subjects with those of the subjects in the Singaporean curriculum (with English as counterpart subject for Khmer). We also interviewed a number of curriculum developers and textbook authors/translators to understand the rationale and approaches of curriculum revision and how the textbooks were developed, revised and used.

Third, to answer research question three, we employed a questionnaire to survey a sample of subject teachers' knowledge, skills and attitudes required to teach the subjects. The survey also asked the teachers about technical and administrative scaffolding they received for teaching the subjects. One hundred and fifty-two (152) teachers of the three subjects at grades 9 and 12 were randomly selected from eight provinces to complete the survey. The target areas were chosen

[1] The focus of the study at this stage was suggested by the leadership of MoEYS. Following studies will center on other subjects and grades at different levels.

based on a geographical representation of the country. Efforts were made to ensure that 70-80 percent of the selected teachers were from rural schools.

Details on analytical approaches of the textbook review and the teacher survey are provided in Chapters 4 and 5.

VI. Expected Outcomes

This study was expected to produce the following outcomes:

(1) Identified strengths and weaknesses of content and pedagogy in the science, mathematics and Khmer textbooks/curriculum at grades 9 and 12;

(2) Identified competence/incompetence of teachers in the knowledge of subject matter and pedagogy;

(3) Identified constraints in delivery of the mathematics, science and Khmer subjects; and

(4) Recommendations to i) improve content and pedagogy for educating students to be capable for the economy of a middle income country and beyond, ii) update/upgrade teachers' competence to effectively deliver the improved content and pedagogy, and iii) address constraints of ineffective delivery in such aspects as facilities and support.

Specifically, the expected results of this research are that some lessons will be slightly modified, some will be moderately modified, some maybe removed and some new ones will be added. These changes should make the next edition of the subject textbooks more relevant and easier to use for teaching and for students to learn the relevant knowledge, skills and attitudes intended. This will enable them to progress to the next level of education and/or the employment if they want to, with minimal on-the-job training.

It is also hoped that this research will blaze a path for similar undertakings on other levels and subjects that are deemed contributive to sustainable economic growth in Cambodia.

VII. Structure of the Report

This report is outlined as follows in six chapters. The next chapter discusses the knowledge, skills and attitudes demanded by the Cambodian economy in order to move from a low-income country to an upper middle-income country by 2030. Chapter III entails the existing legislation and policies concerning the curriculum of general education. Chapter IV presents the results of the textbook review by examining the content of the textbooks in terms of knowledge, skills and attitudes demonstrated. Chapter V deals with the constraints to effective delivery of these subjects at the classroom level. The final chapter synthesizes the findings of the study and renders conclusions and pertinent recommendations.

CHAPTER II

KNOWLEDGE, SKILLS AND ATTITUDES: IMPLICATIONS OF CAMBODIA BECOMING AN UPPER MIDDLE-INCOME COUNTRY

I. Introduction

Cambodia has attained a high and sustained economic growth in the past two decades. The country's average annual GDP growth was recorded at approximately 7.7 percent during 1996-2013, of which agriculture contributed 4.2 percent, industry 12.1 percent and services 8.2 percent. Such a high and sustained growth level exceeds that of the country's neighbors, Thailand and Vietnam and is higher than the East Asian and Pacific region as a whole during the same period (ADB Key Indicators 2014).

Cambodia's high and rapid growth was chiefly led by the rapid growth in exports of the garment and footwear industry in the past decade. The annual growth of this industry during 2001-2013 averaged 14 percent (GMAC 2014 online). The direct employment generated by this sector amounts to 600,000 jobs. Including indirect employment, it is estimated to exceed one million jobs today. Meanwhile, the steady growth of agriculture, especially of rice and other cash crop plantations, is considered to have had a significant impact on income growth and improved livelihood of farmers.

The income per capita also increased from approximately 300 USD in 2000 to 1,036 USD in 2013, more than triple in 13 years. Based on the income classification of the World Bank, as of July 1, 2013, low-income countries are countries with income of less than 1,035 USD per capita; lower middle-income countries have an income between 1,036 USD and 4,085 USD; upper-middle income countries have an income between 4,086 USD and 12,615 USD; and high-income countries have an income of 12,616 or more.[2] Thus, Cambodia is on the verge of graduating from a low-income economy to a lower-middle income one.

Given this high and sustained growth trajectory, the Royal Government of Cambodia (hereafter, RGC), as stated in her rectangular strategy III (RS-III), that it aspires to become an upper-middle income country by 2030 and a high-income country by 2050 (RGC, 2014a). To achieve this goal, the RGC has been keen to learn from the experience of countries that were trapped in the middle-income status, the so-called "*middle-income trap*" (Filipe, 2012). In general, low-income economies like Cambodia tend to exploit their low cost-labor and depend on abundant natural resources. However, to reach middle-income status, an increase in productivity of both capital and labor is an inevitable requirement.

There are examples of countries which have moved from lower income countries to the middle income segment, but found themselves trapped in the middle-income status. A transition from low-income to middle-income status is a major leap toward attaining the coveted high-income status and eventually catch-up with the richest (Spence, 2011). A majority of Latin American countries have remained middle-income even though they achieved relatively high income as early as in the nineteenth century. There is also a risk of an upper-middle income trap when a country has moved out of lower-middle income. It is not different for some countries in Asia. For example, Sri Lanka, Thailand, and Malaysia have been known as middle-income-trapped countries and a few more such as Indonesia and Pakistan are at risk of following the same track as those early fast growing countries. The middle-income trap is generally caused by growth slowdowns due to the lack of innovation as a result of low investment in human resources and skill development.

[2] http://data.worldbank.org/news/new-country-classifications, accessed on August 31, 2014.

So what are the right *knowledge, skills and attitudes* for Cambodia that are needed by the labor market in order avoid falling into this middle-income trap? This study explores the knowledge, skills and attitudes needed for Cambodia to become an upper-middle income country by 2030. In order to meet these objectives, this study reviews Cambodia's economy and its growth strategy, including Cambodian Industrial Development Policy (IDP); it discusses the workable definitions of knowledge, skills and attitudes in general and those needed for high growth in the specific Cambodian context; and it describes the middle-income trap and its causes. This study also reviews the South Korean case of education and training for economic development. Finally, conclusions and policy recommendations are provided.

II. Cambodia's Development Policies and Growth Strategy

Cambodia's development policies date back to its first legislature during 1993-98. The priority was given to peace building and rehabilitation, rather than economic development. As a war-torn country, peace and social stability were pre-conditions for any development policies. In the second legislature (1998-2003), following the collapse of the Khmer Rouge in 1998 and the early stages of peace being established, Cambodia became integrated into the regional and international community. Specifically, Cambodia was given her seat back at the UN in December 1998 and officially admitted to ASEAN in April 1999. In the third legislature (2003-2008), the development of the private sector was the core and key challenge of the Socio-economic development plan (SEDP II). With social and political stability, Cambodia was able to achieve a remarkable economic growth and as a result, poverty was substantially reduced. In the fourth legislature (2008-13), emphasis was put on economic growth, poverty reduction and social development. In the fifth legislature (2014-2018), as stated in the National Strategic Development Plan (2014-18), with the aspiration to become an upper middle income country by 2030, growth, employment, equity and efficiency are at the center of the development policy. Table 1 summarizes the evolution of the development policy since its first mandate in 1993 until today.

Table 1. Evolution of Cambodia's Development Policy

Legislature	Area of Focus	Policy Tools
1st legislature (1993-98)	+ Peace-building and Rehabilitation; + Macro Economic Growth; + Social Development; + Poverty Reduction.	+ National Program to Rehabilitate and Develop Cambodia (NPRD); + Socio-Economic Development Plan (SEDP I, 1996-2000)
2nd legislature (1998-2003)	+ Restoration of Peace and Security; + Regional and International Integration; + Promotion of Socio-economic Development	+ Triangular Strategy (TS)
3rd legislature (2003-08)	+ Economic Growth and Poverty Reduction; + Social Stability; + Regional and International Integration; + Private Sector Development	+ Economic Development Plan (SEDP II, 2001-05); + Cambodia Millennium Development Goal (CMDGs); + National Poverty Reduction Strategy (NPRS); + Rectangular Strategy I (RS-I)
4th legislature (2008-13)	+ Economic Growth; + Poverty Reduction; + Social Development	+ National Strategic Development Plan (NSDP 2009-13); + Rectangular Strategy (RS-II)
5th legislature (2013-18)	+ Growth; + Employment; + Equity; + Efficiency	+ National Strategic Development Plan (2014-18); + Rectangular Strategy (RS-III)

Source: RGC various years

The engine of growth has been concentrated in the existing agriculture, garment, construction, banking, and tourism sectors. However, in recent years the emerging car parts and electronics industries have signaled a structural transformation in the industrial sector. Japanese firms such as Yazaki, Denso, Minebea, taking advantage of the low wage workforce and its proximity to their main factories in Thailand, have established subsidiaries in Cambodia. The wage differentials between the two countries offer opportunities for companies to situate in Cambodia and are responsible for the relatively low value-added assembly work, while factories in Thailand are responsible for the relatively higher value-added production process.

Structural change is happening and will continue to happen in the foreseeable future. The share of agriculture to GDP will continue to shrink, while the share of industry and services will expand. At the same time, the movement of labor force from shrinking sectors to expanding ones will occur. The industrial sector will expand and diversify. Labor forces will be needed for this sector, especially for the emerging light manufacturing assembly and production. A new growth pattern and strategy, taking into account these emerging industries, should be adopted if Cambodia is to become an upper-middle income country (4,086 USD - 12,615 USD per capita income).

Before the global financial crisis, Cambodia attained an average growth rate of 10 percent per annum, but it was no longer the case after 2008. The country was hit hard by the crisis due to its high dependence on only a few industries, namely tourism, garments and construction. This negative effect was compounded by globalization and regional economic integration, which provided more space for FDI to move out of Cambodia in search of more business-friendly

locations as evidenced during the global financial crisis. This experience strongly suggests that the past growth strategy – i.e. depending on labor intensive industries to lead the economy – is not sound and is likely to make Cambodia vulnerable to future crises/shocks.

III. Cambodia's Industrial Development Policy

Learning from the negative experience of over dependence on a few industries as growth engines and the footloose nature of some particular FDI, the Royal Government of Cambodia has drafted a well-documented Industrial Development Policy (IDP). The forthcoming IDP focuses on three groups of priorities (IDP 2014-24, draft) (RGC, 2014b):

1. Attracting new industries by encouraging FDIs in the areas of machinery assembly and assembly of electrical appliances and transportation equipment; and through the promotion of SMEs in the areas of medicine, craftsmanship, construction materials, packaging materials, furniture.
2. Promoting agro-processing industry through modernization of processing techniques and technology, packaging and strengthening its value chain.
3. Considering the possibility of promoting strategic industries such as energy and heavy industries, water supplies and green-based technology.

The policy outlines two future growth strategies for Cambodia: 1) diversifying the economy based on existing comparative advantages (abundant land, favorable location, and cheap labor); and 2) upgrading endowments to move up the ladder of comparative advantages (World Bank, 2012). Diversification can take the form of increasing product ranges and allied industries (UNDP, 2011). That is, Cambodia should be able to produce better designed garment products, move up the agricultural value chain by engaging in rice milling and processing activities, progress from food crop to cash crop production, or expand the destinations and the variety of tourism.

Given the current conditions of Cambodia, industrial diversification seems to be a tough challenge (World Bank, 2012). The abundance of low-wage labor will remain a magnet for labor-intensive industries and thus reduce individuals' incentives to upgrade skills. Lack of market information and coordination prevents the establishment of new business in industries other than the labor intensive ones and exacerbates skill gaps and the mismatch in the current labor market. The labor force enters the labor market with limited education. According to the World Bank and ADB (2014), the supply of technical and vocational workers lags far behind the enterprise demand, suggesting a skill mismatch with the labor market. From the supply side's point of view, this is a structural issue in Cambodia's whole higher education, which needs to be addressed and dealt with in a coordinated manner with all related educational institutions. As in the study by D'Amico (2012), higher education institutions in Cambodia in 2012 produced approximately 29,000 graduates, most of whom were in social sciences and the market demand was only around 16,000 jobs. In 2014, the number of graduates is projected to rise to around 70,000 and the available jobs are only around 22,000. In contrast, in 2010-12 due to this skill mismatch, there were only 7,000 applicants for 36,000 jobs for workers with technical and vocational skills (Heng, 2013). Table 2 explains the projected skill mismatch between the number of graduates produced by higher education institutions and those demand by the labor market in Cambodia in 2009-14.

Table 2. Projected Demand for and Supply of Higher Education Graduates during 2009-2014

Discipline	Demand	Supply	Excess Supply	Supply as % of Demand
Disciplines in Excess Supply				

Business and management	**11,414**	**46,974**	**35,560**	**412**
Foreign Languages	2,916	32,958	30,042	1,130
Information technology	2,928	17,956	15,028	613
Accounting	9,220	23,562	14,342	256
Banking, finance, and economics	17,215	30,683	13,468	178
Sociology, humanities, and arts	1,570	13,789	12,219	878
Law	1,184	11,820	10,636	998
Tourism	2,632	6,591	3,959	250
Other Science	860	4,773	3,913	555
Agriculture and rural development	5,141	8,638	3,497	168
Disciplines in Excess Demand				
Engineering	8,153	7,197	-956	88
Health Science	14,307	12,424	-1,883	87
Marketing	8,066	2,501	-5,565	31
Total	**85,606**	**219,866**	**134,260**	**257**

Source: HR Inc. Cambodia (2009).

Skills development can contribute to industrial diversification in the medium-term and promote comparative advantage of Cambodia in the long-run to avoid the middle income trap. With higher-skilled labor force, Cambodia will be able to move up the value chain, new entrepreneurship will emerge, and current SMEs will develop. In addition to the private sector, upgrading skills in the public sector improves capacity of the government in economic management, growth facilitation and public administration for better governance. However, Cambodia faces a lot of skills issues, discussed later in this paper, which can hinder the success of industrial diversification.

IV. Definitions: Knowledge, Skills and Attitudes

In order to analyze what knowledge, skills and attitudes are needed for high growth in Cambodia, this study first outlines the working definitions of the terms. While the concept of knowledge is rather complicated, the Cambodian Qualifications Frameworks (CQF) simply defines knowledge as "*the ability to recall, understand, and present information*" and divides knowledge of students into three categories as follows (National Training Board: NTB 2012):

1. Knowledge of specific facts;
2. Knowledge of concepts, principles, and theories; and
3. Knowledge of procedures

Cunningham and Villasenor (2014) define skills as "*the capacity to perform a specific task"*. Upon their critical review of 28 studies on employer skills demands, the authors categorize skills valued in the labor market into four groups: 1) basic/lower-order cognitive skills; 2) higher-order cognitive skills; 3) technical skills; and 4) socio-emotional skills (see Appendix 1 for more examples of skills in each set).

1. **Lower-order cognitive skills**: the basic academic *knowledge* of literacy and numeracy
2. **Higher-order cognitive skills:** those abilities required for complex information processing e.g. problem-solving skill, critical thinking skill, foreign language, and decision-making skill
3. **Technical skills:** a subset of cognitive skills necessary for performing specific jobs e.g. computer literacy, administrative skill and sewing skill
4. **Socio-emotional skills:** including behaviors, *attitudes*, and personality traits that influence how a person does things e.g. cooperation, teamwork, and punctuality

Based on the above definitions, knowledge is categorized as lower-order cognitive skills, while attitudes are grouped as socio-emotional skills. This means that the analysis on required knowledge, skills and attitudes for Cambodia to move from a low-income country to an upper-middle income country can be achieved through the analysis of required skills in these four subsets.

In the Cambodian context, the commonly used terms in skills development literature is "soft skills" and "hard skills". According to World Bank (2006), soft skills consist of two domains: 1) thinking skills (critical and creative) and 2) behavioral skills (perseverance, self-discipline, and teamwork). By the above definition provided by Cunningham and Villasenor (2014), thinking skills are grouped in "higher-order cognitive skills", and behavioral skills are in the group of socio-emotional skills. Therefore, soft skills include higher-order cognitive skills and socio-emotional skills. Hard skills are technical skills.

V. Knowledge, Skills and Attitudes Needed for Higher Growth

This section attempts to analyze the issues of knowledge, skills and attitudes currently faced by Cambodia. It further reviews what kind of knowledge, skills and attitudes Cambodia need to develop for higher growth. Over the past decade, Cambodia has made progress in skills development of its workforce, but the achievement has not been sufficient to completely fulfill skill demands (World Bank, 2012). Only 6.5 percent of firms in the 2003 Investment Climate Survey reported skills as a major constraint to their growth, but the number rose to 22 percent in a similar survey in 2007 and fell back to 15.5 percent in the 2009 study. Adequate skills will be a severe constraint to future growth.

One important skills constraint is the shortage of labor with skills required by employers. Table 2 presents a summary of skills demand for five key export sectors including both existing and emerging industries: 1) garment and footwear, 2) light manufacturing assembly, 3) tourism, 4) milled rice, and 5) agro-processing and fisheries. Based on this Table, it is crystal clear that all priority sectors seemingly need a workforce with similar categories of technical skills e.g. specialized workers, mechanics, technicians, engineers, staff and officers, supervisors and managers. Yet, their specializations need to be industry specific. While technical skills are important to perform the work, employers in the five key export sectors face similar shortages of labor with strong foundation/lower-order cognitive skills i.e. literacy and numeracy, which are necessary for life-long learning. The five sectors also share similar needs for labor with certain higher-order cognitive skills – namely language skills, communication skills, and problem solving skills – and certain socio-emotional skills including ability to understand common sense, cross-cultural understanding, maturity, teamwork, and initiative.

Each subset of skills is classified into three levels: low skills, medium skills, and high skills. According to Table 3, in this short-run (2014-2018), the five key export sectors do not require a large, highly-skilled workforce yet, except in the tourism sector. The garment and footwear industry, milled rice, and agro-processing will have high demand for medium skills but little demand for low skills in the next five years. Only the tourism and light manufacturing industries are predicted to require a large low-skilled workforce. Table 4 summarizes the expected skills demand by the five key export sectors of the economy during 2014-18.

Table 3. Skills Demand for Five Key Export Sectors

Garment and Footwear Industry[1]		
Technical Skills		
Low skill	**Medium Skill**	**High Skill**

Machine operators (sewing machine and multiple machine)	**Specialized workers** (C&T, shoe makers, markers & pattern makers, multi-skilled operators)	**Specialized workers** (merchandisers and sourcing buyers)
Shoe makers	**Mechanics and technicians** (electrical and mechanical)	**Engineers** (industrial, mechanical and electrical)
Laborers	**Staff and officers** (compliance, OSH, QA &QC)	**Staff and officers** (accountant, compliance, industrial relations)
	Supervisors (technical and production line)	**Managers** (middle level, production, and technical)
Lower-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
Literacy	Literacy	Literacy
Numeracy	Numeracy	Numeracy
Higher-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
Communication skills	Communication skills	Communication skills
General language proficiency	General language proficiency (multiple)	General language proficiency (multiple)
	Problem solving skills	Problem solving skills
	Decision making skills	Decision making skills
	Public speaking skills	Public speaking skills
Socio-Emotional Skills		
Low Skills	**Medium Skills**	**High Skills**
Common sense	Common sense	Common sense
Cross-cultural understanding	Cross-cultural understanding	Cross-cultural understanding for business purposes
Flexibility		
Manual dexterity		
Maturity	Maturity	Maturity
Teamwork	Teamwork	
	Initiative	Initiative
Light Manufacturing Assembly[2]		
Technical Skills		
Low skill	**Medium Skill**	**High Skill**
	Specialized workers (C&T, shoe makers, markers & pattern makers, multi-skilled operators)	**Specialized workers** (based on the nature of enterprise)
Technical and practical skills /experience	**Mechanics and technicians** (electrical, mechanical and maintenance)	**Engineers** (industrial, mechanical and electrical)
	Staff and officers (compliance, OSH, QA &QC)	**Staff and officers** (accountant, compliance, industrial relations, and

		logistics)
	Supervisors (technical and production line)	**Managers** (middle level, production and planning, and technical)
	Technical and practical skills /experience	Technical and practical skills /experience
Lower-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
Literacy	Literacy	Literacy
Numeracy	Numeracy	Numeracy
Higher-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
	Communication skills (reading, writing, and to follow instruction)	
	General language proficiency (including foreign language)	General language proficiency (including foreign language)
	Problem solving skills	Problem solving skills
Socio-Emotional Skills		
Low Skills	**Medium Skills**	**High Skills**
Work ethics		
Common sense	Common sense	Common sense
Cross-cultural understanding	Cross-cultural understanding	Cross-cultural understanding
Maturity	Maturity	Maturity
Manual dexterity	Manual dexterity	
Teamwork		
	Initiative	Initiative
Tourism[3]		
Technical Skills		
Low skill	**Medium Skill**	**High Skill**
Housekeeping workers	**Specialized workers** (cooks and culinary, food and beverage, waiters and waitresses)	**Specialized workers** (chefs)
Helpers	**Mechanics and maintenance staff**	**Engineers, electricians, and mechanical technicians**
Bell boys	**Staff and officers** (front office, booking, sales and marketing,)	**Staff and officers** (sales and customer services)
Concierge	**Supervisors** (in all positions)	**Managers** (general)
Security guards		
Lower-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
Higher-order cognitive skill		

Low skill	**Medium Skill**	**High Skill**
Educational foundation		Weak educational foundation and outsized expectation
Basic and simple skills	Communication skills	
	General language proficiency (including foreign language)	General language proficiency (including foreign language)
Problem solving skills	Problem solving skills	Problem solving skills
	Experience	(Life) experience
	Customer services	
Socio-Emotional Skills		
Low Skills	**Medium Skills**	**High Skills**
Common sense	Common sense	
Maturity	Maturity	Maturity
	Initiative	Initiative
		Cross-cultural experience
Milled Rice[4]		
Technical Skills		
Low skill	**Medium Skill**	**High Skill**
Laborers are hard to recruit	**Specialized workers** (milling machine operators)	
	Mechanics and technicians (electrical, mechanical, machine mechanics, and QA & QC)	**Engineers**
	Staff and officers (semi-skilled logistics personnel, SPS assurance, computer literacy)	**Staff and officers** (marketing and sales, professional with international business understanding, professionals with training in QC, SPS, standards)
	Supervisors (technical and production line)	**Managers** (experienced general manager, operation)
Lower-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
Basic and simple skills and competencies for industry	Educational foundation	
Literacy and numeracy	Literacy and numeracy	
Higher-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
Basic communication skills	Communication skills	Unrealistic expectation
Simple problem solving skills	General language proficiency (including foreign language)	General language proficiency (including foreign language)
	Problem solving skills	Problem solving skills

Socio-Emotional Skills		
Low Skills	**Medium Skills**	**High Skills**
Common sense	Common sense	Common sense
Maturity	Maturity	Maturity
Teamwork	Teamwork	
	Initiative	Initiative
		Cross-cultural experience and international business experience
Agro-processing and Fisheries Sectors[5]		
Technical Skills		
Low skill	**Medium Skill**	**High Skill**
Machine operators (basic machines)	**Specialized workers** (operators of food related machines, steam machinery and boilers; qualified personnel in storage methods for freshness and loss minimization and packaging)	**Specialized workers** (specialized in products and production health & safety; advertising and marketing, R&D)
Basic understanding of hygiene and cleanliness	**Mechanics and technicians** (health, hygiene, and safety; electrical and mechanical; mechanics;)	**Engineers and technicians** (chemical and food safety; electrical and mechanical; process control)
	Staff and officers (QC)	**Supervisors** (technical, production line, QC,
		Managers (business, factory)
Lower-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
Literacy	Literacy	Literacy
Numeracy	Numeracy	Numeracy
Higher-order cognitive skill		
Low skill	**Medium Skill**	**High Skill**
	Communication skills (reading, writing, and to follow instruction)	
	General language proficiency (including foreign language)	General language proficiency (including foreign language)
	Problem solving skills	Problem solving skills
Socio-Emotional Skills		
Low Skills	**Medium Skills**	**High Skills**
Work ethics		
Common sense	Common sense	Common sense
Cross-cultural understanding	Cross-cultural understanding	Cross-cultural understanding
Maturity	Maturity	Maturity
Manual dexterity	Manual dexterity	

Teamwork		
	Initiative	Initiative

Note: blank cells mean no skills required.

Source:

1:CTIS Skill-Need Survey of Employers, 2013 and National Employment Agency and International Labor Organization Survey as cited in RGC, 2014c

2:CTIS Skill-Need Survey of Employers, 2013 as cited in RGC, 2014c

3:CTIS Skill-Need Survey of Employers, 2013; National Employment Agency and International Labor Organization Survey as cited in RGC, 2014c

4:CTIS Skill-Need Survey of Employers, 2013 as cited in RGC, 2014c

5:CTIS Skill-Need Survey of Employers, 2013 and National Employment Agency and International Labor Organization Survey as cited in RGC, 2014c

Table 4. Expected Demands of Labor for Each Key Export Sector, 2014-2018

	Garment and Footwear	**Light Manufacturing Assembly**	**Tourism**	**Milled Rice**	**Agro-processing and fisheries sectors**
Low Skill	***	****	****	***	***
Medium Skill	****	****	****	***	***
High Skill	**	**	****	***	***

Note:

*: very low growth in demand

**: low growth in demand

***: medium growth in demand

****: high growth in demand

*****: very high growth in demand

Source: RGC, 2014c

These findings in Cambodia are consistent with findings on skills demand in other countries. A very recent desk review of 28 studies conducted by the World Bank on employers' skills demand highlights the tremendous importance of socio-emotional skills, followed by higher-order cognitive skills (Cunningham and Villasenor, 2014). Although the subsets of skills changes, the perceived importance of these two domains of skills is still confirmed, irrespective of location of the country, size of economy, type of industry, market orientation, modernity of firms, and occupations and skill level of workers.

Some types of missing skills could be supplemented through employer training, but some others can be obtained only through formal education. The share of employers providing training to at least some of their workers was only 48 percent in the 2007 Investment Climate Survey. The skills provided cover some of the technical skills (marketing, sales, and customer service skills), higher-order cognitive skills (decision-making and problem-solving skills) and socio-emotional skills (communication skills, teamwork and leadership) (CAMFEBA, 2008). However, workers must have lower-order cognitive skills or basic skills, which have to be provided through formal education, to receive further workplace training (HRINC, 2011 as cited in World Bank, 2012).

Yet, current problems associated with formal and non-formal education hinder the success of skills development. While good early childhood care and education (ECCE) lays a foundation for lifelong learning, the access and quality of ECCE in Cambodia are reduced by poor nutrition in households, lack of positive stimulation, and limited existence of ECCE programs (World Bank, 2012). For general education, there is a large enrollment rate at primary level, very slim enrollment rates at the higher levels, and poor quality issues at all levels. The gross enrolment rate (GER) in 2013-2014 was 116.1 percent at primary level, but only 53.3 percent and 24.9 percent at lower- and upper-secondary levels respectively (MoEYS, 2014). The dropout rate in academic year 2012-2013 was 10.5 percent in primary, 21.2 percent in lower secondary and 14.0 percent in upper secondary (ibid, 2014). In the same schooling year, the completion rate was 88.9 percent in primary, 39.5 percent in lower secondary, and 22.74 percent in upper secondary (ibid, 2014). The relatively short number of years of schooling experienced by youth as well as low quality education offered is explained by low public spending in education (1.96 percent of GDP in 2014) [3], coupled with low quality teachers (DRF, 2014).

Cambodia's higher education encounters problems of low enrollment and limited relevance to the labor market. In 2013-2014 academic year, a total of 253,764 students continued to higher education, 47,561 students over the target (MoEYS, 2014). However, this figure represented only about 5 percent of the tertiary age group (World Bank, 2012). About 50 percent of university students are trained in business and commerce; only a small proportion of students earn their degree in subjects such as science, technology, engineering and mathematics (STEM) (DRF, 2014). Cambodia is thus generally criticized of having low numbers of tertiary education graduates in science and engineering, which are required by the labor market, and an oversupply of business graduates.

Technical and vocational education training (TVET) in Cambodia is considered as a medium-term strategy to remedy the skills shortage. TVET enrollment has grown over the last decade, and more than 90 percent of the enrollments were for short-term courses, and largely in the agricultural science. Despite the high unemployment rate among college graduates, vocational training is not considered as a viable alternative in Cambodia. High school graduates value academic studies and target white collar jobs unrelated to industry demands (Martinez-Fernandes

[3] http://www.mef.gov.kh/documents/shares/budget/budget-in-brief-2014.pdf, accessed on August 31, 2014.

& Wayman, 2014). To improve the status of vocational training and attract youth to where there is demand, high-quality and competency-based training is needed (OECD, 2012).

Notwithstanding their intention to provide supplement training to their workforce, employers found it hard to do so due to the lack of information by training providers. A study by HRINC (2011 as cited in World Bank, 2012) reported that employers used three channels to train their workers: in-house programs (53 percent of employers), local providers (43 percent of employers), and foreign training providers, particularly for senior management (27 percent of employers). Together with high training costs, lack of time, high employee turnover, and a lack of information about training opportunities, 64 percent of employers in the same HRINC study pointed out "the lack of good training providers" as the most severe constraint in providing enough training courses to their workers. Probably due to limited networks and resources, SMEs were reported to be more affected by this information failure than large firms. For them to take further action to remedy their skills shortage, employers in the same HRINC study requested information on several important aspects, such as workplace training providers, quality of vocational training centers, availability of particular skills, and quality of universities.

VI. Understanding the Middle-Income Trap and Its Causes

Moving into the upper middle-income category is achievable for a number of countries. However, past experience shows that moving out of the upper-middle income group into a high-income one is another story. Cambodia is now climbing to become a lower-middle income economy and is expected to move into an upper-middle income by 2030 and high-income one by 2050. To meet these targets, Cambodia needs to be ready to tackle the middle-income trap suffered by many countries. This section reviews the workable definition of the 'middle-income trap' and its possible causes. Apparently, there is no clear definition of middle-income trap. Yet, Gill and Kharas (2007) were the first to describe apparent growth slowdowns in many former East Asian countries as a middle-income trap. It is a situation in which a country has successfully lifted its economy from least developed or low-income status to middle income, but remains at that level without much prospect of becoming an advanced or high-income country. ADB (2011) notes that when falling into the middle-income trap, countries are unable to compete with low-income/low-wage economies in manufactured exports and with advanced economies in high-skill innovations. These countries cannot make a timely transition from resource-driven growth, with low cost labor and capital, to productivity driven growth.

Past studies show that moving out of the lower-middle income category needs the upgrading of skills. Rising wages and low absorption capacity or lack of original innovation are the main causes of the middle-income trap (Spence, 2011; Todaro and Smith, 2011). The industries that drove the growth in the early period start to become globally uncompetitive due to rising wages, resulting in FDI moving to other low-wage economies. In this sense, it is related to a coordination issue, in which those who will invest in skills are at the center of discussion. Firms will not enter a market if workers do not possess skills they need, but workers will not acquire the necessary skills if there is no prospect of employment. This situation leaves a country in a bad equilibrium, where there is low average income and a class of citizens trapped in absolute poverty. The issue of skill development has come down to a question of, which comes first: skills or demand for skills?

Improving the ability to handle high value-added production tasks is one way to break free from the income trap. As FDI accumulates and production expands, domestic supply of parts and components increases and local suppliers emerge. However, local wage and income will not surge much if all important production tasks with high value-added are performed by firms in foreign countries. Therefore, locals must replace foreigners in all areas of production including management, technology, design, factory operation, logistics, quality control, and marketing. As foreign dependence is reduced, internal value rises dramatically and the country will become a

dynamic exporter of high quality manufactured goods and a capable competitor of advanced economies. The best examples of this are Korea, Taiwan, Hong Kong, and Guangdong and other provinces along China's east coast (World Bank, 2012). It is noteworthy that Thailand and Malaysia have not yet succeeded in breaking through the invisible "glass ceiling" in manufacturing (Ohno, 2009). Therefore, improving workers' skills is a priority for future economic growth of Cambodia (World Bank, 2012). Waiting until the demand for skills arises to develop the skills can be too late since skills take years to develop.

Case Study: Education and Vocational Education Training for Economic Development in South Korea

One of the best development models in East Asia, Korea has experienced a fast economic transformation through export-led growth strategies as import substitution was relatively short-lived (Koo and Kim, 1992). It has transformed itself from a state of extensive poverty to one of the comparative wealth. From early 1960s to 1990s, the country's economic growth averaged 7 percent as a result of booming education during this period. That is, the educational attainment was high among third world countries (Ashton et all., 2005). There was recognition of primary school and secondary school enrollments in the early stage of industrialization. The mainstays of growth of Korea were its people and its people (Gill and Chon-Sun, 2000).

Growth Strategy

When the labor was abundant, wages were low, the Korean government focused on the export of light industry, then they moved to heavy and chemical industry in the early 1970s, when they felt that they could not compete anymore with other newly industrialized countries whose wages were lower (Leung-Chuen, 2001).

The export-led growth strategy underscored the education and training as they played a major role in contributing to the South Korea's economic miracle. In that case, there was an emphasis on the linkage between economic policy and educational and training policy. That is, the transformation of the education and training system was in line with the planned changes in the economy. The state controlled both public and private vocational training systems, and sought to match the supply of skilled workers to the demands of enterprises (Ashton et all., 2005).

The increase in the enrollment was quite interesting. The tertiary enrollment rose from 11 percent in 1977 to 37 percent in 1987, while the public spending on education increased to 10 percent of the GDP, which was the highest in the world. Training emphasized the creation of scientists, engineers and technicians. Because of this, research and development (R&D) increased from 0.32 percent to 2.61 percent in the period 1971–94. In order to promote science and engineering, a number of approaches were introduced, one of which was the establishment of Korean Advanced Institute of Science (KAIS). The purpose of KAIS was to produce Master and PhD graduates in science and engineering (ibid, 2005).

Parallel to the senior academic high schools, the government established vocational senior high schools. Table 5 shows the proportion of students enrolled in senior academic high schools and senior vocational high schools from 1965–94. The development of senior vocational high schools was prioritized for skills development. The vocational high schools were introduced with the expectation of drawing two thirds of the students to this type of school, but only forty percent of the students attended the

vocational senior high schools due to the continuing strong preference of parents towards academic high schools.

Table 5: Distribution of academic senior high school students and vocational senior high school students, South Korea: 1965-94

	1965 %	1970 %	1975 %	1980 %	1990 %	1994 %
Academic	60	53	58	55	65	59
Vocational	40	47	42	45	35	41

Source: KEDI, 1994

Institutionally, the skill formation policy was directed by a small political and bureaucratic elite. At that time, the Economic Planning Board was very powerful, and one of its responsibilities was to set the agenda for skill formation (ibid, 2005). The selection of students to universities and training colleges was based on quota. Non-academic high schools consisted of commercial (45 percent), technical (32 percent), vocational and comprehensive (20 percent), agricultural (2 percent), and fishery and maritime (1 percent) schools (Gill and Chon-Sun, 2001).

Skills for HCIP

To promote further export, the Korean government moved to the development of skills for heavy chemical industry programs (HCIP). The HCIP was the most significant policy for the promotion of vocation education and training to provide new industries with semi-skilled and skilled labor, while the expansion of vocational high schools was also one of the priorities. Launched in 1973, the HCIP targeted six industries, including steel, electronics, petrochemicals, shipbuilding, machinery and non-ferrous metals (Koo and Kim, 1992). As a result, in 1980, one in three junior college students was studying engineering or the natural sciences. It is worth noting that it was felt that the manpower needed for the HCIP would not be met by the public training centers alone. Therefore, the Korean government required that companies take responsibilities for training their workers.

Reform of the Skill Formation System

The development of the Korean education system was focused on science and engineering. Since the export-led growth strategy had been successful, it was felt that the skill formation system needed further upgrading and that a focus on human resource-led growth, and knowledge-based development, should be introduced. The Presidential Commission of Education Reform was, therefore, launched in 1994. The reform recognized that while the system had served relatively well through the industrialization stages, it may have been far less suited to the future economy.

Conclusion

All in all, the Korean growth strategy did not depend on resources, but the people and policies. The emphasis was placed on education and vocational training. As a result, fast growth was achieved based on high attainment of education and skill development through vocation education and training in the areas of science and engineering. Despite this, Korea is currently struggling to reach the highest developmental stage, which requires knowledge.

VII. Conclusions and Recommendations

Cambodia is facing both a skill shortage and a skill mismatch. The country's growth strategy is based on the upgrading of existing industries, garments and footwear, light manufacturing, tourism, and milled rice export. Cambodian IDP 2014-24 (draft) promotes new industries that include machinery assembly and assembly of electrical appliances and transportation equipment; agro-processing industry through modernization of processing techniques, technology, packaging and strengthening of the value chains; and promoting strategic industries such as energy and heavy industries, water supplies and green-based technology. Given the current status, in order to move out of the lower-middle income category by 2030, the following should be considered:

- A large low-skilled workforce is needed for tourism and emerging sectors i.e. light manufacturing.
- In the short-run, the labor market does not need a large high-skilled workforce, except the tourism sector, but rather a medium-skilled workforce.
- All priority export sectors seemingly need the same category of workforce e.g. specialized workers, mechanics, technicians and engineers.
- Strong foundation/lower-order cognitive skills i.e. basic literacy and numeracy, which is also stressed by employers in all export sectors, are needed.
- Common higher-order cognitive skills: language, communication skills, and problem solving are need for middle and higher positions, and so are common socio-emotional skills: common sense, cross-cultural understanding, maturity, teamwork, and initiative.

Attention should also be paid to the middle-income trap when Cambodia enters the upper-middle income category. Innovation should be promoted further so that the country can grow fast enough to reach high-income levels by 2050. Depending on the current growth strategies, it is very likely that the country will be trapped in the upper-middle income level. Recalling that Cambodian growth is more resource-based, there is also a good lesson to be learnt from the case of Korea, where the promotion of R&D was the center of its growth policy.

CHAPTER III

EXISTING NATIONAL CURRICULUM LEGISLATION AND POLICY FRAMEWORK

I. Background

Policies and strategies for education development in Cambodia were guided by the sequential frameworks of the 1990 Jomtien World Declaration on Education for All (WDEFA), the 2000 Dakar Framework for Action and the Cambodia Millennium Development Goals (CMDGs). This guiding framework for Cambodia's education reform was to set goals for EFA by 2015 to satisfy the global basic education policies aiming at meeting the basic learning needs. Concerted efforts in Cambodia during the 1990s and 2000s were on widening access to its constitutionally defined 9-year Basic Education. The Policy for Curriculum Development 2005-2009 was designed under the EFA National Plan, CMDGs and the Education Strategic Plan.

Under the current vision as mentioned in the National Strategic Development Plan (NSDP) 2014-2018, the Education Strategic Plan (ESP) 2014-2018 is prepared to develop human resources for moving the country to the levels of upper-middle income by 2030 and high-income by 2050. In line with the NSDP 2014-2018, the Royal Government of Cambodia is committed to transfer roles and responsibilities to sub-national levels. Under the human resource development framework towards the Vision 2030, Cambodia is required to build knowledge, competence, entrepreneurship, skills, creativity and innovation in all sectors, especially science and technology and the ability to manage research and development (ESP 2014-2018: pp. 11).

II. The Education for All National Plan 2003-2015

Cambodia adopted a pro-poor education financing policy toward ensuring equitable access to quality basic education as cited in its EFA National Plan 2003-2015. Concerning the lower secondary education, the policy aimed to improve quality and distribution of textbooks reaching a target of one textbook per student in each subject in grades 7-9. Life-skills curriculum for lower secondary education, covering civic, environment, and HIV/AIDS education was also planned for implementation in early 2000s (Royal Government of Cambodia, 2003: 17).

Overall objectives (EFA National Plan 2003-2015: pp.32) for the nine-year Basic Education are summarized as follows:

- Ensure that by 2015, all children particularly girls, children with difficulties and those belonging to ethnic minorities gain access to and complete free and compulsory primary education of good quality.
- Eliminate gender disparities in primary and secondary education by 2005, and receiving gender equality in education by 2015.
- Improve all aspects of the quality of education and ensure excellence of all so that recognized and measurable learning outcomes are achieved by all, especially literacy, numeracy and essential life skills.

The concentration of the MoEYS on attaining basic education expansion through rights-based and pro-poor policies and implementation has given the Government to focus on additional cross-cutting concerns such as gender, ethnic minorities, disabled learners, HIV/AIDS, environment, and peace education etc. The focus on building human resources or a new generation for the 21st century was ill prepared and lacked linkage to the skills demands of the labor market.

Modernizing the national curriculum is necessary to keep pace with rapidly moving global and regional changes. Madhur (2014:21) suggests a revision of the national curriculum to be in line

with the eight areas of specialization under the Cambodia Qualifications Framework and consider involvement with the private sector. He argues that continuous revision of the curriculum across the education system will be central in adjusting the country skill sets towards the regional ASEAN qualifications and benchmarks.

III. Policy for Curriculum Development 2005-2009

This Policy was approved in December 2004. It aimed at improving the school curriculum and covered grades 1-12 in the current education system under the MoEYS. The main objective of the Policy is to contribute to enhancing equitable access to a nine-year basic education. This policy was made based on the 1996 Core Curriculum in regards with the teaching time allocation and creating spaces for local life-skills. The Policy offers choices for students' subject selection for grades 11-12 by adding learning hours for each subject and a reduced number of subjects during grades 7-10.

The national curriculum is a useful resource for teachers, school directors, educational officers, parents, scientists, researchers and other stakeholders (MoEYS, 2004). It is meant to be revised every 5 years according to policy in Cambodia. The Policy suggests a review in 2009 for the following 5 years in order to reflect the development of the country. But the MoEYS failed to revise it and create a new policy for 2010-2014.

The curriculum promotes citizenship, life-work, personal and social knowledge and skills. It failed to promote ways of thinking (creativity and innovation, critical thinking, problem-solving) and ways of working (communications and collaboration).

IV. Education Law 2007

General education is the fundamental level of education (Article 23). It comprises primary and secondary education. General education aims at enhancing knowledge of morality and building good characteristics by advancing learners' personal, intellectual and physical capacity and fundamental skills. Secondary education shapes learners to have complete personality and characteristics by enhancing knowledge, skills, vocational training, and moral education which enable them to participate in economic and social development and to further their studies in technical and vocational training and higher education (Education Law: pp.5-6).

Moral and civic education, peace education, education for sustainable development, education on how to live together, education on how to respect cultures and traditional values shall be the main components of the fundamental education program (Education Law: Article 23). The Law instructed the MoEYS to determine a detailed framework of curriculum for implementation at all educational levels under the existing education system. Reflecting the Law and based on the Globalization and ASEAN Economic Integration, the NSDP tends to reflect more on the visions of economic development. Human capital development is the first priority of its key policy areas.

V. Education Strategic Plan 2009-2013

Curriculum and textbooks were developed under the Education Strategic Plan 2009-2013. The ESP highlights textbook distribution to students. Under the analysis on performance of the MoEYS in 2009-2013 against the three policy areas: (i) ensuring equitable access to education services; (ii) Improving quality and efficiency of education services and (iii) Institutional and staff capacity development for decentralization.

It was a challenge for the MoEYS to ensure high quality education due to a lack of core textbooks and learning materials. The MoEYS attempted to improve the distribution and management of the textbooks and ensure the supply of new textbooks. But the issue of lacking new textbooks, curriculum and teacher guides in disadvantaged areas remained (MoEYS, 2014: 8).

VI. Curriculum Development Framework – Cambodia and Singapore

During the 1990s and 2000s, Cambodian education policies were emphasized on right-based and inclusive approach while Singapore applied economy-based policies focusing heavily on developing human capital for 21st century. The below table illustrates the differences and similarities between Cambodia and Singapore on visions of the Ministry of Education, desired learning outcomes from the education systems, coverage of Basic Education level, subjects taught at secondary education level and teaching methods for additional discussion.

Table 5. Curriculum Focus between Cambodia and Singapore

Focal area	Cambodia	Singapore
Vision of the Ministry of Education	To establish and develop human resources of the very highest quality and ethnically sound in order to develop a knowledge-based society within Cambodia.	"Thinking Schools, Learning Nation" – to prepare a generation of thinking and committed citizens who are capable of contributing towards Singapore's continued growth and prosperity. The Ministry is consistently revisiting its curriculum to ensure that the skills and knowledge taught in the schools meet the challenges of the 21st century
Desired outcomes from the schooling system	To achieve the holistic development of Cambodia's young people. To engender a sense of national civic pride, high moral and ethical standards and a strong belief in young people's responsibility for the country and their citizens.	8 core skills – (i) character development, (ii) self-management skills, (iii) social and cooperative skills, (iv) literacy and numeracy, (v) communication skills, (vi) information skills, (vii) thinking skills and creativity and (viii) knowledge application skills.
Basic Education	9 years – primary education (6) and lower secondary (3)	10 years – compulsory primary (6) and secondary education (4)
Secondary Education Subjects	Subjects for grades 7-10: Khmer, Mathematics, Social Studies, Sciences, Foreign Languages, Physical and Health Education and Sport Subjects for grades 11-12: Khmer literature, physical health education and sport, foreign languages (English or French), mathematics (basic and advanced), sciences (physics, chemistry, biology, earth and environmental studies), social studies (moral and civic, history, geography, economics), Elective Vocational Education Program - EVEP (ICT, Accounting/business management, Local vocational technical subjects, tourism, arts	Core subjects: English, Mother-tongue, Mathematics, Combined Humanities and Science Elective subjects: Humanities, science, and literature in Chinese.

	education)	
Pedagogy	A combination of teacher-centered and student-centered approaches	A diverse range of pedagogies: enquiry-based and experiential learning

Sources: Cambodia: MoEYS (2014), MoEYS (2004); and Singapore: Hodge (2014)

VII. Conclusion and Recommendations

Cambodia since 1996 has revised its schooling system. The schooling system focused on rights-based curriculum rather than on economic-based one. This move indicated the education sector support for the policy and strategic plan development to be in line with the world frameworks of EFA. The new curriculum policy should consider all necessary strategies to equip students with skills and attitudes to face new problems and issues that will come into their lives.

Cambodia's practice in its curriculum emphasized moral and civic education and did very little to enhance low-skilled workforce for the 21st century. The educational administration concentrated on completing curriculum and textbooks rather than meeting the learning outcomes and achieving the students' learning goals. Although the textbooks were written to equip students with traditional culture, civic and moral education, they are lacking creative and analytical skills to advance themselves to further study as well as ready to join the world of work with a level of acceptable productivity in their respective workplaces.

Low-quality of teachers and irrelevance of the curriculum/textbooks to enhance Cambodia's competitiveness and economic growth in the past decades have slowed down the skilled labor supply process for the booming service and industrial sectors. Thus, Cambodia will not be able to reach the level of the upper-middle income country by 2030 without changing the current practices of teaching and curriculum policies.

The four pillars of learning as advised by international communities after the 1990 WDEFA concentrate on; learning to know, learning to be, learning to do, and learning to live together with harmony. Post-EFA 2015, schools in Cambodia should be prepared to offer ICT-based learning, inquiry-based learning and project-based learning to enhance fundamental skills in primary education and prepare the learners well after their Basic Education to acquire other professional skills to enter the new world of work.

CHAPTER IV
TEXTBOOK ANALYSIS

I. Grade 9 and 12 textbook review and interviews with authors

This section contributes towards addressing research question 2: *Does the Cambodian school (K-12) curriculum prepare students with the knowledge, skills and attitudes required by an upper middle-income economy?*

In order to fully answer this question an extensive study of all aspects of the curriculum is required. This would include a study of the *Intended curriculum* as described in MoEYS policy documents, the *Written curriculum* as presented in the text books, the *Taught curriculum* as delivered by teachers to their students in the classroom, the *Learned curriculum* being what students actually learn, and the *Examined curriculum*, which is what is finally examined.

In this chapter we consider only the *Written* curriculum, that is the textbooks. In Cambodia, since there is only one set of approved text books produced by MoEYS, they are considered by most to *be* the curriculum.

In this initial stage of the review, only Grade 9 and Grade 12 textbooks of Maths, Khmer and Science (Physics, Chemistry, Biology) have been considered as indicators of the quality and relevance of the *knowledge, skills and attitudes* in each subject. These five subjects however, represent the core of the curriculum. Grades nine and twelve represent the two most important milestones in the school curriculum; grade nine being the end of basic education and grade twelve, the end of secondary education.

Interviews with members of the committees of authors and the technical advisors that prepared the text books were carried out in order to fully understand the process involved.

The most important educational skills necessary for Cambodia's future economic development, as identified in Chapter 2, are;

1. Lower-order cognitive skills-literacy and numeracy
2. Higher-order cognitive skills-analysis, decision-making, problem-solving, communication, foreign languages.
3. Socio-emotional skills—work attitudes, e.g. being straightforward, honest.
4. Technical skills and experience –TVET.

The analysis is therefore framed by the following questions;

1. Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *appropriate for their grade levels*? Why or why not?
2. How do the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *compare with those in Singapore*?
3. Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *relevant and sufficient to meet predicted market demands*?
4. Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *a sufficient foundation for higher education*?

Experienced lecturers from RUPP were asked to review the grade 9 and 12 Cambodian text books in their specialist subject using the above framework and compare them with the respective syllabus from Singapore. Detailed, chapter by chapter analysis of grade 9 and grade 12 text books was carried out and is shown at the end of this report. Their analysis is summarized below, 5 indicating sufficiency and 0 indicating none.

Table 6. Appropriateness to the grade

0  **5 (Sufficient)**

Subject	Grade 9			Grade 12		
	Knowledge	Skills	Attitudes	Knowledge	Skills	Attitudes
Maths	3	1	1	3	1	1
Khmer				3	2	1
Physics	3	1	1	3	1	1
Chemistry	2	1	1	3	2	1
Biology	2	1	1	3	1	1

Table 7. Compared with Singapore

Subject	Grade 9			Grade 12		
	Knowledge	Skills	Attitudes	Knowledge	Skills	Attitudes
Maths	2	1	1	2	1	1
Khmer						
Physics	2	1	1	2	1	1
Chemistry	2	1	1	3	2	1
Biology	2	1	1	2	1	1

Table 8. Relevance to market demand

Subject	Grade 9			Grade 12		
	Knowledge	Skills	Attitudes	Knowledge	Skills	Attitudes
Maths	1	1	1	2	1	1
Khmer				1	1	1
Physics	2	1	1	2	1	1
Chemistry	2	1	1	2	1	1
Biology	2	1	1	1	1	1

Table 9. Sufficient for further study to HE

Subject	Grade 9			Grade 12		
	Knowledge	Skills	Attitudes	Knowledge	Skills	Attitudes
Maths	2	1	1	3	1	1
Khmer				2	2	1
Physics	3	1	1	2	1	1
Chemistry	2	1	1	3	1	1
Biology	3	1	1	3	1	1

The reviewer's comments are presented below by subject, followed by synthesized answers to the four questions posed above.

II. Maths

1. Grade-9 review

The Grade-9 Mathematics textbook is written like an exercise book which can only bring students to the first levels of Bloom's taxonomy and so makes it difficult for them to reach higher levels 4, 5, 6 (although there are some critical thinking problems given in the series of exercises).

The substance in each lesson is not enough for the students to get formal concepts of Mathematics and thus the students cannot build a strong foundation. Some lessons in the text book exist in the Singaporean secondary two (Grade-8), some lessons (probability) are at a higher level and full of serious mistakes and others are different. In general, the lessons in the Cambodian Grade-9

mathematics textbook provide fewer concepts and applications compared with those of the Singapore syllabus.

The main goal of learning (challenging) Mathematics should be to analyze problems and justify the answers of the given exercises with logical reasoning as well as to create new things from fundamental concepts. "The central concept of the framework is mathematical problem solving" (O & N(A) Level Mathematics Teaching and Learning Syllabus, Singapore, 2012, p.14)

2. Grade-12 review

Cambodian students can choose to specialize in the applied sciences or the social sciences and students study different mathematics course in the two streams. Applied science students study Advanced maths, while students in the social sciences study Basic maths.

The Advanced Grade-12 Mathematics textbook is better written than that of the Grade-9 but it is still difficult to access by the students since some parts are missing and only appear in the fundamental Grade-12 Mathematics book.

The substance in each lesson is still not enough for the students to get formal concepts of Mathematics and thus it is difficult for the students to build a strong foundation.

We find that, in the Cambodian Advanced Grade-12 mathematics textbook, some lessons are similar to those of Singapore, some do not overlap and others are at lower levels than that of the Singaporean syllabus, for example:

1. Chapter 1 only introduces the notion of geometric series while, in the Singaporean syllabus, some properties of series have been introduced and especially the Maclaurin's series are used.
2. Chapter 2 only gives some simple graphing while, in Singapore, graphing techniques like, coordinate transform and symmetry with respect to x and y are presented.

The answers to the four questions focused on the analysis the text books are the followings:

1. **Are the knowledge, skills and attitudes presented in the grade 9 and 12 Cambodian text books *appropriate for their grade levels*? Why or why not?**

   The knowledge presented at each level was considered appropriate due to their contents being similar to those of the good education systems in the world like Japan, France Singapore and so on while the level of cognitive skills required were still commonly low, mostly at levels 1 (nearly absent), 2, 3 and with a small amount at level 4 in sense of Bloom's Taxonomy. See the survey on Grade 10, Grade 11 and Grade 12 provided at the end.

   The lack of clear definitions, general approach or algorithm (which have been found in many sections of Grade 9) and of logical reasoning did not construct a strong Mathematical base for critical thinking towards other higher levels for example, levels 5 and 6. Moreover, due to less connection to daily life and being forced to remember so many unnecessary things (rather to understand), the students are frustrated and scared to learn Mathematics. The wrong interpretations and unclear explanations both contained in some sections of Grade 9 and 12 also caused the students to have bad attitudes towards Mathematics rather than to show the power and beauty lying in it.

2. **How do the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian Mathematics text books *compare with those in Singapore?***

Mathematics is an international language where common things, for example, definitions and theorems, are internationally known and agreed. Although the contents in the Cambodian Mathematics text books of Grade 9 and 12 are similar to those of Singapore, some formal definitions, which are used to explore some Mathematical properties and to create theorems, are not given. Moreover the Cambodian students would have difficulty remembering the definitions mostly given in the Grade-9 text book and in some parts of Grade 12 and hence have difficulty understanding the concepts which enables them to apply only the given properties or theorems to solve the problem rather than to analyze the problem, to justify the solution to the problem and finally to create new ideas (theorem) and to solve other similar problems. These kinds of critical thinking problems can often be found in the Singaporean text books and also in most other Mathematics text books as well.

3. **Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books relevant and sufficient to meet predicted market demands?**
   Although some sections in both Grade-9 and Grade-12 Cambodian Mathematics text books present some life skills, none of the Cambodian text books reviewed was considered to be relevant or sufficient to meet predicted market needs since the text books do not provide a deep knowledge to students while the skills and attitudes are still severely lacking.

   In the text books, students are often asked to apply Mathematical properties or theorems to solve the imposed problem without necessarily understanding it. The text books do not challenge students to make a Mathematical model, which might transfer a real world problem into a Mathematical problem.

   Predicted market demands will require higher order skills. Both Grade-9 and Grade-12 text books do not integrate higher order skills such as posing questions, formulating hypothesis, defining problems, generating possibilities, predicting, observing, using apparatus and equipment, comparing, classifying, inferring, analyzing, evaluating, verifying, communicating.

4. **Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *a sufficient foundation for higher education*?**
   Although the content in the Grade 12 (and some sections in Grade 9) is likely to prepare the Cambodian students for the "Foundation Year" at university, none of the Cambodian text books reviewed was considered to be a sufficient foundation for higher education in terms of knowledge, skills or attitudes. In particular the skills and attitudes conveyed by these texts were considered to be severely lacking.

III. Khmer language

1. **Are the knowledge, skills and attitudes presented in the grade 9 and 12 Cambodian text books *appropriate for their grade levels*? Why or why not?**
   a. Knowledge *(1-3 on Bloom's Taxonomy)*
   On average, the knowledge presented in this book is acceptable, but the levels of some lessons are too high and equal to a university program. According to analysis from lesson 1 to 10, the overall knowledge levels are at 1-3 on Bloom's Taxonomy.

   Lesson sequences, most of the time, are not in coherent order, and sometimes not related to the main topic. For instance, lessons 1, 2, 3 are respectively about *Khmerism, Brahmanism, and Buddhist Literature,* while lessons 9 and 10 are respectively about *Relation of Khmer and Foreign Literatures,* and Foreign *Literature*. These lessons should be next to each other.

Moreover, the subtitle in each lesson is out of order, and some parts of one lesson are included in another lesson make them irrelevant.

Generally, the content of text books lacks clear explanation, and most of the time is insufficient, and misinformed. Most reading texts are partial extracts from various sources rather than the whole original. Thus, these texts are not adequate for the level. Mostly, the texts are too short with unclear information, and explanation.

b. Skills *(1-2 on Bloom's Taxonomy)*
The skills provided by this book are for Faculty of social science in Khmer literature and arts only and they do not provide sufficient skills such as writing, speaking, reading, and listening; for example, these skills are not included for practice. Moreover, the skills presented are not widely used for jobs outside the literature and arts. The book does not provide any techniques to implement such topics in their daily life. There is a lack of evaluative and creative skills in both topic and content for each lesson. No lessons show bad and good experiences and then lead students to solve problems applied to society.

c. Attitudes *(1-2 on Bloom's Taxonomy)*
On average, the attitude of learners towards the knowledge is still low. Most lessons don't show the benefits of the lessons and how to apply them in their daily life. This would cause the learners to lose attention to their study and they wouldn't behave in better ways as in the aims of the lessons. Moreover, because learners are forced to learn unclear, misinformed, insufficient knowledge, they would misunderstand, and get bored and frustrated. Also, when learners are not encouraged to think critically or independently, they might lose their interest in learning.

2. **Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books relevant and sufficient to meet predicted market demands?**
   None of the lessons reviewed were shown to be relevant or strong enough to meet the projected market demand in either 2020 or 2030 in term of knowledge, skills, or attitudes. The knowledge, skills, and attitudes provided by this book focus only on literature, and Khmer culture rather than general topics related to daily life. Specifically, the knowledge, skills contained in this book are lacking, and provide unclear objectives and usefulness in daily life. It is unlikely that graduates could find appropriate jobs related to doing ritual ceremonies (lesson 7, Page173-198).

3. **Higher education: Is it a sufficient foundation for post-secondary education?**
   None of the lessons reviewed was considered to be a sufficient foundation for post-secondary education in terms of knowledge, skills or attitudes. Again as we mentioned above, the knowledge, skills, and attitudes provided by this book focus only on literature, and Khmer culture. So, most students are able to study only Khmer literature and arts because they have no basic knowledge to pursue other subjects. They can choose other subjects to study but they would face many difficulties in unfamiliar fields. In fact, the book should add some more content related to other fields rather than only literature. Particularly, the book was considered to be lacking of foundation for higher education.

IV. Science (Physics, Chemistry, Biology)

In answer to the four questions that formed the focus of the analysis;

1. **Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *appropriate for their grade levels*? Why or why not?**

On average, the knowledge presented at each level was considered appropriate although some sections were inappropriately high, even compared with Singapore, one of the best education systems in the world, although the levels of cognitive skills required were uniformly low, almost entirely at levels 1-3 on Bloom's Taxonomy. This inconsistency in the level of content was observed in all of the science texts reviewed.

Cambodian students have no choice of different levels of study. At grade 11 they can choose to specialize in either science or social science. But in Singapore they can study in one of three streams, Express, Normal or Technical, depending on their ability and preference, up to grade 12. **Providing a variety of levels responds to a wider range of students' abilities so that more students are able to succeed in their education.**
While some content is appropriate to the grade level, there is a lack of clear and sufficient explanation throughout the texts. Generally the content in the text books is insufficient, but even so, MoEYS has instructed that some chapters are not required to be taught. Numerous errors were found ranging from minor mistakes of orthography, to serious errors of conceptual sequence, and even duplication of an entire chapter in grade 9 and 10 Chemistry. **Being forced to learn difficult, fragmented, poorly explained and sometimes wrong, information makes students bored and frustrated.**

The fields of science are disconnected at the lower secondary level, not integrated as they are in most countries in order to present science 'as it is experienced'. The Nature of Science is presented as a type of knowledge, more than a way of thinking, whereas a balance between these views is desirable, and there is a disconnection with everyday life, society and the environment. **When students learn about what they experience in their everyday lives, they see it as useful and relevant.**

2. **How do the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *compare with those in Singapore*?**
   The most obvious and serious deficiency in the Cambodian text books compared with Singapore is the lack of the empirical nature of science. The process of science is almost entirely absent. The Singapore science syllabus states, "Central to the curriculum framework is the inculcation of the spirit of *scientific inquiry* (p.1)." **Although MoEYS objectives state that the curriculum should, "emphasize active and applied learning," the science textbooks clearly view science as a collection of factual information to be learned passively.**

   Experiments are sometimes described although they are not required, whereas in Singapore they form the foundation for teaching and learning. **If experiments are optional and not examined then teachers and students are unlikely to do them.**

   Although difficult theory was often presented in the Cambodian texts, students were only expected to remember it. **The terms evaluate, analyze or create did not appear in any question or exercise, whereas these are frequently mentioned in the Singapore syllabus.**

3. **Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *relevant and sufficient to meet predicted market demands*?**
   None of the Cambodian text books reviewed was considered to be relevant or sufficient to meet predicted market needs in terms of knowledge, skills or attitudes. In particular the skills and attitudes conveyed by these texts were considered to be severely lacking.
   Students are not encouraged to question or think rationally by themselves. They are often asked to simply remember difficult theory without necessarily understanding it. **Memorization without understanding produces passive learners. Presenting facts**

without explanation or logical reasoning discourages rational thinking. Disconnection with everyday life creates perception that science is irrelevant.
Higher order skills are almost entirely missing, e.g. Posing questions, Formulating hypothesis, Defining problems, Generating possibilities, Predicting, Observing, Using apparatus and equipment, Comparing, Classifying, Inferring, Analyzing, Evaluating, Verifying, Communicating.

4. **Are the knowledge, skills and attitudes expressed in the grade 9 and 12 Cambodian text books *a sufficient foundation for higher education*?**
None of the Cambodian text books reviewed was considered to be a sufficient foundation for higher education in terms of knowledge, skills or attitudes. In particular the skills and attitudes conveyed by these texts were considered to be severely lacking. This is consistent with previous analysis in the report, *Upper Secondary School Curriculum Reform in Cambodia: Relevance for Employment and Tertiary Education;*

> *Analysis of high school textbooks found that the levels of thinking that students were exposed to across all subject areas and given opportunity to practice were of a lower order. Students were required to perform only at lower levels of thinking, and were poorly prepared for creative, critical, original thinking by Upper Secondary Science textbooks. This conclusion is also supported by: a) answers from our foundation year students who commented on insufficient opportunities at high school to develop skills for teamwork, decision-making, communication, and analysis.* (UNICEF, 2014, p.12)

It is also useful to look at some general differences in the way that science is taught in Cambodia and Singapore.

Table 10. Systemic differences

	Cambodia	**Singapore**
Levels	One track	Express, Normal, Technical
Subjects	Physics, Chemistry, Biology, Earth Science	Integrated themes; Diversity, models, systems, interactions
Central concept	Science as facts	Scientific Inquiry
Experimental work	Described, not required	The foundation for teaching and learning
Scientific concepts and principles	Emphasis on remembering difficult facts	Emphasis on understanding and application
View of science	Science as a type of knowledge	Science as a way of thinking

Levels – The Cambodian curriculum does not allow students any choices in science at lower secondary level. Students follow one track. At grade 11 they can choose to specialize in either science or social science. But in Singapore they can study in one of three streams, Express, Normal or Technical, depending on their ability and preference, up to grade 12. **Providing a**

variety of levels responds to a wider range of students' abilities so that more students are able to succeed in their education.

Subjects – Science in Cambodia is presented as four separate subjects; Physics, Chemistry, Biology and Earth Science from grade 7 through 12. But in Singapore, lower secondary science is considered as only the three basic sciences, Physics, Chemistry and Biology integrated into four themes, Diversity, Models, Systems and Interactions. The basic sciences are taught separately in upper secondary. There is a trend towards more integration of science in lower secondary since it presents science 'as it is experienced.' **When students learn about what they experience in their everyday lives, they see it as useful and relevant.**

Earth science is considered part of geography. The Cambodian curriculum also includes geography but it is only offered in the social science stream. The separation of these two subjects Earth Science and Geography, which are normally combined together, creates a problem for students who want to study geography at university, since both science and social science students are lacking half of the background required. **Earth science should be combined with geography into a single subject.**

Table 11. Cambodia-Singapore subject/theme comparison

Cambodia Grade 9		**Singapore Grades 7, 8, 9**	
Subject	**Topics**	**Themes**	**Topics**
Physics	Ch. 1 Effects of rotation on forces Ch. 2 Simple machines Ch. 3 Electricity Ch. 4 Electromagnetism Ch. 5 Optics	Diversity	2. Exploring Diversity of Matter by their Physical Properties 3. Exploring Diversity of Matter by its Chemical Composition 4. Exploring Diversity of Matter Using Separation Techniques 5. Understanding Diversity of Living Things
Chemistry	Ch. 1 Periodic Table of the elements Ch. 2 Carbon, Oxygen and Hydrogen Ch.3 Oxides, Acids, Bases and Salts	Models	6. Model of Cells – the Basic Units of Life 7. Model of Matter - The Particulate Nature of Matter 8. Model of Matter - Atoms and Molecules 9. Ray Model of Light
Biology	Ch. 1 Photosynthesis Ch. 2 The nervous system Ch. 3 The immune system Ch. 4 Diseases and pathogens Ch. 5 Human effects on natural systems	Systems	10. Transport System in Living Things 11. Human Digestive System 12. Human Sexual Reproductive System 13. Electrical Systems

		Interactions	14. Interactions through the application of forces 15. Energy and Work Done 16. Transfer of Sound Energy through Vibrations 17. Effects of Heat & its Transmission 18. Chemical Changes 19. Interactions within Ecosystems

Central concept – The Singapore science syllabus states, "Central to the curriculum framework is the inculcation of the spirit of scientific inquiry (p.1)." **Although MoEYS objectives state that the curriculum should, "emphasize active and applied learning," the science textbooks clearly view science as a collection of factual information to be learned passively.**

What is scientific inquiry?

Through inquiry learning, students will be able to acquire knowledge and understanding of their natural and physical world based on their own investigations, apply the skills and processes of inquiry and develop attitudes and values that are essential to the practice of science.

To emphasize the learning of science as inquiry, teachers can incorporate the essential features of ***Question, Evidence, Explanation, Connections*** *and* ***Communication*** *and provide students with experiences that varies between guided (partial) and open (full) inquiry. The teacher is the leader of inquiry in the science classroom and the student is an inquirer. The teacher creates a learning environment that will encourage and challenge students to develop their sense of inquiry. Teaching and learning approaches centre on the student as an inquirer.*

What are some features of an inquiry classroom?

An inquiry classroom is visibly different from a traditional classroom in the following ways:

Table 12. Traditional vs Inquiry classroom

Traditional	**Inquiry**
Students often work alone	Students often work in groups
Emphasis on mastery of facts	Emphasis on understanding of key concepts
Follows a fixed curriculum closely	Allows for pursuit of student questions
Activities rely mainly on textbooks and workbook materials	Activities rely on primary sources
Students are viewed as "empty vessels"	Students are viewed as thinkers with their own theories about the world
Teachers tend to disseminate information to students	Teachers facilitate an interactive learning environment
Teachers tend to seek correct answers	Teachers seek to understand student learning
Assessment tends to be separate from teaching	Assessment is interwoven with teaching

(Source: Science Syllabus, Lower Secondary, E/N(A), 2013, Ministry of Education, Singapore)

Experimental work – In the Singapore syllabus, experimental work should be the foundation for teaching and learning. But in the Cambodian science text books few experiments are described and the introduction states that they are, "additional for students to do by themselves." **If experiments are optional and not examined then teachers and students are unlikely to do them.**

Scientific principles and concepts – It is surprising that the general level of difficulty of many principles and concepts in the Cambodian curriculum are higher than in Singapore, which has one of the world's best education systems. But the level of cognitive skills required of Cambodian students is much lower than the levels expected of Singapore students, who are encouraged to understand and apply what they learn. **Cambodian students are often forced to remember difficult information they don't understand.**

View of science - Science is BOTH a body of information derived through empirical processes, and a way of knowing through empirical processes. The Singapore curriculum focuses on the "practice of science", but the Cambodian curriculum focuses on transmitting knowledge. As stated in the Singapore syllabus, **there should be, "a balance between the acquisition of science knowledge, skills and attitudes."(Preamble)**

Interviews with text book writers/translators and technical advisors

According to interviewees, the current Cambodian text books, except for Khmer language, were prepared with technical and financial assistance from the Japan International Cooperation Agency (JICA)[4] and UNICEF. The texts for upper secondary were prepared at a different time from those of lower secondary; Grades 10-12, in 2005 and Grades 7-9 in 2007. The text books were prepared over a period of about six months.

The selection of members of the text book committee of authors was from government staff "by exam" (A1) according to one member and by oral invitation from former writers without written criteria, according others (A3, A4), and one interviewee explained that he was actually only a translator, not an author. Those invited were "only teachers who were good at writing and liked this work and were available to spend their part time to do it" (A4). Some were senior members of the Department of General Education Inspection office and the Department of Pedagogical Research (now the Department of Curriculum Development) and some were lecturers from RUPP and others were high school teachers. Qualifications of writers/translators varied but none held recognized higher degrees, some held local undergraduate degrees from the early 90s and others had only a Diploma of secondary teaching. The low pay offered was considered a factor in the low qualifications of the writers since "no-one wanted [to do this work] because the payment was very low" (A4). Individual teams of Cambodian writers related to each subject were led by Japanese or UNICEF experts. Only some interviewees claimed that they were aware of MoEYS curriculum policy at the time.

In the preparation of upper secondary text books supported by JICA, team members with sufficient understanding of English were taken to Japan for one month of training in curriculum development using Japanese curriculum and text books (the list of chapters was translated). Comparison was made between the old Cambodian text books and the Japanese equivalent to identify gaps. Chapters were selected based on relevance (some chapters in the old books were considered out of date), whether they were necessary for further studies or if they were not covered in the old texts. Some authors noted that they were careful to avoid any content that might be considered politically sensitive (A3, A4). Other foreign text books in English (selected

[4] From 2005 to 2007, JICA technically supported curriculum development of Mathematics, Biology, Chemistry, and Physics at the Upper Secondary level (Grades 10 to 12) only, and textbook development of Mathematics, Biology, Chemistry, and Physics for Grade 10 only.

by the foreign expert from US, Singapore and Malaysia) were then used for selection of appropriate chapters to fill in the holes.

In the text books supported by UNICEF, the technical expert was Malaysian so, "Mostly [the references were from] Malaysia because the UNICEF expert was Malaysian" (A3). Decisions about chapter selection were made by consensus of the team members and generally, the foreign chapters were not adapted to the Cambodian context, only summarized. The foreign experts led the consideration of balancing knowledge, skills and attitudes when selecting chapters although most interviewees agreed that the books only contain cognitive levels up to level 3 on Bloom's taxonomy.

When asked to respond to the criticism that the current text books are too theoretical, some interviewees agreed that there is a lack of practical in the text books but that they realized that there was no department in the ministry to administer distribution of equipment and so most teachers would have had difficulty teaching experiments due to lack of equipment in schools. So, experiments were only chosen if they involved locally available equipment. One writer became defensive and claimed that those who criticized "had knowledge lower than the book." The same writer also claimed that the text book contains all cognitive levels of Bloom's taxonomy.

On returning to Cambodia the subject teams then translated individual chapters according to their expertise, those without sufficient understanding of English turned to equivalent French texts for source material instead. Regular editorial meetings were held by the teams to correct the translation followed by a final proof reading by a Cambodian technical expert. But one Cambodian subject expert explained that his role was only to make final corrections and he had no involvement in selecting writers, reference texts, relevant chapters, or arranging the sequence and scope of content.

The biggest constraint reported by author/translators was the page limit set by the MoEYS Printing House for each text book due to a limitation of available funding. According to one interviewee, the final text books "are really only summaries, not text books". Writers and subject experts also complained that the corrections they made during the drafting process were often not made at the MoEYS printing house due to lack of technical understanding by the typists. Low remuneration was also a problem mentioned by several writers who withdrew after writing the text books, refusing to continue to the preparation of teacher's books. Writers commented that they were not given any additional income after subsequent reprinting of the texts. Another interviewee summed up in general that the limited content, lack of explanation and low quality of the books were a result of the low payments offered to the writers and to the printing house by MoEYS.

Suggestions by interviewees for the next edition of text books included;

1. Translating complete foreign texts as they do in Vietnam.
2. Doing a comparative study
3. Inviting expert teachers to train how to teach from the new texts.
4. Should invite private sector to produce texts so they can compete.
5. Should add more details, explanation, exercises, experiments and relevant applications.

V. Conclusion

Cambodia's future economic development will require human resources with a wide range of hard and soft skills. The lack of high-order, socio-emotional and technical skills in the present graduates from the school system has been widely reported already. This research has attempted to identify the causes of these deficiencies and this section has looked specifically at the text books that all students and teachers depend on; in Cambodia with only one set of approved text books, the text books *are* the effective *written* curriculum.

To what extent are the text books used in Cambodian schools responsible for these deficiencies?

The following summary of the analysis of the grade 9 and 12 text books of Mathematics, Khmer language, and Science, classified into the three domains, Knowledge, Skills and Attitudes can perhaps provide some of the answers;

4. Knowledge

- Content generally difficult, fragmented, not well explained and sometimes wrong, but only memorization required
- Most factual information is described very theoretically (abstract/unreal) not practically.
- The substance in each lesson is not sufficient for students to build a strong foundation for thinking towards higher cognitive levels.
- Levels of difficulty are inconsistent, with some content in grade 9 considered to be at university level.
- Sequence of concepts often does not follow a logical constructive order.
- Even though content in the text books is generally insufficient, MoEYS has instructed that some chapters are not required to be taught.
- Disconnection with everyday life, society and the environment.
- Disconnection between fields of science; not integrated 'as-experienced'.
- Language confusion over the use of technical words and symbols in French and English.

5. Skills

- Emphasis on remembering, understanding and applying facts. Questions of "how" and "why" are sometimes observed, but learners are only required to memorize and answer from the written texts, not from their own thinking skills.
- The process of science is not shown and not experienced through practical work.
- Missing higher order thinking skills; Posing questions, Formulating hypothesis, Defining problems, Generating possibilities, Predicting, Observing, Using apparatus and equipment, Comparing, Classifying, Inferring, Analyzing, Evaluating, Verifying, Communicating.

6. Attitudes

- Memorization without understanding produces passive learners
- Being forced to learn difficult, fragmented, poorly explained and sometimes wrong, information makes students bored and frustrated, unlike the stated hope of the text book committee, that the book will become "a good friend without fail" (Preface, Grade 9 Science).
- Presenting facts without explanation or logical reasoning discourages rational thinking
- Disconnection with everyday life creates perception that learning at school is irrelevant
- Students, who are not encouraged to question or think by themselves, lose interest in learning.

Although the present analysis only considered a small sample of the text books used to deliver the secondary school curriculum, the number, variety and serious nature of problems observed, seem to indicate that they are a major source of the skills deficiencies observed in high school graduates. As such they represent a significant obstacle to the delivery of the *intended* curriculum.

Interviews with text book authors/translators and subject specialists help to explain some of the causes of the deficiencies observed in the text books. A fundamental weakness in the preparation of the texts was the selection and remuneration of the author/translators. When the text book authors are under qualified and underpaid they are lacking the basic motivation to work well. When they choose chapters from different books from different countries and even different languages, as well as being restricted by a low page limits, the result is inevitably a low quality text book. It's little wonder that there are errors of sequence and scope, a lack of explanation, a mixture of technical terms in French and English and inconsistent levels of difficulty.

Cambodia – Singapore comparison

Comparison was made with the Singaporean curriculum which at first would appear to lead to an obvious conclusion. Singapore is one of the most developed countries in South-East Asia and has a world class education system so a comparison with Cambodia would obviously show that the Cambodian curriculum is lacking. But the aim of this comparison was not simply to expose the weaknesses in the Cambodian curriculum. It was to identify specifically the ways that the two systems are different to indicate possible directions for change, and that is most easily observed by contrast. Singapore's history of change can help to give guidance towards the future development of Cambodia.

The Singaporean education system provides its students with a complete and balanced range of hard and soft skills, whereas the Cambodian education system is only providing a limited quantity of lower-order hard skills and is lacking in technical and soft skills. Consequently, it rates low in terms of its ability to satisfy market demands. It is possible to describe the qualitative differences diagrammatically as follows.

Table 13. Qualitative skills evaluation

	Hard skills		Soft skills	
	Lower order cognitive skills (Remembering, Understanding, Application)	Technical skills (Computer literacy, numeracy, foreign languages)	Higher-order cognitive skills (Analytical, critical Evaluative, thinking)	Socio-emotional skills (Attitudes; curiosity, creativity, objectivity, integrity, perseverance, responsibility)
Compared with Singapore curriculum				
Market demand (0 – 5)	2-3	1	1	1

Perhaps the most significant difference between the two systems and therefore the biggest signpost towards the future for Cambodia is in the fundamental emphasis in the way that education is delivered. In all of the Cambodian text books reviewed there was an emphasis on memorization of difficult theoretical concepts often disconnected with student's everyday experience, environmental and concerns and modern social reality. Perhaps this is a result of the cultural perception that all knowledge should be treasured for its intrinsic value.

The Singaporean curriculum however, clearly focused on a more practical view of knowledge; that it has value as it can be used by students in their everyday lives, to aid society and the environment. The emphasis in all subjects reviewed was on student-centered, active pedagogies in which students participate in constructing relevant knowledge. E.g.

Language: *The six principles of EL teaching and learning; Contextualization, Learner-centredness, Learning-focused Interaction, Integration, Process Orientation, Spiral Progression (*English Language Syllabus 2010)

Mathematics: *The central focus of the framework is mathematical problem solving* (O&N(A) Level Mathematics Teaching and learning Syllabus, 2013)

Science: *Central to the curriculum framework is the inculcation of the spirit of scientific inquiry* (Science Syllabus, Lower secondary E/N(A), 2012)

CHAPTER V

CONSTRAINTS TO DELIVERY OF CURRICULUM AT THE CLASSROOM LEVEL

I. Introduction

Education is a complicated process involving many stakeholders and activities. Traditional analysis considers these three aspects - input, process and output. While inputs and outputs can be identified and measured with fairly reliable and valid instruments, process is considered by practitioners, policymakers and scholars to be a substance in a black box.

In this particular section of the review, we look at teachers as an input factor as well as a process factor. The quality of teacher preparation, teacher induction, professional development and the teaching and learning materials they use, are input factors that determine the quality of the processes of how teachers teach and facilitate learning activities in classrooms. Therefore we will consider each of these four factors to find out whether they are constraining the effective delivery of the curriculum.

In order to answer this research question, data were collected from the review of related documents and a survey of 152 teachers in different provinces. Demographic information is presented in Table 1.

Table 14. Demographic information of participants

Variable	Responses	Distribution
Sex	Male	74.7%
	Female	25.3%
Educational attainment	Grade 9	20.7%
	Grad 12	24.7%
	Bachelor and above	54.6%
Subject taught	Khmer	23.7%
	Mathematics	20.4%
	Science	55.9%
Age	Mean	38.80
	SD	8.35
Years of teaching	Mean	16.92
	SD	9.05

The presentation of input factors is in the following order - teacher preparation, teacher induction, professional development and teaching and learning materials.

II. Teacher Preparation

As an aftermath of the genocidal regime in which almost all intellectuals including teachers were either killed or fled the country, and prolonged civil wars, the reopening of the school system started from scratch in the early 1980s. Recruiting teachers was the most challenging task for the then Ministry of Education. The government had to use different modalities of teacher training as the situation improved. As a result of passing through different poor modalities of teacher training ranging from 4 months of in-service training or 3 years of schooling with 1 year of in-service in 1980, many teachers currently only hold the same qualification as the school level they

teach. More than 50 percent of high school teachers hold a qualification no higher that a high school certificate. This research shows a strong relationships between teachers' pre-service education and their performance in the classroom, which is eventually responsible for the quality of their students' achievement, especially equipping learners with relevant knowledge and skills required in society.

Literature on teachers and teaching in Cambodia shows that the teacher training system in Cambodia is relatively week compared with teacher education in other countries or other professions in Cambodia (WB, 2014). While most countries in the region require four years of teacher education for all school levels, Cambodia uses a 12+2 years of teacher training for basic education and BA+1 years for upper secondary school teachers. Table 2 Teacher training center and teacher qualification

Table 15. Teacher training center and number of teacher qualification by qualification

Training model		Number of teachers by qualification	
Model	School level	Level of Education	%
9+2 or 12+2	Preschool	At the level or lower than Lower Secondary Education	30%
	Primary School	At the level or lower than Upper Secondary Education	82%
Bac II +2	Lower Secondary School	At the level or lower than Bachelor	97%
BA+1	Upper Secondary School	Above Bachelor	2.5%

Teacher training is a sole responsibility of the government. As can be seen in Table 2, the decision for one to become a teacher is determined prior to pre-service training. Those who completed grade 12 have to go undertake the 2 years teacher training at one of the 16 Provincial Teacher Training Center (PTTC). The six Regional Teacher Training Center (RTTC) requires a successful completion of grade 12 (Bac II) to undertake a 2 year training to become a lower secondary school teacher. As for upper secondary school teacher, the training modality is BA/BS +1 offered only at National Institute of Education. It is worth of notice that every year, there were about 7000 teachers applying to be upper secondary school teachers. However, only about 1000 are admitted. With this inflexible teacher preparation, graduates from university have no chance to become teachers even if at lower school level such primary or lower secondary school. As a result of the current training modality, majority of teachers hold only high school degree (Table 2).

High expectation for a high-paid career is the most effective drive for every individual to choose his/her future career path. Given teaching profession in Cambodia is a low-paid job to be mostly working in public schools only poor quality candidates and rural students are mostly attracted as they do not have other choices. Majority of teacher trainees who enrolled in the Teacher Training Center of the Northwestern region of Cambodia in 2011 and 2012 were D and E graders of the national examination (Chhit, 2013, WB, 2014).

Given their school poor performance and poor transfer of knowledge from their trainers at their training institutes, teachers in schools, and teacher trainees and teacher trainers in teacher training centers have serious problems of knowledge of the contents of the subject they teach (World Bank, 2014). Through a test of knowledge on subjects of teaching, in some cases, trainees know more than trainers and teachers have more or less the same average score as grade 9 students (WB, 2014: 89).

Teachers also have considerable problems concerning knowledge of pedagogy and application of teaching techniques. Teachers face three main obstacles in developing their effective learning and teaching capacity. . Firstly, teaching and learning at the teacher training center is still dominated by ineffective practices of traditional teaching approaches. The practices and habits of trainers are naturally transferred to trainees who eventually become classroom teachers of tomorrow. With limited exposures to good and effective teaching practices and quality learning environments, teachers have no clue on what constitutes effective teaching. A study (WB, 2014) shows that Teacher Training Centers are suffering from shortages of qualified trainers, equipment and facilities. Secondly, effective pedagogy is involved with student engagement, encouragement and assessment. The study cited above also indicates that teachers have a very limited understanding on how to engage and encourage students in in-classroom and out-classroom activities and assess students' strengths and weaknesses. Tests, homework and quizzes were given for the purpose of recording scores that served for monthly or semester or annual assessment. Teachers have significant difficulty analyzing students' errors of learning and proposing solutions for students to improve. Finally, the most serious obstacle to effective teaching is the materials teachers use to teach. As indicated in the textbook analysis section of this report, textbooks which are in most cases the only materials available for students, present all sorts of errors and therefore lessen students' and teachers' confidence in using them.

Teaching force in Cambodia is no sufficient quality to deliver knowledge of subject contents in textbooks, apply teaching-learning techniques in teachers' manuals and share skills, practices and habits of effective teaching and learning with their learners. Teacher candidates are selected from a pool of high school graduates and learn from poorly resourced and under-staffed training centers. As today teachers are the factory of producing human capital of tomorrow, it simply conclude that Cambodia, without addressing the current challenges, will not be able to move out from the list of low income countries and the dream to move Cambodia to an upper-middle income country in 2050 will not be realized.

III. Teacher induction

This section of the report focuses mainly on the absence of technical support or any systematic, ongoing, intensive and caring professional development programs for teachers. Such programs could allow new teachers to have opportunities to observe experienced teachers, to be observed by others, and to be part of networks or a teaching professional community where all teachers share together, grow together through sharing knowledge, experiences and materials, and learn to respect each other's work in a professional manner (Wong, 2004).

It does not matter how good teacher education programs are, teachers are never considered to be finished products on their deployment day. They need a strong mentored induction program especially during their initial years in the classroom so that they can develop a strong foundation of experience that may lead them to become accomplished teachers and to enjoy their profession.

From the first day of deployment, teachers must be well-supported financially, spiritually and technically in order for them to confidently ensure effective delivery of their service as teachers. In practice, teachers face many challenges as they establish themselves as young educators in schools and communities that are often unfamiliar to them. These teachers are often left unsupported especially financially and technically. Financial support for resettlement at schools where beginning teachers are deployed is known to be small or virtually non-existence and their first monthly salary is usually only received after 6 months of service or even after a year in some cases.

A teacher induction program can acculturate those newcomers to the idea that professional learning is a lifelong pursuit. Professional development during induction is virtually absent in Cambodian schools currently. The teacher survey in this research indicates that, although

teachers had a mean teaching experience of more than 10 years, they had only participated in a teacher induction program, on average less than 1 time.

It is no longer a contestable issue that teacher induction has a profound and significant impact on beginning teachers and subsequent student learning. However, the current view of teaching in Cambodia seems to be that it is only teaching, usually for half a day, for a meager salary and with poor accountability. Teacher induction programs are considered to be a burden and even impossible for many teachers.

In order for schools to cultivate a culture of professional development through mentoring and induction programs, both established and beginning teachers have to work together. For example, established teachers, sitting in the beginning teachers' classroom or allowing beginning teachers to sit in their classroom is an act of mentoring. After each sitting it should be followed by discussion to share experience on why and how things happened.

But, such professional development requires teachers to stay in school all day so that they have time for doing the other things that are usually expected of teachers such as;

i) Preparing materials for teaching
ii) Marking and servicing students
iii) Supporting colleagues through induction program on
   - Interpersonal skills
   - Instructional effectiveness
   - Leadership
   - Work experience
   - Content area

In addition, induction programs must be well-supported financially, administratively and technically by national and sub-national levels including schools. To realize the practice of teacher induction programs, there needs to be a change in the mindset of all stakeholders that teaching is a full time position and that teachers are expected to work full days at school in order to carry out all the other related school activities in addition to teaching in the classroom.

According to the responses by teachers interviewed, teachers tend to stay in schools only when they have classes to teach. This is understandable because of the low salary, poor working environment and lack of staff rooms where teachers can sit and work. Teaching is considered to be a part-time job, as teachers have to divide their available time doing other jobs for additional income. Studies (VSO, 2008; Benveniste, Marshall and Araujo, 2008) suggest that school principals are reluctant to require teachers to stay in school to work full days due to the poor salary and the need to do other income generating jobs to support their families, which is common practice for many teachers.

In short, teacher induction programs to ensure teaching effectiveness, which have been found to be a significant predictor of teacher performance and retention in the literature (Paliokas and Killion, 2013; Wong, 2004), are lacking or not implemented systematically. A systematic restructure of teaching workload and support is required in order for teachers to have time for performing other tasks in addition to their in-class teaching. Three actions must be taken concurrently if the teacher induction programs stipulated in the Teacher Policy Action Plan are to be realized. Firstly, teachers must be paid for full time employment and then required to stay in school all day. Secondly, staff rooms/corners must be established in each school to create working space for teachers, and finally, a system of classification of teachers according to seniority and expertise must be in place so that teachers know who has what knowledge and expertise and who needs what knowledge and expertise in the schools. These people will have to work together in a friendly and supportive manner in order to grow together as stated in the

Child Friendly School document (UNICEF, 2009) in order for everyone to feel reassured that success by someone is an encouragement for success by everyone else in the school.

IV. Professional development

Teaching involves lifelong learning. However, teaching every day for a lifetime does not make someone a lifelong learner. Teachers have to continuously develop themselves in knowledge, pedagogy and the diverse needs of their students in order to ensure effective delivery of their lessons. There are several ways that teachers can improve their professional practice such attending professional development program, workshop and conferences.

Table 16 Professional development programs

	Participation in training programs	**Mean**	**SD**
1	General pedagogy	0.91	1.04
2	Improvement of knowledge of subject matter	0.36	0.90
3	Diversified learning needs of students	0.25	0.82
4	Students assessment	0.35	0.80
5	Pedagogy for students with special needs	0.12	0.50
6	Curriculum update after reform	0.44	1.10
	Professional development activity		
1	Attend workshop	0.33	0.62
2	Attend educational congress	0.04	0.25
3	Observe classes of other teachers	0.86	2.13
4	Provide supports to novice teaching	0.54	1.72
5	Co-teach subject with another teacher	0.69	1.48
6	Discuss the subject with the subject expert	0.90	2.02
7	Write an article for press and magazine	0.00	0.00
8	Write a research journal in research publication	0.04	0.22
	ICT training courses		
1	Basic computer courses	0.37	0.62
2	Software program for teaching specific subject	0.21	0.63
3	Internet course	0.16	0.37
4	Telecommunication for teaching	0.07	0.25
	Use references from a foreign language	Never	26.3
		Occasionally	43.8
		Often	5.8
		Do not know foreign language	24.1
	Use computer for preparation of the lesson	Never	32.6
		Occasionally	28.4
		Often	14.2
		Do not have/do not know	24.8

Knowledge and skills in the above programs play very important roles for updating teachers to ensure their teaching effectiveness as lifelong learners. Teachers were asked to indicate their frequency of participation in professional development training programs and professional development activities which are commonly practiced by teachers in higher achieving school systems around the world (ETS, 2003; SABER, 2011). Surprisingly, teachers have attended a training program less than 1 time, which can be considered a very low frequency for teachers who have more than 10 years teaching experience.

There are three types of in-service training or professional development program sporadically provided for teachers. They are defined by the training program providers rather than by types of training as classified above. The most active providers are NGOs but they are usually small in scope and coverage. The second and third in-service program providers - Teacher Training Department and Primary School Department, are rather passive due to lack of financial support and insufficient qualified and committed professional trainers.

There are two broadly categorized priorities that must be taken into consideration in order to make significant reform in professional development programs. Firstly, required priority training programs must be regulated and institutionalized. Training programs must be linked to credits that will be in turn used for promotion in the career path (to be developed) as well as for increase in salary scale from one step to another. In the current practice, this promotion is based on the number of years of service.

It is worthy of notice that professional development can be institutionally driven or an individual initiative as in international practice. In some countries where teacher licensing is regulated, teachers are required to participate in professional courses for a certain period of days or hours every year. In Singapore (Wei, Darling-Mammond & Orphanos, 2009), teachers are required to work together for 20 hours per week in order to plan lessons, prepare materials, execute lessons and discuss their weaknesses and strengths. In addition, the government pays teachers to attend professional development for 100 hours per year outside of school hours, usually offered by professional experts such as teacher researchers and academics.

The interviews with teachers, textbook authors and textbook specialists suggest that there are misconceptions about teachers. Most of the interviewees agree that to be a good teacher one must have a very deep understanding of the subject he/she teaches. In fact, one cannot teach without knowing the content of the subject. However, just knowing the content of the subject does not make someone a good teacher (SEAMEO, 2010).

Practice in countries around the region (SEAMEO, 2010; aitsl, 2011) show that teachers must *inter alia*

- know the content and how to teach
- know the students and how they learn
- know how to assess what students learn and provide feedback
- engage in professional learning and sharing

Cambodia, along with the other 10 SEAMEO countries, has spelled out clearly the knowledge, skill and attitude requirement of teachers in to order to ensure effective teaching. However, as Table 2 indicates, teachers are not fully supported in order for them to maximize their potential to be effective teachers. Teachers get few opportunities to participate in professional development activities other than their classroom teaching. Apparently, that is all that teachers themselves expect and all that is expected of teachers by students, parents, and educational authorities.

In addition to the problems that teachers face in the content in the textbooks, they also have difficulty in changing their teaching practices. As can be seen Table 4, teachers still play the central role in transferring knowledge from poorly developed written curriculum to students. The majority of teachers tend to practice a teaching approach that requires teachers to play an important role at all times, including during times when students have to work in large or small groups or individually.

Table 17. Learning in group and individually

Variables	Frequency distribution

	Never	Sometimes	Often	Always
Students learn individually without teacher	32.1	47.8	17.9	2.2
Students learn in large group without the teacher	46.3	43.1	8.9	1.6
Students learn in small group without the teacher	40.6	45.3	11.7	2.3
Students learn individually with teacher	11.7	32.8	40.1	15.3
Students learn in large group with the teacher	6.4	27.9	44.3	21.4
Students learn in small group with the teacher	13.2	32.9	30.3	11.8

The fact that teachers treat themselves as indispensable in the teaching and learning process indicates that teaching the content of the textbook is very important for teachers. This is understandable. Teachers are not confident that students can learn by themselves and fear that they will have problems with inspectors who come to examine what teachers do in comparison with what is written in the textbook. This kind of teaching practice creates a culture that teachers who can cite the lessons or apply formulae are the most respected. A culture of individual and independent learning should be encouraged so that students can develop a sense of diligence in their life. This is a performance characteristic that is most needed by the employment sector.

It was attempted to see difference between situation in Grade 9 and Grade 12. In most cases, the difference was not statistically significant.

In short, based on the interviews with teachers, textbook authors and subject specialists, it can be concluded that teachers meet numerous constraints that prevent them from effectively delivering the intended curriculum to their students. National assessments in grades 3, 6 and 8 conducted in late 2000s (MoEYS, 2006, 2007 & 2008) and grade 12 examination in 2014 indicate that in general Cambodian students have lower knowledge than expected in the intended curriculum.

V. Teaching and learning materials

For both teachers and students, the most important teaching and learning materials are textbooks and teacher guides. As far as the textbooks are concerned, there are two aspects that need discussion-textbook availability and textbook quality.

We asked teachers to indicate the number of students with textbooks and additional study materials. As can be seen in Table 5, textbook and resource availability for students remains a serious problem. More than 50% of teachers indicated that about two-thirds of their students had textbooks while more than 80% of teachers observed that more than half of the students in their class had no other materials than a few textbooks.

International assessments such as TIMSS, PIRL, PISA and SQCMEQ have all consistently found that the possession of textbooks has a significant and positive impact on students' achievement in all subjects tested and from year to year. The fact that many students do not own sets of textbooks presents a most challenging task for teachers. Students come with different backgrounds and learning needs and approaches. Differences in textbook availability create an additional difficulty for teachers to ensure effective and fair learning among their students.

Table 18. Percentage of students with textbooks and other resources and students with right level of knowledge for the studied grade based on teachers' judgment

Variables	Percentage distribution			
	0 -25	26-50	51-75	76-100
Percentage of student who have textbooks	7.2	18.4	30.3	40.1
Percentage of student have other resources in addition to textbooks	55.0	23.0	10.5	1.3
Percentage of teachers with teacher standard	Yes	70.3		

	No	29.7
Percentage of teachers with teacher guide	Yes	58.6
	No	41.4

It is worth emphasizing here that students also have a lot of difficulty using the current textbooks due to the errors in content they contain, the language used and the sequence of ideas. Some subjects are closely related such as mathematics and science. Some applications in science require students to have background knowledge in mathematics. However, the required content in the mathematics textbook in some cases appears later than that in the science text book. Such an error, caused by insufficient coordination during text book preparation, discourages students from using the textbooks even if they are available.

Teacher guides and teacher standards are useful resources for teachers. However, as indicated in Table 5, only about 70% and 60% of teachers respectively own these materials. Teacher guides can advise teachers on teaching methodology and provide supplementary explanation to the student book, which contains a shorter version of the lessons and many errors. The teacher standard is a benchmark that teachers can use to measure their competence; whether they are good enough to handle the grade they are teaching or need further improvement of their content knowledge. The shortage of these two documents certainly handicaps their effectiveness (WB, 2014).

The fact that education is a long term investment is true in all systems but not all systems make educational experience enjoyable and beneficial for learners and teachers through provision of sufficient teaching and learning materials. Cambodia is in this category. Both parents and government fail to make basic learning materials sufficiently available for teachers and students to enable enjoyable and rich classroom experiences. Insufficient provision of textbooks or poor management of the collection of distributed textbooks and teacher guides and standards, is a failure of the education authorities at both national and sub-national level. Refusal by parents to purchase textbooks from the market for their children, suggests that they also place insufficient value on education.

Table 19. Satisfaction and expectation of teachers

Variables	Percentage distribution		
	Low	Moderate	High
Teacher satisfaction of their teaching profession	1.5	23.7	74.8
Successful implementation of the written curriculum	0.7	43.1	56.2
Expectation of student success	3.7	56.6	39.7
Student's commitment to successful learning	2.9	57.4	39.7

Despite some difficulties in fulfilling their duties, teacher satisfaction toward their teaching is relatively high with more 70 percent of the respondents indicating so (Table 6).

While professional satisfaction and teacher expectation on successful implementation of the curriculum was relatively high, other aspects of expectation such as student's commitment for success were reported by teachers to be moderate.

The expectations of teachers to the successful completion of the curriculum and student's success are consistent with their views on perceived challenges. Some of the difficulties that might hinder teacher's effectiveness are included in Table 6.

Table 20. Perceived challenges by teachers

Challenges	Percentage distribution			
	Never	Sometimes	Often	Always
Knowledge of lessons	32.8	60.4	6.0	0.7
Teaching methodology	30	54.6	13.8	1.5
Attitude towards lessons	31.2	56	12	0.8
Technical problem of the lessons in textbook	27.6	55.1	15.7	0.8
Lack of documents and other resources	13.3	49.6	25.9	11.1
Lack of students' attention in studying lessons	9.8	48.5	33.3	8.3

About half of the teachers reported facing the challenges in Table 6 sometimes in their teaching career. This is a convincing perception in light of reports that have shown widespread extent of these challenges (e.g. the low grade 12 exam pass rate in 2014 of less than 50%). This perhaps shows a consistent awareness of teachers between what they observe and the reality of student's learning when effective measure was taken to monitor the examination process. Alternatively it may show that these challenges are important in the style of teaching they use, since simple memorization without understanding avoids all of the challenges listed.

It is the teacher, what the teacher knows and can do, that is the most significant determining factor to improving student achievement. In fulfilling their roles in the black box of teaching and learning, teachers meet many constraints that prevent them from effectively transferring the knowledge, skills and attitudes from themselves and the textbooks to students.

VI. Conclusion and recommendations

MoEYS recognizes in its national policy that the quality of education is poor. The result of the 2014 national examination for grade 12 is concrete evidence that further confirms the poor quality. In addressing the quality issues, MoEYS has put forwards various policy options in its series of policies such as upgrading academic qualifications of teachers, incentivizing teachers to continue further study through scholarships, providing financial support to teachers, improving classroom conditions and teaching-learning materials, revising the national curriculum and textbooks and upgrading teaching-learning methodologies (VSO, 2011). However, teachers still have low capacity to carry out their tasks; to deliver knowledge, skills and attitudes to their students and change student behaviors towards becoming responsible and productive citizens. Their low capacity has various causes that include the lack of effective mechanisms to systematically support teacher professional development.

Given the following facts:

- Level of difficulty of the contents of Cambodian written curriculum (textbooks) especially science and mathematics is comparable with that of Singapore;
- Content of the lessons from one lesson to another of the same grade and from one grade to another are not systematically and appropriately structured;
- Teachers are selected from poor teachers candidates;
- Teacher guides and student textbooks are not sufficiently available for teachers and students respectively;
- Teachers undertake a short period of pre-service with just only 12 years of general education and 2 years of pre-service except upper secondary school teachers (BA + 1);
- Unsystematic teacher support through induction and professional development;
- Poor teacher salary compared to other profession of similar qualifications;

It can generally be concluded that Cambodian school teachers can mostly teach the content of the textbooks to students. Therefore, they are unable to implement the curriculum as it is intended to develop skills and attitudes required by the economy.

The following recommendations are made to ensure effective teaching force that will be able to effectively fulfill their important roles of developing human capitals required by the economy of the upper middle income country by 2030 and high income country by 2050.

1. Teachers, as well as officials in education and other ministries, treat their current meager salary from the government as an excuse for them not to fulfill their duties attentively, ethically or professionally. Any potential salary increase must be linked to strengthening of performance and improved professional conduct of every individual following guideline documents such as Career Pathways and Teacher Standards. Clear career pathways and a salary comparable to other professions of similar qualification levels will attract better candidates to be trained by competitive education providers from both public and private entities. Currently teacher training for pre-service and in-service for future teachers is the sole responsibility of the Ministry of Education, Youth and Sport. Given the fact that current Teacher Training Centers are suffering from poor human resources and facilities and equipment, the Ministry should consider providing more opportunity to qualified higher education institution to offer teacher training program. Similarly diversifying entry points for BA graduates to become school teachers at lower level is worth exploring. Encouraging private service providers to participate in teacher training and education will help reduce the government burden. However, the Ministry should have quality standards for teacher training to be fairly implemented by all service providers with the state as guarantor of standards and quality compliance.

2. Cambodian teachers today are expected to deliver only the content written in the textbooks. Therefore, they are not encouraged to use materials from other sources to share with their students. Students learn from teachers and textbooks mainly just the knowledge content rather than skills, attitudes and behaviors. The national curriculum and school textbooks and teachers' manuals need to be revised against the theories of student learning outcomes, core abilities and social relevance. In order to ensure their effective revision, it is necessary that a series of studies on student learning outcomes, core abilities and social relevance needs to be conducted. Teaching is a profession, meaning that it is more than just a job to make money for survival; therefore in order to ensure success in implementing the revised curriculum, teachers must be retrained and made accountable for new roles as knowledge facilitators. They should go through a very good education system in well-equipped and well-staffed teacher education colleges.

3. Upon appointment to schools, teachers should not be expected to work right away independently. They need mentoring and support. Every school must run an institutionalized induction program for new teachers. It is expected that in each school or each cluster, a certain percentage of teachers are beginning teachers who need support from established teachers; independent teachers who can handle teaching without support; established teachers who can support beginning teachers, and lead teachers who can contribute to the development and improvement of the school in general. Time must be allocated for each teacher to perform necessary teaching duties other than classroom teaching alone. This program will both help beginning teachers to grow, and create a culture of team work - a characteristic much needed by employment agencies. If schools can implement such induction programs they can provide useful models for students.

4. A part from school or cluster-based professional development programs, teachers must identify their own individual needs for professional upgrading in training workshops and academic conferences. Teacher education institutions must make annual training programs and academic conferences known to as many teachers as possible so that teachers can prepare and seek financial support for their participation. By networking

with the academic community through conferences, teachers can see the value of research and writing research papers. It is frequently mentioned in the literature that teachers are the best action researchers. They are the ones who know classrooms most clearly. Their writing on classroom practices can inform policymakers more accurately than scholars from outside. In addition, participation in conferences is also an effective measure to improve the understanding of teachers' needs among education policy makers, planners and managers. Better understanding of teachers' needs by listening to teachers' voices can help policy makers, planners and managers negotiate issues of concern in education that directly affect teachers and the quality of education. So teachers' dialogue forums through teacher associations or federations should be established and held regularly.

5. Such self-initiated professional practices by teachers will happen only when MoEYS applies a performance management approach to its education reform strategy. A performance management approach in education, as studies suggest, shares benefits with all parties. It contributes to building greater consistency in the teaching and learning experiences of students and teachers, increasing higher levels of attainment, lowering dropouts and repetition, increasing retention, enhancing staff capacity, improving quality of teaching and learning, building clearer hopes for teachers and staff, creating a culture of accountability and performance and promoting high-quality of working relationships within the education system. This approach can be implemented in various ways through accountability mechanisms.

6. Above all, public expenditure to education must be significantly increased to a level that is higher than any other sectors in the country. Effective and efficient management measures must be introduced to promote good governance in education. These measures are in line with ministerial measures in financial reform and keys to ensuring better performance of educational entities at all levels, especially at schools. A plethora of studies suggests that when schools are held accountable to their citizenry, expenditures can be more equitable, there is reduced 'leakage' of public funding and better services can be ensured. The outcomes of ensured accountability will result in lower dropout rates, higher retention rates, lower repetition rates and better learning outcomes in knowledge, skills and attitudes.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

Cambodia's economy has sustained rapid growth for more than two decades, which has been essentially propelled by low-skill workers in garments, agriculture, tourism, and construction. To become an upper-middle income country by 2030, the country needs to ensure an average annual economic growth of 7 percent (RGC, 2014). To achieve this target, Cambodia needs to enhance its key growth-supporting factors and boost the competitive advantage in the present sectors while expanding into new industries. This means diversifying and upgrading its productive and absorptive capabilities to unleash growth potential by moving toward higher value and more technologically advanced products and services for export in the medium and long terms.

The intended curriculum of the Cambodian education system is strategically situated, particularly in synchrony with the economic growth roadmap in the long run. Refinement of competitiveness and innovation of the workforce is on top of reform agendas of the key sectors, especially in the education realm. However, in actuality the workforce is unable to respond to the knowledge and skills demanded by the private sector, as evidenced by the present skill shortage and mismatch. Employers have great difficulty recruiting staff for senior management positions and workers with higher-order cognitive skills (such as work attitudes, decision-making skills, critical-thinking skills, communication skills, and problem-solving skills). Further to industry-specific technical skills, these soft skills are paramount if Cambodia is to move up the industrialization ladder as envisioned.

Thus, what is causing the low quality of these key components in Cambodia? While there are many intertwined contributing factors, this study sheds some light on the shortcomings of the written and taught curriculums. Our textbook review of the three subjects crystalizes the disarrayed and technically-erroneous contents in many chapters of the textbooks. Also, the contents are abstractly explained and dictate memorization, and are irrelevant to daily practicality and market demand. Compared with the Singaporean curriculum, the grade and subject substance is inappropriate and inadequate. Consequently, the contents culminate in concentration on remembering, understanding and applying facts, and discourage higher-order thinking skills. This mode of presenting knowledge produces passive and indifferent learners without rational and critical thinking traits and attitudes to reality. This is in stark contrast with the Singaporean curriculum which emphasizes a practical view of knowledge, daily occurrences, and student-focused, inquiry-based pedagogies.

On the taught curriculum, the teachers' survey reveals that teachers merely practice content citation in their teaching by delivering only the content knowledge written in the textbooks. Thus, students learn from the teachers and textbooks only the content of knowledge rather than skills, attitudes and behaviors. The survey also finds that teacher support through induction and professional development is unsystematic, which may exacerbate the low teaching quality.

Precisely, our findings pinpoint that the contents of the textbooks do not contain the tailor-made and sufficient knowledge as intended in the curriculum of general education. The presentation, demonstration and transferring of the contents does not lend to production of the needed skills and attitudes. This deficit is reflected in the current labour force unprepared for the economy presently and in the future.

In conclusion, to reach upper-middle income status by 2030 Cambodia needs to refine its human capital to excel in productivity and value of products and services in the current key industries as well as in the emerging ones. To do so, general education must ensure the right and quality

knowledge, skills and attitudes (KSA) required for further education and demanded by the evolving economy. This study suggests a comprehensive and in-depth revamp of the written and taught curriculums so that the wanted KSA are produced in accordance with the intended curriculum and the economic growth pathway.

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Appendix 1

Textbook Review: Mathematics

Appendix 2

Textbook Review: Science

Appendix 3

Textbook Review: Khmer

Appendix 4

Classification of Skills in Each of the Four Domains

Socio-emotional	Higher-order cog	Basic cog	Technical
Adaptability	Analysis Skills	Basic literacy	Advanced IT
Collaboration	Critical Thinking	Numeracy	Advanced vocational
Commitment	Decision-making		Basic vocational
Control emotions	Entrepreneurship		Computer Literacy
Conscientiousness	Foreign language		Degree level
Cooperation	Intellect		Degree subject
Creativity	Language		Experience
Conflict aversion	Learning Processes		Grades
Cultural diversity	Listening skills		Hands-on training
Customer Awareness	Manage risk		Industry-based skills
Customer Handling	Oral communication		IT knowledge
Dependability	Organization		Job-specific skills
Efficiency	Planning		Office administration
Emotional Stability	Problem-solving		Practical knowledge
Extraversion	Strategic management		Professional skills
Flexibility	Time management		Score on employer test
Hard worker	Thinking skills		Statistical analysis
Honesty	Written-communications		STEM
Initiative			Technical skills
Independence			Theoretical training
Integrity			University attended
Leadership			Work experience
Modesty			
Motivation			
Negotiating			
Negotiate conflict			
Networking			
Open to new ideas			
Personal appearance			
Positive attitude			
Proactive			
Punctuality			
Professionalism			
Responsibility			
Self-confidence			
Self-management			
Social values			
Stress-management			
Teamwork			
Work ethic			

*the skills in the list were condensed from 140 different skills names in the 28 studies reviewed in this paper. The author's used the definition of each skill category to assign each skill to a category. One could argue that some skills better fit in another, or multiple, skill categories. The table is organized such that the skills categories that are most similar are next to each other.