Southeast Asia Primary Learning Metrics (SEA-PLM)

Assessment Framework

Revised Draft Document incorporating feedback from the Domain Technical Review Teams

January, 2017

FINAL

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PREFACE

The development process for the SEA-PLM assessment framework

1. This assessment framework for the South-East Asia Primary Learning Metric (SEA-PLM) assessment program outlines an approach to assessing mathematical literacy (Chapter 2), reading literacy (Chapter 3) and writing literacy (Chapter 4). It also puts forward a conceptual framework for the context questionnaires (Chapter 5). The orientation implied by these labels is intended to emphasise that the curriculum arrangements in participating countries, which are necessarily at the centre of a regional assessment program, have as a major purpose the preparation of young people to participate effectively as members of society in such a way that they can use what they have learned at school – their reading, writing and mathematics skills, and their citizenship – to deal with the many challenges they will meet in their life beyond school.

2. The purpose of this assessment framework is to articulate the basic structure of the SEA-PLM. It provides a description of the constructs to be measured. It also outlines the design and content of the measurement instruments and describes how measures generated by those instruments relate to the constructs. The contents of this assessment framework combine theory and practice to describe "both the 'what' and the 'how'" (Jago, 2009, p. 1) of SEA-PLM.

3. This framework has been designed to accommodate the potential for SEA-PLM to span the compulsory years of schooling should this be a future goal of the program. To this end, the content and processes explicated for each of the four domains (mathematical literacy, reading literacy, writing literacy and global citizenship) are structured to reflect their conceptual foundations. The fourth domain - global citizenship - is a relatively new concept and as such a stand-alone assessment framework[1] has been developed to provide extensive context surrounding the implication that there are multiple issues that connect us as citizens of the globe.

4. The first implementation of SEA-PLM targets students in Grade 5 (or equivalent) and consequently the examples and detail in this framework focus on content relevant to students at that level. Should future implementations of SEA-PLM target students in grades other than Grade 5, the examples and detail of this framework could be extended to accommodate this change without the need to change the overarching framework definitions and structure.

5. During the period from late 2014 to early 2015, a group of researchers from the Australian Council for Educational Research (ACER) – comprising members of the international surveys team, psychometricians, test developers and questionnaire experts – collaborated in reviewing curriculum documents provided by six countries, (Brunei Darussalam, Cambodia, Laos, Malaysia, Philippines, Thailand), existing assessment frameworks and other relevant documents, and developing a draft assessment framework for use in the SEA-PLM project.

6. The first draft of the SEA-PLM Assessment Framework was presented for discussion at the

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[1] Details of the Global Citizenship domain are provided in a separate report (see SEA-PLM Global Citizenship Domain Report).

meeting of technical experts in Bangkok, Thailand, in February 2015, and subsequently revised following detailed review. A revised draft accommodating the resulting expert input was sent to members of the technical groups in March and further input was sought. This document presents the framework revised to take account of that further technical input.

Review of curriculum documents

1   A review of the six countries' curricula was undertaken as a prelude to developing the assessment frameworks. Annex II provides a list of the curriculum documents examined for each of the six countries.

2   Different approaches were used for mathematics, reading and writing, where all of the countries had subjects clearly aligned to these domains, and for global citizenship, where the connection between the domain and subject areas was less clear.

Mathematics, reading and writing

3   The review of these domains had two broad components.

4   First, the curricula were examined to ascertain their structures and key conceptual underpinnings. The examination documented year levels covered by each curriculum and its overarching orientation. For each of the relevant subjects (mathematics and language), the review described the main content areas and components, the skills and processes addressed and – where they were included in the documentation – the standards specified at given year levels. Descriptions of any national assessment programs, or of guidelines for assessment at the school or classroom level, were described in this part of the review. Other features specific to particular countries were also noted: for example, the existence of detailed syllabi and their content (Philippines); time allocations per week for the subject (Cambodia and Thailand) or content area (Malaysia); systematic inclusion of a set of mathematical processes in each section of the syllabus and suggestions for teaching and hands-on activities as part of the official curriculum (Brunei); and the transition from mother-tongue to English/Filipino as the language of instruction (Philippines). In the reviews of the mathematics curricula, the use of tools ICTs (particularly computers and calculators) was noted, along with year levels at which such use was initiated.

5   The analysis revealed that the countries vary in the way and the depth to which they specify their curriculum (content, processes, skills), with some doing so at a more general level, and some at a very specific (almost lesson by lesson) level, and degrees of generality in-between. They also vary in the attainment standards for which they aim. However there is also considerable similarity across the countries in terms of the approaches taken. Broadly the same content is covered for each of the domains of reading, writing and mathematics, and the processes or skills referred to in the framework make frequent appearances in the curriculum statements of all the countries whose documents were reviewed.

6   Second, across the countries for which documentation was available, the curricula for each subject area were examined to assess the degree of their alignment with each other and with the literacy orientation proposed for the SEA-PLM assessment framework. Relevant features were tabulated for each domain. For example, the review assembled evidence of the curriculum

documents' references to the broader aims of education that align with a literacy orientation: that is, education as a means of developing the skills and motivation to apply what is learned, and to equip oneself for future learning and engagement in life as a citizen in the 21st century.

Global citizenship

7   This curriculum review began with a desk review to formulate a definition of global citizenship that addresses core ASEAN values and can be used as the foundation on which to develop content appropriate for primary children grade (aged around 10 years).

8   This desk review was conducted at the ACER from November 2014 to February 2015. The review began with consideration of documents associated with a broad range of global education initiatives. Following this, a range of literature produced by eminent scholars in global citizenship education was also reviewed.

9   To identify ASEAN core values, the key strategy and operational documents of the Association of Southeast Asian Nations (ASEAN) and relevant literature on ASEAN and global citizenship were reviewed.

10   The desk review to provide definitions for global citizenship in the ASEAN context was submitted to UNICEF as a separate deliverable to this framework. The definition of and structure for the global citizenship domain in this framework reflect the outcomes of the desk review and subsequent feedback from the SEA-PLM global citizenship Domain Technical Review Panel.

Changes made following input of the technical review panels

11   As a result of the deliberations of the Domain Technical Review Panels for global citizenship, Literacy (Reading and Writing) and Mathematics, a number of changes were made to the draft frameworks, which are reflected in the current document:

- The global citizenship framework was adapted to include examples of outcomes relevant to Grade 5 students.

- The global citizenship framework includes details only of attitudinal constructs that may be assessed but is structured to allow for future development of achievement or behavioral constructs to be assessed with reference to the framework.

- While the literacy orientation proposed for the framework was widely accepted, revisions intended to clarify the ways in which such an orientation accommodates local curriculum arrangements were incorporated throughout the framework document.

- The language and examples used in the framework were changed substantially to expand its emphasis on and relevance to the South-East Asian context.

- For Reading, Writing and Mathematics, the balance proposed in the number of items populating the different framework categories was carefully reviewed and modified.

- A suggestion was added regarding the potential benefit of each country carrying out an independent alignment study, to maximise the usefulness of SEA-PLM data for national policy-related purposes.

CHAPTER I

INTRODUCTION

Overview

12   The SEA-PLM program serves the goal of improving quality of education through system level monitoring of learner achievements. The initiative aims at supporting SEAMEO member countries to better measure and understand the status of learning achievement amongst the general population and for specific groups by applying culturally appropriate metrics to learning outcomes associated with reading, writing, mathematics and global citizenship. The assessment will be built to measure the extent to which curriculum outcomes in the four SEA-PLM learning domains are demonstrated by students of the participating SEAMEO countries.

13   One common aim of curricula across countries in the South East Asian region is to develop citizens who are well prepared and positively disposed to engage actively in their worlds. Reading, writing, mathematics and global citizenship are fundamental to achieving these outcomes. The SEA-PLM program, will assess the degree to which students are meeting these shared curriculum objectives. To this end, the curricula of SEAMEO countries have contributed to the design and contents of this framework.

14   Large-scale international educational surveys have been conducted since the early 1980s in many parts of the world. More recently, regional and national sample-based assessments have attempted to redress some of the shortcomings of the broad international surveys by focusing on more localised concerns (Wagner, 2011). The SEA-PLM program aims to achieve the breadth and rigour of a large-scale international survey, while at the same time addressing the unique needs and context of countries in the South-East Asia region.

15   The SEA-PLM program includes features designed to cater for the wide range of countries participating in and likely to participate in the SEA-PLM pilot program, including those countries where universal participation in primary education may not yet have been achieved and those countries where educational infrastructure is in expansion. The program may sit alongside any regular assessment regime in participating countries that provide comprehensive measures of attainment against specific curriculum goals.

16   The primary focus in reporting the results of SEA-PLM is to inform policy makers in the participating countries of the progress of educational development under their responsibility. In addition, while the SEA-PLM program is designed as a sample-based assessment, it will generate information that can be used to assist other stakeholders, such as teachers, parents and students, in improving learning at the local level. A key element of the rationale that underpins this strategy is that the assessment materials and the subsequent reports provide information about

the strengths and weaknesses of students in the formative years of schooling. Assessments of this nature are structured so that improvements can be implemented to enhance learning programs, and resulting changes in student achievement can be measured in subsequent cycles of assessment.

17   A fully developed SEA-PLM program would provide an ongoing measure of students' educational progress at key stages of learning: middle primary school; towards the end of primary school; and towards the end of compulsory secondary schooling. For the initial purposes of the SEA-PLM pilot program, the focus will be on students towards the end of their primary education – in Grade 5.

Aims of SEA-PLM

18   The SEA-PLM initiative has three core goals:

- To provide policy makers with relevant, sound and comparable data on contextual and learning outcomes that can directly inform local education policy development.
- To develop indicators of educational outcomes that enable meaningful comparisons of quality.
- To enhance the existing capacities of participating countries to design data collection activities that will assist all aspects of the policy cycle: to develop and implement a reliable, valid and rigorous survey-based assessment and reporting program; and to appropriately analyse, interpret and disseminate assessment data with a view to informing education policy through relevant evidence.

Locally relevant policy-related outcomes

19   While the collection of assessment data to contribute to educational policy development is the primary goal of all assessment programs, current programs vary in their success in achieving this goal. In a review of the impact of national and international assessment programs on educational policy in developing countries, Best et al. (2012) pointed out that prioritising local policy concerns was key to the uptake of resulting information for educational policy development.

20   Local policy concerns refer to those areas most salient to the national context. For example, comparisons between government and private schooling may be important. One country or sub-national area may have challenges in providing adequate school facilities, while another may have challenges in improving reading levels. To be most effective, assessment data must address such local policy concerns.

21   The SEA-PLM program is able to implement this goal by negotiating with participating countries over specific adaptations of or additions to the instruments, so that the adaptations and additions address specific interests and concerns that may be missing from or inadequately covered in the core material. This applies particularly to the context questionnaires.

Comparisons

22   As with all assessment surveys, sub-population comparisons are essential. Education policy makers and practitioners need information on areas of strength and weakness for sub-

populations variously defined by characteristics such as sex, socio-economic status, geographic region, degree of urbanisation, language of instruction and ethnicity. In addition, policy makers often want to compare educational outcomes across administratively distinct school types: public or private; religious or secular for example. SEA-PLM may seek to identify relevant policy issues and develop the sample design to facilitate particular comparisons of interest specifically for countries participating in the pilot and for future participants from the South-East Asian region.

23   An external frame of reference is essential to an informed perspective on evaluating progress and it provides a source of new ideas and possibilities for policy development and implementation approaches. For example, international population comparison surveys such as the Progress in International Reading Literacy Study (PIRLS), Trends in International Mathematics and Science Study (TIMMS) and the Programme for International Student Assessment (PISA) allow policy makers to monitor the development of their education systems by providing outcome data on other countries as benchmarks. This is particularly useful when countries have commonalities, such as a shared educational heritage, similar cultural milieu (for example, language, ethnicity or religion), or a similar level of economic development.

24   Finally, trends – changes over time – are provide important information that contributes to monitoring movement towards goals. For the SEA-PLM program, two categories of trends are particularly useful:

- The change in achievement at a grade level over time.
- The change in differences between sub-populations over time.

25   SEA-PLM is facilitating the establishment of each of these forms of trend measurement according to the interests and needs of the participating countries.

Capacity building

26   Education systems vary in their technical capacity to gather, process, analyse and interpret data in support of the development and review of educational policy. A central goal of the SEA-PLM program is to build upon and enhance those existing capacities. Capacity building will occur at three levels:

- Enhancing capacity to design data collection activities that assists all aspects of the policy cycle (Sutcliffe & Court, 2005) in terms of agenda setting, policy formulation and implementation, and the monitoring and evaluation of policy implementation.
- Enhancing capacity to develop and implement reliable, valid and rigorous survey-based assessment and reporting programs.
- Enhancing capacity to appropriately analyse, interpret and disseminate assessment data with a view to informing education policy through relevant evidence.

The purpose of an assessment framework

27   An assessment framework is an explicit statement and discussion about what an assessment intends to measure. An assessment framework lays out the principles upon which an assessment is built. It serves a number of purposes and audiences:

- It gives a common language to stakeholders for discussion of the domain area.

- It guides test development, ensuring that the instrument serves the intended purposes and covers the domain in the way agreed at the outset.

- It ensures that, where continuity from one year or one grade level to another is of concern, there is an articulated plan for the assessment. This provides stability or, where change is desired, it can be made explicit and implemented deliberately.

- It communicates the purpose and features of the assessment program beyond the immediate stakeholders and, consequently, helps in public interpretation of the results.

General considerations in the design of the SEA-PLM instruments

The curriculum review

28   ACER researchers undertook an analysis of the curriculum documents of the three pilot countries and of three additional countries that are likely to be participants in a future SEA-PLM (Brunei, Cambodia, Laos, Malaysia, Philippines, and Thailand).

29   Based on the findings of this analysis, a framework has been designed that takes account of the common curriculum arrangements and goals of countries in the South-East Asian region, specific syllabus specifications in a number of those countries, and broader educational goals that are common in education systems across the region. The framework proposed is informed by the curriculum in terms of the content, processes and skills, and places the emphasis on students' demonstrated ability to use their reading, writing and mathematics achievements to deal effectively with the challenges they meet in school, at home, in the community. This kind of approach for reading, writing and mathematics also fits well with global citizenship, which has a very strongly outward-looking focus on the extent to which certain knowledge and understandings have been achieved that can affect the way students interact with the world as citizens within the Asian region.

30   However, in recognition of the differences in the approaches taken to curriculum specification and in the details of curriculum content between countries in South-East Asia, is recommended that participating countries consider undertaking further alignment studies of their national curricula in relation to the SEA-PLM framework in order to maximise the benefit obtained from SEA-PLM data for national policy-related purposes such as curriculum reform, assessing pre- and in-service teacher training needs, and the like.

Curricular, cross-curricular and contextual knowedge: the literacy concept

31   SEA-PLM aims to measure both curricular and cross-curricular knowledge, skills and understanding that are likely to allow school-aged students to progress successfully through school and ultimately to play a constructive and fulfilling roles as citizens in society. It adopts broad definitions for the domains of mathematics, reading, writing and global citizenship that are consistent with curriculum specifications but that allow for a focus on the extent to which students in a South-East Asian context are able to make effective use of their knowledge in a variety of relevant contexts. To convey this broadness and the parallels in the way that these four

domains are conceived, the domains are referred to as reading literacy, mathematical literacy, writing literacy and global citizenship. This notion of literacy also includes the fundamental precursor skills in these areas that need to be built in each domain. The assessment of literacy in mathematics, reading, writing and global citizenship embraces the essential knowledge, skills and understanding of these curricular and cross-curricular areas. It also investigates the extent to which such knowledge, skills and understanding can be used.

Literacy involves acquiring and applying skills, knowledge and understanding …

32   The notion of mathematical literacy, for example, focuses on mathematical ways of thinking, the understanding of concepts and principles, and on the ability to apply mathematical knowledge to solve problems in everyday contexts. Similarly, the concepts of reading literacy, writing literacy and global citizenship literacy in SEA-PLM are ultimately focused on reading, writing and global citizenship as means of expressing, communicating and understanding the world of ideas and information. For students currently at early stages of proficiency in any of the domains, the development of reading literacy, writing literacy and global citizenship will inevitably involve mastery of precursor skills (for example, for reading literacy, decoding, phonemic awareness and basic vocabulary development; and for mathematical literacy, concepts such as number or spatial relationships). These elements, although not ends in themselves, are essential stepping stones on the path to the development of literacy within each domain, and may, therefore, be included in the assessment of literacy in SEA-PLM.

… in a range of contexts

33   In their everyday lives, in their relations with family and friends, at school, at work and in the community, people use mathematics, reading, writing and global citizenship in countless ways. Therefore, SEA-PLM's aim of measuring students' ability to deal with the demands of life both at and beyond school situates the sets of assessment tasks across a wide range of contexts. For SEA-PLM, three broadly defined contexts have been identified in which the knowledge, skills and understanding related to the cognitive domains are likely to be enacted: personal, local and the wider world. An additional area included in the SEA-PLM assessment, labelled intra-domain, deals with tasks provided without a context. Personal tasks relate to those matters that affect the individual, involving an inward focus. Local tasks pertain to contexts that require engagement with other individuals or with elements of the immediately surrounding environment. Tasks that have a wider world context focus on issues relevant to whole communities or countries, and may even take a global perspective. Each of the domains will elaborate on personal, local and wider world in somewhat different ways, but all will include tasks that assess students' proficiency across these three contexts to ensure that the instruments cover the range of areas in which mathematics, reading, writing and global citizenship are applied. While the intention is generally to contextualise tasks in real-life contexts, a number of intra-domain tasks (tasks without context) are also included. For example, in the early stages of conceptual development, these comprise tasks that permit students to show their understanding of precursor skills within each domain, such as number sentences in mathematical literacy, recognition of letters and single words in reading literacy, and production of letters or single words in writing literacy. In addition, allowing

for some context-free items permits inclusion of items that reflect the widest possible range of current classroom practice.

Structure of the SEA-PLM instruments

34   The core cognitive domains assessed in SEA-PLM are mathematical literacy, reading literacy, writing literacy and global citizenship, initially for Grade 5. Each student sampled for SEA-PLM will be administered some assessment material in two of the learning domains. Background questionnaires are also included as part of the program. A student background questionnaire is administered to every participating student (where necessary, this may involve assistance of teachers), allowing investigation of the relationship between performance on the cognitive domains and the background characteristics of students, such as sex, family type, home language and socio-economic status. In addition, school principals are requested to complete a separate questionnaire that yields school-level data such as school type, number of teachers and physical resources. Again, this information can be used to better understand factors associated with the performance of students in the mathematical literacy, reading literacy, writing literacy and global citizenship assessments.

35   A substantial amount of test material is developed for the literacy domains in order to allow good coverage of the knowledge, skills and understanding involved in each. However, it is not necessary for every student to complete all of the tasks, and to do so would make the assessment unreasonably long. Just as SEA-PLM assesses a sample of students to gain an overall picture of the whole population's proficiency, so each sampled student completes only a sample of tasks from each domain. This design allows robust reporting of population and sub-group performance, and comparisons to be made of performance in the different domains. Annex 1 shows the assessment booklet designs for the Grade 5 assessment proposed to be administered in 2015.

Response formats

36   Response format refers to the kind of response that students are invited to give to an assessment task. In large-scale studies, typically two main response formats are employed: selected response, in which test takers choose among options provided; and constructed response, in which test takers generate their own response. The choice of response format for a task must be appropriate to the mode of delivery (for example, oral, paper-based or computer-based), to essential characteristics of the domain, and to the specific aspect of the domain being measured in a given task. The choice must also take into account practical considerations, such as the amount of testing time available, the feasibility of collecting reliable data from students and the resources demanded for coding (scoring) the data.

37   The SEA-PLM Grade 5 assessments will be paper-based, and use both of the main response formats: selected response and constructed response. Typically, the selected-response format that will be used in paper-based SEA-PLM is the multiple-choice question, in which test takers select one alternative from four or more options. The constructed-response format is a short written response (a number or a solution showing working in mathematical literacy; a word or one

or two sentences in reading literacy or global citizenship). In these domains, research has shown that the format in which tasks are administered has a significant impact on student performance. For example, Routitsky and Turner (2003) showed that in an international assessment of mathematics a mixture of task formats should be used, because students at different ability levels from different countries performed differently according to the format of the tasks. Monseur and Lafontaine (2009) found that there was a significant gender effect related to the two main task formats in reading assessments. In addition to these issues of fairness, construct considerations suggest that both multiple-choice and constructed-response formats be used. Including constructed-response tasks is important in ensuring that some elements of the domain can be adequately measured: for example, constructed-response tasks are particularly useful when the focus of a task is to assess the quality or process of students' thinking, rather than to elicit a correct or incorrect response. For these reasons – to ensure proper coverage of the ability ranges in different cultural contexts, to ensure fairness between boys and girls, and to reflect the range of skills relevant to the domains – tasks of both multiple-choice and constructed-response formats are used in the mathematical and reading literacy assessments. Taking account of the additional resources required for coding constructed-response tasks, this format is used sparingly, with no more than 30% of the mathematical and reading literacy tasks in constructed-response format. For writing literacy, constructed-response formats will comprise most, if not all, of the instrument. This is necessary because in order to obtain a valid measure of students' ability to write, tasks must elicit direct evidence of what and how they write (rather than, for example, merely the ability to recognise correct forms of writing).

Reporting SEA-PLM

38   SEA-PLM reporting will initially be designed for use by a wide range of policy makers, including those responsible for resource distribution, curriculum development and teacher training. However, it is intended that other versions of the results, with different emphases, will also be published; for example, to help teachers use the data to inform their practice, or to communicate the outcomes to interested members of the public, including parents.

39   The results for mathematical literacy, reading literacy, writing literacy and global citizenship will each be reported on a described proficiency scale, which gives both quantitative results about the proportions of students performing at different levels of proficiency and qualitative descriptions of the kinds of skills, knowledge and understanding associated with each level.

40   Using item response theory (IRT) methodology, the tasks for each domain are arranged along a scale that indicates progressively the level of difficulty for students and the level of skill required to answer each task correctly. The scale summarises both the proficiency of a student in terms of his or her ability and the complexity of a task in terms of its difficulty. The assessment instruments are designed using common tasks to permit a future link between grade levels (vertical linking), so that student proficiencies across grades are calibrated on the same scale, thus allowing reporting on the value added as students' progress through school. Common tasks will also be used over time at the same grade level (longitudinal linking) to link assessments from one assessment administration to the next, so that a system can monitor whether proficiency is improving (or declining) at a given grade level.

41   Reporting will draw upon information from the student and school background questionnaires. These data will be analysed in relation to the domain-related outcomes to describe the characteristics of schools, families and students associated with stronger and weaker performance in the cognitive domains. It is this kind of analysis that provides the most useful information to assist national governments in policy formulation and in identifying directions and priorities for improvement of learning outcomes.

42   The analyses will provide evidence to guide effective and purposeful improvements in an education system and in time can allow nuanced interpretation of the impact of educational reforms. Specifically SEA-PLM can inform teacher improvement agendas; provide a reference point for the development of teacher standards; provide a helpful framework for curriculum reform initiatives; assess school base reform; or provide a means to assessment the effectiveness of financial reform initiatives. Importantly, given the structure of the SEA-PLM the results of the assessment can be a powerful means of assessing equity within and across countries in the ASEAN region.

CHAPTER 2

MATHEMATICAL LITERACY

The importance of mathematical literacy

43 An understanding of mathematics is central to a young person's future educational success and their preparedness for life beyond school. The primary focus of SEA-PLM in mathematics is on a broadly defined set of mathematical skills and processes and, in particular, on the extent to which students are able to make use of their mathematical knowledge and skills to solve problems and to deal with the kinds of challenges they meet in a variety of contexts, where mathematics may be relevant to those problems and challenges.

44 A set of underlying skills or competencies is a primary driver of students' ability to effectively use their mathematical knowledge in a variety of contexts. Students need communication skills, both to recognise and process information and to express their reasoning and conclusions. Mathematical literacy often requires students to devise strategies for solving problems. This involves a set of critical control processes that guide an individual to recognise, formulate and solve problems, and to monitor and direct their progress through the solution process. When dealing with problems presented in various contexts, students need to be able to transform the information as presented into a mathematical form ready for the application of relevant procedural knowledge, and when mathematical results and conclusions are found, these often need to be interpreted in relation to the original context. These steps of transformation and interpretation are often referred to as steps in the mathematisation process. Students need to be able to work with different representations of mathematical objects and information, such as graphs, tables, charts, diagrams, symbolic expressions and the like. Students need to develop reasoning and argumentation skills, in order to explore and link problem elements, to make inferences, and to justify conclusions. Students need a repertoire of specific procedural knowledge and skills, and to recognise when a particular piece of knowledge might be relevant to the problem at hand. Therefore, they need to be able to use symbolic, formal and technical language and operations in order to interpret, manipulate and make use of symbolic expressions within a mathematical context that is governed by various conventions and rules. This may also involve using mathematical tools that might be relevant to a particular problem situation, such as measuring instruments, calculation devices, computer-based tools and knowing when a particular tool would be appropriate and the limitations of such a tool.

45 These competencies are fundamental to mathematical literacy and are called on to varying degrees by the SEA-PLM assessment tasks. The competencies are based on work originally done by Mogens Niss (Niss, 2003; Niss & Højgaard, 2011).

46   The SEA-PLM mathematical literacy framework reflects current best assessment practice as reflected, for example, in the OECD PISA mathematical literacy framework (OECD, 2013), but is oriented to include the specific interests of a SEA-PLM at Grade 5. As such, it includes precursor skills such as fundamental mathematical concepts (for example, magnitude, the use of positional and relational language); as well as knowledge typically developed in the primary schooling years: numeration, arithmetic operations, classification of objects, shape recognition, elementary algebraic thinking (for example, simple number sentences), measurement, and the use and interpretation of data.

Defining the domain

47   SEA-PLM is intended to be relevant to students at varying stages of learning of mathematics.

48   The working definition of mathematical literacy for SEA-PLM is:

> *SEA-PLM mathematical literacy is a person's capacity, given a problem in a context that is of interest or importance to them to translate the problem into a suitable mathematical formulation, to apply mathematical knowledge and skills to find a solution, and to interpret the mathematical results in relation to the context and to review the merits or limitations of those results.*

Mathematical literacy …

49   The term mathematical literacy is used to emphasise that the focus is on using mathematical knowledge and skills (including those learned in the mathematics classroom) to solve problems that arise in contexts beyond the classroom.

… is a person's capacity, given a problem …

50   Action is required by a person to solve a problem. Success in solving the problem depends on the person's capacity to focus their mathematical competencies – their skills in communication, devising strategies, mathematisation, representation, reasoning and argumentation, using symbolic, formal and technical language and operations, and using mathematical tools – on the problem.

… in a context that is of interest or importance to them …

51   This focus on problems in context helps the person to recognise and appreciate the role of mathematics in the world and the actions they need to practise to make sense of their world. That the problem is of interest or importance to the person provides a reason for students to engage with the problem and encourages their enthusiasm and persistence in finding a solution.

… to translate the problem into a suitable mathematical formulation …

52   Part of the action that needs to be taken to solve the given problem involves reformulating it in mathematical language in a form that can lead to a mathematical solution.

… to apply mathematical knowledge and skills to find a solution …

53   This action gives results in mathematical language.

… and to interpret the mathematical results in relation to the context and to review the merits or limitations of those results.

54   The suitability of the mathematical results is tested in the problem context to see whether they constitute a solution to the problem.

Organisation of the mathematical literacy domain framework

55   There are three components contributing to the SEA-PLM definition of mathematical literacy:

- Context: the situation in which the problem to be solved has arisen.
- Process: the actions required to solve the problem.
- Content: the mathematical knowledge and skills required to find a mathematical solution.

56   An assessment of a student's mathematical literacy, therefore, needs to have questions that:

- are set in a context of interest or importance to the student, involving one or more of the actions required to solve a problem in the context; and
- use broad mathematical competencies as well as a particular set of mathematical knowledge or skills appropriate to the stage of development or level of mathematical knowledge of the student.

Context

57   Test items and tasks used in the SEA-PLM instruments are each associated with a context type. A context is the situation within which the details of a test item or task are located, or the situation that generated the stimulus material for the task. Contexts help to define the focus of thought or action in which people responding to problems or challenges must engage.

58   The main purpose of the defined contexts is to ensure that the set of items or tasks covers a range of situations in which students meet problems and challenges, and a range of different purposes for which the problems and challenges have been devised, so as to encourage engagement with the broadest possible range of individual interests and with a range of situations in which individuals typically operate in the 21st century.

59   The SEA-PLM program will use four context types: personal contexts, local contexts, wider-world contexts and intra-mathematical contexts.

60 Personal contexts have an individual focus. The problem or challenge primarily affects the individual and engagement with the task involves an inward focus. Problems fitting this context type include more abstract challenges that may have limited external purpose, and challenges focusing on personal concerns that are likely to be of interest and relevance only to the individual involved, such as games and puzzles, personal health, personal transport or travel, or personal finance.

61 Local contexts have an interactive focus requiring engagement with other individuals or with elements of the immediately surrounding environment. Problems fitting this context type involve day-to-day situations and activities at home or at school, in the local community or at work, where the focus of thought and action lies in connections and interactions with immediately surrounding people or objects.

62 Wider-world contexts have an external focus on broader situations that may affect whole communities or countries, or that have a wider relevance at a more global level. Problems fitting this context type involve broad social issues such as public policy, transport systems, advertising and broad scientific issues such as weather, climate, ecology or medicine.

63 Intra-mathematical contexts refer to problems where all the elements involved belong in the world of mathematics, without reference to any external or real-world contextual elements. School mathematics problems are sometimes set without reference to context, hence it is relevant to include some problems of this type. However, most frequently challenges that involve application of mathematical knowledge occur in a context (personal, local, or wider-world) that must be analysed to some degree before relevant mathematical knowledge can be identified and applied.

Process

64 Three processes have been defined for the SEA-PLM mathematical literacy assessment.

Exhibit 1: SEA-PLM mathematical literacy
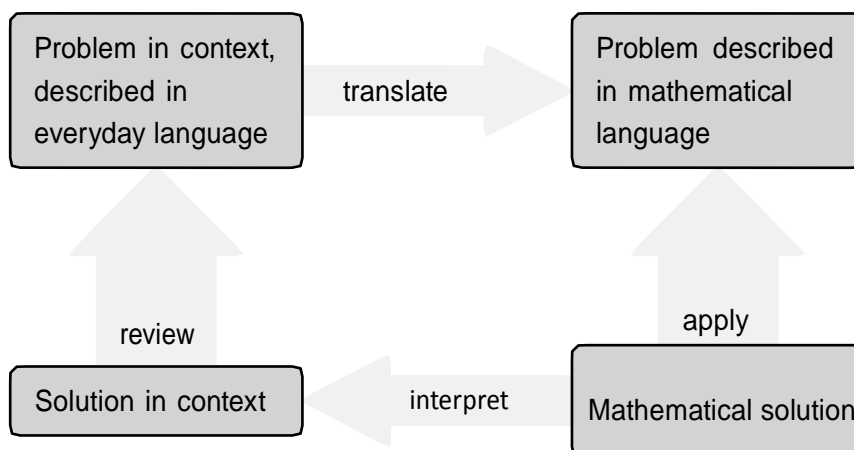
65 As shown in Exhibit 1:

- translate is the process of expressing the problem in mathematical language, thus taking it from the context to a mathematical formulation suitable for finding a solution.

- apply is the process of using mathematical knowledge and skills to find a mathematical solution or to generate mathematical results: this process deals mainly with mathematical ideas, objects and techniques.
- interpret is the process of retranslating the mathematical solution to the context of the problem. This may include a review of the solution to see whether it is reasonable and makes sense in context, and identifying any limitations for the solution.

66   In the assessment, a particular item may involve only one step in the solution cycle. For example, in an item focusing on apply, the translate step is included as part of the question and the required answer is the mathematical solution.

67   An example of such a problem is in the item shown in Exhibit 2. The problem has been formulated in clear mathematical terms, without any context other than the mathematical elements included (hence it is in the intra-mathematical category). The solution process involves reading and understanding the numbers and symbols, applying arithmetic skills to carry out the multiplication shown, and then choosing the correct answer from the options provided.

Exhibit 2: Example intra-mathematical item, presented in clear mathematical formulation (no translate step required)

$13 \times 6 = ?$

   A   68

   B   78

   C   603

   D   618

68   In some items, two or more processes are required, In that case, for example, if the interpret step is of greater significance to the solution cycle than the apply step, this item would be categorised as interpret.

69   An example of this is shown in Exhibit 3, where the problem Planting Seeds is presented. Here students must read a small amount of information presented in a family context (this is considered to be in the local context category), then translate that information into a mathematical problem – in this case it would be to divide 850 by 7. Students must then carry out the division and select from the given options the one that matches the result of the calculation. While both the apply and translate process categories apply in this problem, it has been assigned to the apply category because it was judged that carrying out the division is likely to be the more challenging aspect of this problem for most students.

Exhibit 3: Example item Planting Seeds set in the local context category and illustrating the apply process category but where the translate process is also involved

Planting Seeds

There are 7 people in Mali's family.

They need to plant 850 seeds.

They plan for each person to plant about the same number of seeds.

About how many seeds should each person plant?

- **A** about 12 seeds
- **B** about 80 seeds
- **C** about 120 seeds
- **D** about 600 seeds

Content

70 Content refers to the specific mathematical knowledge and skills needed to find a problem solution. This framework uses three general content categories that reflect broad categories very frequently found in mathematics curricula around the world: number and algebra; measurement and geometry; and chance and data.

Exhibit 4: Example item Mangoes, which illustrates the number and algebra content category, the personal context category and the translate process

Mangoes
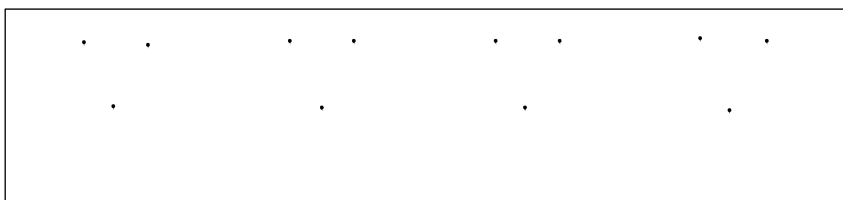
Which of these shows how to work out how many pomegranates there are?

- **A** 4 + 3
- **B** 3 + 3 + 3
- **C** 4 ÷ 3
- **D** 4 × 3

71 A problem in the number and algebra category, mangoes, is shown in Exhibit 4. This problem requires students to recognise which one of four possible mathematical formulations is appropriate in order to translate the problem depicted in the graphic stimulus into mathematical terms. The solution options provided show how algebraic thinking can be used to formulate the

required calculation, but in a practical and concrete personal context. The problem does not focus on carrying out the calculation shown, but on recognising how the calculation should be written mathematically, hence it is in the translate process category.

72 Problems arising in real life do not necessarily fall neatly into one content category. It is part of the student's role as problem solver to choose knowledge and skills from their repertoire of mathematical knowledge and skills appropriate to the problem, combining aspects of different content areas as required and employing their general mathematical competencies to do this.

73 The main purpose of this categorisation is to ensure that a wide set of mathematics knowledge and skills is represented in the problem solution cycle that reflect mathematical learning outcomes targeted through the curricula of participating countries. SEA-PLM mathematical literacy includes the use of basic number skills and other fundamental mathematical conceptual understanding and skills, but encompasses much more than these with its focus on the use of those skills in a variety of contexts. It is also designed to be of interest to, and provide a challenge for, students across a wide range of proficiency at a given level of schooling.

74 One further item example is provided in Exhibit 5 to illustrate the measurement and geometry content category. This problem, Buying Peanuts, is set in a local context and involves carefully interpreting a graphic stimulus to understand the measure of mass that is displayed on the face of each of the scales shown. This item is in the translate process category because it asks students to interpret real-world contextual elements (the sets of measuring scales and the quantities of peanuts) and decide which image displays the specified mathematical quantity (400 grams on the scale displayed in kilograms, so working with the different units of measurement is also involved).

Exhibit 5: Example item Buying Peanuts set in the local context, illustrating the measurement and geometry content category and the translate process

Which set of scales shows 400 grams of peanuts?
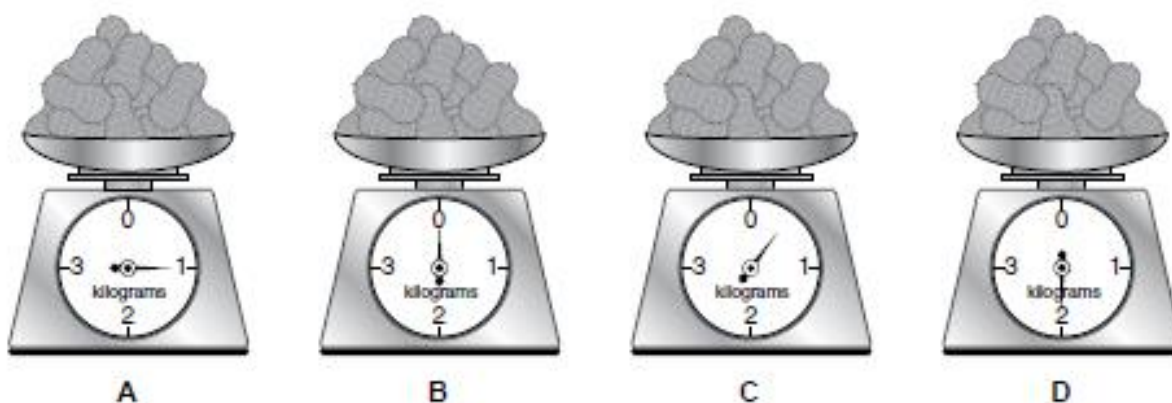
Assessing mathematical literacy

75   The three components that contribute to the definition of SEA-PLM mathematical literacy – content, process and context – also provide the structure for the assessment of SEA-PLM mathematical literacy.

76   Targets are established for each of these components that ensure a sensible coverage and overall balance for the assessment instrument, taking into account the level of schooling being assessed. This in turn ensures that a broad selection of problems or problem components is included to provide a fair, engaging and challenging assessment of mathematical literacy. The items in each instrument cover a wide range of difficulty appropriate to the level of schooling.

77   It is recognised that availability of calculators may vary considerably for fifth grade students across different South-East Asian countries, hence the SEA-PLM test items are structured to be as 'calculator-neutral' as possible – they can be done without a calculator and using a calculator is not a significant advantage.

78   Establishing context is important for SEA-PLM mathematical literacy, so language is an important component of mathematical literacy questions. The amount of language used and its level of difficulty are carefully monitored and reviewed to minimise the reading load while ensuring the questions are accurate, clear and unambiguous. Careful attention to this issues will also be needed in the preparation of equivalent national versions of all SEA-PLM assessment materials.

Target distribution of score points by each of content, process and context

79   The distributions presented in this section show the proposed target ranges for test items within each framework category for the SEA-PLM assessment at Grade 5.

80   Exhibit 6 shows the target percentages for the three content categories. The targets are given as ranges to emphasise that there is flexibility in the procedure, with the overall aim being to achieve a sensible and appropriate balance of contributions from the content categories that reflects the curriculum emphases of participating countries.

Exhibit 6: Target percentages for mathematical literacy content categories

Content	Target percentage
Number and algebra	35–45
Measurement and geometry	35–45
Chance and data	15–25

81   Exhibit 7 shows the target percentages for process categories. Again, the targets are given as ranges to indicate flexibility while achieving overall coverage and balance in the assessment. The balance in this case is an approximately equal weighting between the two processes, translate and interpret and review, that link to the context and the process, apply, that provides a mathematical solution. Such a balance reflects the emphasis on the application of procedural

knowledge typically seen in the curricula of participating countries.

Exhibit 7: Target percentages for mathematical literacy process categories

Process	Target percentage
Translate	20–30
Apply	40–60
Interpret and review	20–30

82   The three main context categories (personal, local and wider world) should be represented approximately equally in order to ensure a strong mix of contexts that will accommodate the wide range of experiences and interests of students expected to participate, with a smaller proportion of intra-mathematical problems also included in recognition of the place such problems typically occupy in school curricula. Exhibit 8 shows the target percentages of tasks in each context category.

Exhibit 8: Target percentages of mathematical literacy context categories

Context	Target percentage
Personal	25–30
Local	25–30
Wider world	25–30
Intra-mathematical	15–20

Unit structure, response formats and scoring

83   A SEA-PLM mathematical literacy assessment consists of a series of units, each of which has a stimulus to establish a context, then has one or more items that require one or more of the processes (translate, apply, interpret and review) to be used to find an answer.

84   Four categories of response format may be included in assessments of SEA-PLM mathematical literacy.

85   Two of the categories are of the selected-response type, where students select one or more correct answers from a set of options.

- Multiple-choice (MC) tasks have four or five options, with only one being the correct answer and the other three or four being plausible but incorrect answers. The different response options are typically designed to expose particular misunderstandings, misconceptions or common errors.
- Complex multiple-choice (CMC) tasks present statements or propositions, and require students to select one or more correct response options to each statement from a set of possible options, such as 'true or false' or 'always, sometimes, never'.

86   Two of the categories are varieties of the constructed-response type, requiring students to write

an answer, complete a drawing or mark a position.

- Closed constructed-response (CCR) tasks provide a structured format for the students' response, which might be a single number, a word or a mark on a diagram.
- Open constructed-response (OCR) tasks typically need a more extended process to reach the required answer.

87   Some task formats provide opportunities to award partial credit for some items, where students show some progress towards a solution but without giving a response deserving full credit.

88   Exhibit 9 shows the target percentages for response formats. A preponderance of selected response items is proposed in recognition that the processing of responses to such items is significantly easier.

Exhibit 9: Target percentages for mathematical literacy response format categories

Response format	Target percentage
Selected response (MC and CMC)	60–80
Constructed response (CCR and OCR)	20–40

CHAPTER 3

READING LITERACY

The importance of reading literacy

89　Reading literacy is a foundational skill. It underlies success not only in school subjects, but also in many areas of adult life (Smith, Mikulecky, Kibby, & Dreher, 2000). Acquiring skill in reading literacy benefits the individual not only by assisting participation in education and literate society, but also by shaping one's thinking processes (Olson, 1994). Reading literacy is of fundamental importance to individuals in meeting their personal goals. At a broader level, a literate population is central to a nation's pursuit of its economic and social goals.

90　In the early stages of reading development, a number of precursor skills need to be acquired to support the central activity of reading for meaning. Precursor skills include letter and word recognition, fluency and speed in oral decoding of sentences and passages, and listening comprehension. While these precursor skills remain subsidiary to reading literacy, it is useful to track and measure progress in their acquisition, so that systems, schools, teachers and parents can understand what aspects of students' reading development may need attention as their reading progresses.

Defining the domain

91　The working definition of reading literacy for SEA-PLM is:

> *Reading literacy is understanding, using and responding to a range of written texts, in order to meet personal, societal, economic and civic needs.*

Reading literacy …

92　The term reading literacy is used in preference to the word reading to emphasise that what is being assessed goes beyond simple decoding of words, though it also includes that. Reading literacy includes a range of cognitive skills such as locating and interpreting information, as well as knowledge of words and knowledge of linguistic structures and features. The term reading literacy also encompasses the idea that reading is done in a context and for a purpose. Thus, reading literacy includes the notion of relating one's knowledge about the world to texts, and using texts to develop and reappraise one's knowledge of the world.

… is understanding, using and responding to …

93　These verbs are intended to give a sense of the broad range of purposes for which texts might be read. Understanding involves comprehension, while using and responding to acknowledge both that the reader is actively involved in the construction of meaning and that reading is functional.

94   The term written texts indicates that the focus is on the written word. It comprises handwritten, printed and digital texts, but not spoken texts. Visual artefacts such as diagrams, pictures, maps and tables may be regarded as components of written texts if they contain words or where they support the meaning of the written text.

… in order to meet personal, societal, economic and civic needs.

95   People read for a variety of purposes, from meeting their individual learning needs or other aspects of personal development, to communicating with others, to meeting the demands of their jobs, to informing themselves about local and global issues.

Organisation of the reading literacy domain framework

96   The SEA-PLM reading literacy framework is primarily described in terms of content (the text variables: text format and text type), context (the situation to which texts are relevant) and process (the cognitive processes readers use). As an adjunct, the inclusion of precursor skills contributes to elaborating the constituents of the domain at the early stages of reading development. The precursors are described in terms of constituent skills such as word recognition.

Content: text variables

97   Content in the reading framework is represented by text variables: text format and text type.

Text format

98   Text format refers to the way texts are organised or laid out on the page, in very broad terms. SEA-PLM uses three categories of text format: continuous, non-continuous and composite.

99   Many texts are in the form of continuous text or prose. Continuous texts are composed of sentences and paragraphs. (An example of a continuous text is given in Exhibit 11.)

100   Other texts that readers are required to engage with in daily life are constructed in non-continuous formats. These include diagrams, tables, maps and lists of other kinds (Kirsch & Mosenthal, 1990). (An example of a non-continuous text is given in Exhibit 12.)

101   This broad distinction between continuous and non-continuous texts is a common one in reading frameworks, such as PISA (OECD, 2010), PIRLS (Mullis, Martin, Kennedy, Trong, & Sainsbury, 2009), SACMEQ (Ercikan, Arim, Oliveri, & Sandilands, 2008) and PIAAC (OECD, 2009), though there are some variations in terminology.

102   A composite text involves more than one part. It could be a text containing both continuous and non-continuous parts (such as a page from a newspaper that comprises prose text and graphs), or it could be several texts on a single theme but in one format (for example, several opinion pieces by different authors related to a single issue).

Text type

103   Text type refers to the genre, orientation or broad purpose of a text. SEA-PLM uses six categories

of text type: narrative, descriptive, persuasive, instructional, transactional and label.

104 Narrative texts present and develop characters, events and themes, and deal with questions relating to when or in what sequence. Examples of narration are short stories, recounts of recent activities, diary entries and stories of a person's life. The Hole, shown in Exhibit 11 is a narrative text, telling the story of an adventure of two children.

105 Descriptive texts present information about people or objects and abstract concepts or constructs; these kinds of texts address what and someh ow questions. Description includes forms of global citizenship sometimes referred to as exposition. Examples of description include describing a person or a place, a plant or a problem, a feeling or a phenomenon or, at the level of precursor skills, a label for an image. Country Fact File (Exhibit 12) provides information describing features of various countries.

106 Persuasive texts refer to those that deal with opinions and points of view, and are used to persuade the reader. They address some which and why questions. Examples of persuasive texts are a letter to the editor, a book review, an advertisement for a product, a job application letter and a discussion of the benefits or disadvantages of a public policy.

107 Instructional texts explain what to do in order to complete a specified task and address some how and when questions. Examples of instructional texts are giving directions for finding a location, listing materials and steps required to make an object, and explaining what to do in an emergency.

108 Transactional texts aim to achieve a specific purpose involving an exchange of information between two or more parties, such as arranging for something to be done. Transaction is represented by tasks such as reading a message from a friend or correspondence related to delivery of goods. Transaction as a text type follows the definition as used in the PISA 2009 reading literacy framework (OECD, 2010).

109 Label is a text consisting of a single word, or a small set of words, used to identify something. This text type is used to categorise images or words that are presented in isolation, as a stimulus to assess some of the precursor skills of reading. Exhibit 10 is an example of a text with a label. This text consists of an image accompanied by four words, one of which is a suitable label for the image.

Exhibit 10: Example reading item: Label

    A   Gloves

    B   Grapes

    C   Girl

    D   Road

Processes

110   Locate: A common purpose for reading is to locate information. The information required might be specific, such as which character performed a particular action in a narrative, or it might be more general, such as finding evidence that supports an argument. Sometimes the information to be located is found in a single sentence and sometimes it must be gleaned from several paragraphs. This kind of reading has been called 'reading the lines' (Gray, 1960), because no inference, or only minimal inference is required to complete this kind of task. An example of an item requiring students to locate information is given in Exhibit 11.

Exhibit 11: Example reading item: The Hole

The Hole

'I can see something shiny at the bottom,' said Kit. 'Maybe it's a gold coin.'

'Don't be silly,' said Sara, peering into the hole. Her younger brother was always seeing things, creating objects out of nothing.

'Maybe it's a sword,' continued Kit. 'Maybe a king buried a gold sword in the ground many years ago, and then forgot about it.'

'Maybe it's dirt, covered in dirt, covered in more dirt,' said Sara. 'It's just a hole, probably made by a wild animal.'

'You are wrong!' exclaimed Kit. 'No animal could make a hole as big as this!'

'Well, if you are so sure this is not an animal's hole, perhaps you should climb into it.'

Kit began to turn pale. 'Erm … No. I cannot go in the hole … because … I have a sore foot!' Sara smiled; it had nothing to do with Kit's foot. A big hole could mean a big animal.
'I have an idea,' she said, picking up a stone that lay beside her. 'I will drop this into the hole. If we hear a clink, there is treasure. If we hear a thud, there is dirt. If we hear a yelp, there is an animal.'

Sara dropped the stone and they heard nothing for a moment. Then they heard a splash.

Sara says 'I have an idea'. What is her idea?

    A   to push her brother into the hole

    B   to go into the hole to explore

    C   to throw a coin into the hole

    D   to drop a stone into the hole

111 This is an example of a locate item for The Hole text, presented in continuous format, of narrative type, set in a personal context.

112 In order to identify what Nazneen's idea is, students need to find the part of the text that contains the quotation 'I have an idea', towards the end of the text. They then need to continue reading the words that follow, that state first that she picks up a stone and second that she 'will drop this into the hole'. There is some minor inference required in order to recognise that 'this' refers to the stone that she has picked up, as well as to relate both of these to her immediately preceding statement, 'I have an idea'. However, since all the information is explicitly stated, with students able to rely on direct word matches between the item and the text ('I have an idea', 'stone', 'drop … into the hole'), this item is classified as relying essentially upon ability to locate information.

113 Interpret: Interpretation is the process of making meaning from a text. Gray (1960) refers to this kind of task as 'reading between the lines': it involves understanding ideas that are present in a text, but not directly stated. Interpretation might involve parts of a text or the whole text. A wide variety of cognitive tasks may be included in this process, such as recognising relationships between ideas, understanding assumptions made, synthesising different pieces of information or identifying a main idea. An example of an item requiring students to interpret information in a text is given in Exhibit 12.

Exhibit 12: Example reading item: Country Fact File – interpret item

	Afghanistan	Vietnam	Philippines	Nepal
Climate	arid to semi-arid; freezing winters and hot summers	tropical in south; monsoonal in north	usually hot and humid	subtropical in south; cool summers and severe winters in north
Geography	landlocked and mountainous	the fertile Mekong river delta covers a large part of south western Vietnam	made up of 7,107 islands	landlocked; contains eight of the world's 10 highest peaks
Main crops	wheat, fruits, nuts; wool, sheepskins	paddy rice, coffee, rubber, cotton; fish	sugarcane, coconuts, rice	rice, corn, wheat, sugarcane, milk
Typical exports (goods sold to other countries)	fruits and nuts, carpets, saffron	crude oil, marine products, rice, coffee, rubber; garments	electronic equipment, transport equipment, garments	carpets, clothing, leather goods
Wildlife	the Marco Polo sheep: it has the longest horns of any sheep	the saola (a kind of antelope): one of the world's rarest mammals	the Philippine Eagle: the largest eagle in the world	the one-horned rhinoceros: the world's fourth largest land mammal

According to the text, which country has the same export as Vietnam?

114 This is an example of an interpret item for the Country Fact File text, presented in non-continuous format, providing a description of features of various countries and set in a wider-world context.

115 The item asks students to use information in the Country Fact File text to identify a country that has the same export as Vietnam. In order to answer this item, students need to

identify the row 'Typical exports' and read across within that row to determine which goods Vietnam exports (crude oil, marine products, rice, coffee, rubber and garments). They then need to continue to read across the same row, comparing the information about the other three countries, represented by the columns in the table, in order to identify a similarity. The relevant information (garments) is found in the cell describing the Philippines. Nowhere does the table state explicitly that Vietnam and the Philippines export one category of similar goods (garments), nor does the item indicate which category of 'Typical exports' students should focus on. Although the information that leads students to the answer takes the form of a word match between two cells, the task required of students is to interpret the expression 'the same export' and to compare multiple pieces of information in multiple cells of a table in order to identify one single similarity between two countries. They then need to write the word 'Philippines' for this constructed-response item. The need for a series of actions involving identifying relevant information then multiple comparisons means that this item is classified as interpret.

116   Reflect: Active readers constantly relate what they are reading to what they already know and adjust what they know to accommodate what they have read. The process reflect refers to this aspect of reading, in which information within the text is related to knowledge outside the text: in other words, the reader situates the text within the wider context of his or her experience. Because this skill goes beyond the text itself, it has been called 'reading beyond the lines' (Gray, 1960). The broad range of tasks categorised under this process include: focusing on the intended audience of a text or the attitude of the writer; making an evaluation of an argument or a judgement about a character; explaining the effect of a text feature such as its layout; and comparing behaviour of a character in a story with that of acquaintances. An example of a reflect item is given in Exhibit 13. This item also comes from the unit Country Fact File.

Exhibit 13: Example reading item: Country Fact File – reflect item

How is information shown in this text?

    A   in sentences

    B   in paragraphs

    C   in a table

    D   in a map

117   The item in Exhibit 13 asks students to identify the form in which information is shown in the Country Fact File text. In order to answer the item, students need to draw on information beyond the text. In this case, they need to use real-world knowledge to understand the differences between sentences, paragraphs, a table and a map, and to relate this information to the text in order to recognise that the information is presented in a table. Items that focus on the layout of a text are classified as reflect.

118   Recognise words: A basic element of reading literacy is knowledge of words. Knowledge comprises both recognising the written form of the language and conceptual recognition of the meaning of a word – its correlate in the non-linguistic world. Recognising words means relating the written form of a word with its meaning (for example, as represented in picture form). An example of an item requiring students to recognise words is given in Exhibit 14.

Exhibit 14: Example item: Wheel
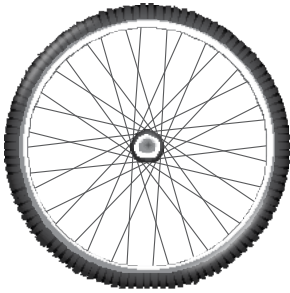
    A   Car

    B   Shoe

    C   Wheel

    D   Cat

119   The Wheel question is set in a local context. Here students are presented with an image of a familiar object and a set of four words, from which they need to select the one that matches the picture of a wheel.

Contexts

120   Test items and tasks used in the SEA-PLM instruments are generally associated with a context type – though for assessment of some of the precursor skills of reading, a context is not provided. Other than tasks of this type, the reading context is the situation within which the text is likely to be read or for which it is likely to be used. The main purpose of defining the contexts is to indicate that the set of items or tasks needs to cover a range of situations in which students are likely to read.

121   The SEA-PLM program uses three context types: personal contexts, local contexts and wider-world contexts.

122   Personal contexts have an individual focus such as personal health, personal transport or travel. Reading tasks fitting a personal context include those that are primarily for personal enjoyment or development, such as reading a story or a TV guide. The story The Hole (Exhibit 11) is an example of a text set in a personal context.

123   Local contexts have an interactive focus requiring engagement with other individuals or with elements of the immediately surrounding environment. Reading in this type of context involves day-to-day situations and activities at home or at school, in the local community or at work, where the focus of thought and action lies in connections and interactions with immediately surrounding people or objects. Reading texts reflecting a local context include a letter from a friend, a school timetable or a description of one's home town. The item Wheel (Exhibit 14), dealing with a familiar everyday object, is an example of an item set in a local context.

124   Wider-world contexts have an external focus on broader situations that may affect whole communities, or countries, or that have an even wider, global relevance. Texts fitting this context type include those dealing with broad social issues such as public policy, transport systems and advertising. Reading texts that reflect a wider-world context include a newspaper report or a historical description. The Country Fact File text (Exhibit 12), describing features of various countries, is an example of a text set in a wider-world context.

Assessing reading literacy

Target distribution of score points by content, process and context

125   The distributions presented in this section show the targets for Grade 5. If the program was extended to other grade levels, the percentages may be adjusted.

Exhibit 15: Target percentages for reading literacy text format categories

Text format	Target percentage of tasks
Continuous	50–60
Non-continuous	30–40
Composite	5–15

Exhibit 16: Target percentages for reading literacy text type categories

Text type	Target percentage of tasks
Narrative	35–45
Descriptive	15–25
Persuasive	10–20
Instructional	0–10
Transactional	0–10
Label	10–20

126   The large proportion of narrative texts represents the emphasis on this type of text in the language curricula of all the participating countries.

Exhibit 17: Target percentages for reading literacy process categories

Process	Target percentage of tasks
Locate	35–45
Interpret	30–40
Reflect	10–20
Recognise word	10–20

Response formats

127 The reading literacy assessment includes both selected-response and constructed-response items. The majority of selected-response items are in simple multiple-choice format. For these items, the test taker selects one of four options. A small number of items may involve complex multiple choice, in which test takers are required to make several decisions, for example, responding to a series of yes / no questions. Constructed-response items comprise no more than 30 per cent of the entire set.

CHAPTER 4

WRITING LITERACY

The importance of writing literacy

128 Like reading and mathematics, writing is a foundational skill for future learning and for full participation in the economic, political and social life of adults. In school contexts, writing is a basic tool for learning. In later life, writing is essential for participation in many aspects of everyday life: for example, in communicating with friends and family, or with government departments. In the workplace even routine jobs increasingly rely on high-level cognitive skills – including written communication – rather than on manual skills. In the digital age, personal and social communication is increasingly conducted in written text, through social media. In the 21st century, written language is as at least as important as it has ever been for the individual.

129 As John Wirt and colleagues put it:

> *Effective writing skills are important in all stages of life from early education to future employment. In the business world, as well as in school, students must convey complex ideas and information in a clear, succinct manner. Inadequate writing skills, therefore, could inhibit achievement across the curriculum and in future careers, while proficient writing skills help students convey ideas, deliver instructions, analyse information, and motivate others. (Wirt, et al., 1998).*

While this statement is almost two decades old, and addressed primarily to an American audience, its message retains its relevance and it is applicable to developing as well as to more developed education systems.

Defining the domain

130 The working definition of writing literacy for SEA-PLM is:

> *Writing literacy is constructing meaning by generating a range of written texts to express oneself and communicate with others, in order to meet personal, societal, economic and civic needs.*

Writing literacy …

131 The term writing literacy is used in preference to the word writing to emphasise that what is being assessed goes beyond simply copying or forming words, although the abilities to write words in legible handwriting and to use correct spelling or character formation are essential components

of writing. The term writing literacy is meant to convey the idea that writing is done in a context, for an audience and with a purpose. Writing literacy includes a range of cognitive skills such as generating and organising ideas, applying vocabulary and drawing on knowledge of linguistic structures and textual features.

… is constructing meaning by generating written texts …

132   The term construct is used here to emphasise that meaning comes from the writer. Written texts contain ideas developed by the writer, using knowledge of language and text, rather than being simply a written copy of others' ideas.

… to express oneself and communicate with others, …

133   While most typically people write in order to convey ideas and information to a specific audience, writing can also be for oneself – an act of personal expression.

… in order to meet personal, societal, economic and civic needs.

134   Writing may be done for a variety of purposes: from keeping personal records to showing one's knowledge in the classroom; from sharing one's experiences with others to getting things done; and from meeting the demands of one's job to participating in public life.

Organisation of the writing literacy domain framework

135   Like mathematical literacy and reading literacy, writing literacy is described in terms of content, context and process. Content in writing literacy refers to types of written text. Context refers to the situations that give rise to the writing. Process refers to the skills applied by writers in constructing texts.

Content: text types

136   Content in writing literacy refers to the text types included as assessment tasks. These are narrative, descriptive, persuasive, instructional and transactional. These categories are widely used in literacy frameworks, such as the PISA 2009 reading literacy framework (OECD, 2010), although there are minor differences in the categorisation of text types from one framework to another. SEA-PLM adds the category label to include tasks directed at early-stage writers.

137   Narrative texts present and develop characters and sequences of events. Narration is a fundamental and universal form of writing. Writing a narrative allows students to exercise their imagination and give shape to ideas and feelings. Examples of narrative texts are short stories, recounts of recent activities, diary entries and stories of a person's life.

138   An example of a narrative text type in the writing literacy assessment is Brothers' Race, shown in Exhibit 18.

Brothers' Race

Use the picture to help you write a story. Write as much as you can.

One day, Kai challenged his older brother to a race.

_____

_____

_____

_____

_____

_____

139 The task presents an image together with instructions to write a story. An introduction, including the name of one of the brothers, is given to assist students who may be unsure how to begin writing.

140 Descriptive texts present information about concrete objects – people, places, items or events – or about abstract concepts or ideas; these kinds of texts explain how things are. Description includes forms of writing sometimes referred to as exposition. Students need to be able to write descriptions for many school tasks, as well as for broader everyday contexts. Examples of this text type include: describing a person or a place; a plan or a problem; a feeling or a phenomenon. An example of a descriptive text type is shown in Exhibit 19.

Exhibit 19: Example writing task: Celebration

New Year celebrations

Write a letter to a friend in another country, describing New Year celebrations in your country.

Tell your friend about:

• Places and times

• People

• Food

• Dress

Your description should be interesting. Write your letter on the lines below.

Dear Friend,

_____

_____

_____

_____

_____

_____

_____

_____

_____

From your friend,

141 Persuasive texts communicate opinions and argue a point of view. In writing persuasive texts, students express their own thoughts, values and beliefs, and attempt to influence others. Examples of persuasive texts are a letter to the editor, a book review, an advertisement for a product, a job application letter and a discussion of the benefits or disadvantages of a public policy.

142 Instructional texts explain how to complete a task. Examples of instructional texts are giving directions for finding a location, listing the materials and steps required to make something, and explaining what to do in an emergency.

143 Transactional texts aim to achieve a specific purpose, such as asking for information about a state of affairs or arranging for something to be done. Transaction is represented by tasks such as writing a message to a friend or ordering goods. Transaction as a text type follows the definition as used in the PISA reading literacy framework: 'Transaction represents the kind of text

that aims to achieve a specific purpose outlined in the text, such as requesting that something is done, organising a meeting or making a social engagement with a friend' (OECD, 2013, p. 66).

144 Label is a text consisting of a single word or a small set of words, used to identify something. This text type is used to categorise images or words that are presented in isolation, as a stimulus to assess some of the precursor skills of writing.

Context

145 Test items and tasks used in the SEA-PLM instruments are each associated with a context type. A context is the situation within which the writing task is likely to take place. The main purpose of the defined contexts is to indicate that the set of items or tasks should cover a broad range of the situations in which students need to write, and a broad range of the purposes and audiences for writing.

146 The SEA-PLM program uses three contexts: personal contexts, local contexts, and wider-world contexts.

147 Personal contexts have an individual focus. The primary audience of writing tasks in personal contexts is the writer himself or herself. Writing tasks fitting a personal context include those that are primarily for individual needs, enjoyment or development (such as writing a story or a personal shopping list), or for personal expression (such as keeping a diary).

148 Local contexts have an interactive focus requiring engagement with other individuals or with elements of the immediately surrounding environment. Tasks fitting this context type involve day-to-day situations and activities at home or at school, in the local community or at work, where the focus of thought and action lies in connections and interactions with immediately surrounding people or objects. Writing tasks reflecting a local context might include: a letter to a family member, a friend or a teacher; a household shopping list; or a description of one's home town.

149 Wider-world contexts have an external focus on broader situations that may affect whole communities or countries, or that have an even wider, global relevance. Writing tasks fitting this context type might focus on broad social issues such as public policy, transport systems, ecology, medicine or advertising. Writing texts that reflect a wider-world context might include a letter to the editor or a description of a famous person.

Process

150 Writing entails drawing on knowledge of language (both written and oral) and a range of skills. In the writing literacy domain, this set of knowledge and skills comprises the process dimension of the framework. Five processes have been identified as intrinsic to writing literacy: generating ideas; controlling text structure and organisation; managing coherence; using vocabulary; and controlling syntax and grammar. A sixth variable, other language-specific features, is included here to accommodate other important features that are not assessable across all languages.

151   Generate ideas: Writing tasks typically require the creation, selection and crafting of ideas. The quantity and quality of the ideas, and their appropriateness for the task, are constituents of this skill. The nature of the ideas will vary from one text type to another. For example, in story writing (narrative), strong characterisation and storyline are important. In persuasive writing, the logic, relevance and persuasiveness of the argument are important, as is the ability to maintain critical distance. In descriptive writing, the completeness of the description, the salience of the details included, and the precision and richness of the picture created for the reader are all important.

152   The process generate ideas is illustrated in Exhibit 20, an extract of the marking guide for the writing task Brothers' Race (Exhibit 18). The criterion assessed for this task is development of narrative (elaboration of ideas), a task reflecting the generate ideas process.

Exhibit 20: Example writing task: Marking guide extract

Criterion	Score	Description
Development of narrative (elaboration of ideas)	0	Evidence of a response, but no relevant information is included
	1	Fragments: few ideas or no complete ideas
	2	Limited writing related to the picture
	3	Simple writing related to the picture; limited detail
	4	Detailed writing with many relevant ideas

153   Using this marking guide, a score is awarded to each piece of student writing, from 0 to 4, depending on how well the writing shows evidence of ability to elaborate ideas relevant to the picture in order to develop a narrative in accordance with the task. As the quantity of relevant ideas increases, together with the level of detail provided, so does the score given.

154   Control text structure and organisation: Different text types have different structures. Effective writers have knowledge of the structural features of texts and select a suitable organisational form for the writing task. For example, if writing a recipe, they will start with a set of ingredients and then describe or list a sequence of steps. If writing a narrative, they know that, conventionally, they will start with an orientation, follow this with a complication and end with a resolution. They also know what to include in each of these sections. For example, the orientation will introduce the main characters and establish the setting.

155   An example of how ability to Control text structure and organisation is assessed is shown in Exhibit 21, the marking guide used for the criterion story elements for the same task, Brothers' Race (Exhibit 18).

156   Exhibit 21: Example writing task: Marking guide extract

Criterion	Score	Description
Story elements	0	Evidence of a response but no relevant information is included
	1	Ideas are present but not a narrative
	2	Ideas are linked into a narrative

157   The focus in this criterion is not on the quantity of ideas, but rather on whether or not students demonstrate ability to link their ideas into a narrative. Students who do no more than describe the elements of the picture provided, for example, would be likely to receive a score of 1.

158   Manage coherence: Good writers are able to structure texts so that the links between ideas are clear to the reader. Coherence is achieved through a logical progression of ideas that express meaning consistent with the reader's general world knowledge, as well as through syntactic features such as reference, and lexical features such as discourse markers and connectives. Good writers make use of paragraphing to group ideas around a central topic or use other graphical means, such as headings, to indicate the relationship between ideas.

159   Control of coherence is a mark of relatively sophisticated writing and may not be taught to students in Grade 5. Coherence can most easily be observed in texts of several paragraphs; students in Grade 5 are typically expected to produce rather short texts, where this aspect of writing cannot easily be assessed.

160   Use vocabulary: Writing involves not just knowledge of words but also an understanding of how they can be used in specific contexts. Good writers are able to draw on a wide vocabulary to present ideas precisely and concisely. They choose words that are appropriate to the purpose, audience and context. A wide vocabulary allows writers to present arguments effectively and to give life to images in descriptive or narrative writing.

161   Exhibit 22 provides an example of how vocabulary is assessed, with the marking guide for this criterion for the task Celebration (Exhibit 19).

Exhibit 22: Example writing task: Marking guide extract

Criterion	Score	Description
Vocabulary	0	Little control of relevant vocabulary
	1	Vocabulary used shows limited ability to convey a message
	2	Vocabulary is adequate to convey detail of message

162   Responses to the task can be awarded scores of 0, 1 or 2 for this criterion, depending on their ability to use vocabulary to convey their message. Providing detail in a written text requires a relatively broad vocabulary.

163   Control syntax and grammar. Writers need to understand implicitly how the rules of grammar govern the way words are put together to form phrases, clauses and sentences. Good writers produce grammatically correct, meaningful sentences and make use of a range of syntactic structures. They link ideas with a variety of cohesive devices and use sentence structures appropriate to the writing task.

164   An example of how the ability to control syntax and grammar is assessed is given in Exhibit 23, for the task Scenes we see: Bird over mountain. The marking guide recognises that students may still be at the stage of gaining control of simple sentences, while also perhaps attempting

to write more complex ones. In this task students are asked to write two sentences, but the marking guide gives some credit (score 1) to students who demonstrate the ability to write a single sentence correctly. If they attempt more complex sentences, they are more likely to make errors; they receive a full credit (score 2) if they demonstrate the ability to write a correctly formed complex or compound sentence, as well as if they write two correctly formed simple sentences.

Exhibit 23: Example writing task: Scenes we see and marking guide extract

Scenes we see

Write two sentences to describe this picture.

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
   _____

Marking guide extract

Criterion	Score	Description
Syntax / Sentence structure	0	Isolated words or sentence fragments only
	1	Some errors but comprehensible or One simple sentence correctly formed
	2	Two simple sentences, correctly formed or One complex / compound sentence correctly formed

165   Other language-specific features. These are not defined in the framework: this category allows description of writing skills judged intrinsic to writing literacy in individual languages or language groups, which would be irrelevant in others. Character formation for some Asian languages is a possible example in this category. Spelling is another language-specific feature that will apply to many but not all languages. Spelling is considered an important feature of writing literacy in English, but less so in Hindi or Spanish, in which the relationship between sound and written form is much more regular (for discussion, see Share, 2008).

166   An example of one way in which other language-specific features could be assessed is given in Exhibit 24, with a marking guide for handwriting for the task Brothers' Race (Exhibit 18).

Exhibit 24: Example writing task: Marking guide extract

Criterion	Score	Description
Handwriting	0	few letters are well formed
	1	legible, most letters well formed
	2	good control of letter formation throughout

Replace Punctuation with Handwriting, as above.

167   The same marking guide could be applied to a number of languages, but would not be applicable to others or would need to be heavily adapted (and treated as a different item).

Assessing writing literacy

168   The writing literacy assessment includes shorter and longer tasks, some requiring the student to write single words and phrases, others requiring the student to develop one or two sentences, and others to write a more extended piece of prose. The longest tasks take 15 minutes: none of the writing tasks requires more than a page or so of composition.

169   The distributions presented in this section shows the targets for Grade 5. The percentages may be adjusted for other grades.

Text types

170   Tasks of different demand and length are each categorised according to one of five text types: narrative, descriptive, persuasive, instructional and transactional.

171   Exhibit 25 shows the target distribution of score points across the tasks by text type.

Exhibit 25: Target percentages for writing text type categories

Text type	Target percentage
Narrative	10–20
Descriptive	25–35
Persuasive	15–25
Instructional	5–15
Transactional	15–25
Label	5–15

172   While the text-type targets for reading literacy include a large proportion of narrative, a smaller proportion of this text type is assigned in the writing literacy distribution. This acknowledges that young students may find it difficult to write a coherent narrative (or story) in the short time allowed under test conditions. On the other hand, transactional is given a greater weight here than in

reading, because composing notes and short messages to others is a type of everyday writing frequently required of students at this age.

Writing processes, coding and scoring

173   The scoring of writing literacy tasks is based on criteria that reflect the writing processes. Some of these criteria are specific to a particular text type and others are more generic. For example, developing characters belongs to the generate ideas process and is applicable only to narratives, but a criterion such as precision, developed for the process use vocabulary, is applicable to all text types.

174   The criteria are operationalised in the form of rating scales with a number of described categories (codes). The rating scales vary in length: some are dichotomous (with only two codes, code 0 and code 1), and some have up to five coding categories (code 0, code 1, code 2, code 3 and code 4). The number of codes for a criterion depends on the number of defined and distinguishable categories into which students' responses can be divided.

175   Some writing tasks, especially those designed to measure the proficiency of emerging writers, will be constrained. Because of their brevity, they will be more likely to be assessed dichotomously as right or wrong. Examples of such tasks include writing single words or manipulating sentence structures.

176   A major challenge in measuring writing literacy in a multilingual survey is achieving equivalence across languages. In order to meet this challenge, the SEA-PLM writing literacy assessment model treats some writing processes as common across languages, while others may be treated as applicable only to one language or to a group of languages. This approach will yield some comparisons between writing performance in different languages, while recognising the particular characteristics of individual languages.

177   Of the five processes specified above, it is envisaged that assessment of generate ideas, control structure and organisation, manage coherence and use vocabulary may be applied across all languages, using common coding criteria. The process control syntax and grammar may be assessed using criteria that are customised in accordance with the features of the individual languages. The sixth process, other language-specific features, may also be assessed using language-specific criteria. Most, if not all, tasks are assessed on multiple criteria, including some that are comparable across languages (for example, criteria focusing on the vocabulary required to express particular concepts) and some that are language-specific (for example, criteria focusing on linguistic rules associated with spelling or syntax). For example, in the assessment of writing in the MTEG project for Afghanistan (in which the target languages are Pashto and Dari), common coding criteria have been used for control syntax and grammar, whereas the spelling criteria (reflecting the other language-specific features process) are treated as separate for the two languages.

178   Exhibit 26 shows a model for how the writing literacy assessment is designed to ensure coverage

of all writing processes, taking into account languages and text types.

Exhibit 26: Model for writing assessment processes by language and text type

Process	Application by language	Application by text type
Generate ideas	Apply across languages	Vary by text type
Control structure	Apply across languages	Vary by text type
Manage coherence	Apply across languages	Apply across text types
Use vocabulary	Apply across languages	Apply across text types
Control syntax and grammar	May vary by language	Apply across text types
Other language-specific features	May vary by language	Apply across text types

179   Exhibit 27 shows the target distribution of score points.

Exhibit 27: Target percentages for writing process categories

Process	Target percentage
Generating ideas	20–30
Controlling text structure and organisation	10–20
Managing coherence	10–20
Using vocabulary	10–20
Controlling syntax and grammar	15–25
Other language-specific features (for example, spelling, character formation, punctuation)	5–15

CHAPTER 5

CONTEXTUAL FRAMEWORK

Overview

210 This section describes the contextual information that will be collected to explain variation in students' mathematical, reading, and writing literacy, and global citizenship. It provides a classification of factors according to the multi-level structure inherent to the process of student learning, and with regard to their relationship with the learning process (antecedents or processes). It also lists the different kinds of variables collected with each contextual instrument and gives a rationale for their inclusion in SEA-PLM in light of prior findings from educational research.

Classification of contextual factors

211 When studying student outcomes, it is important to set these in the context of the range of factors that may explain their variation. Students' learning occurs through a variety of activities and experiences at different levels and through different processes. Contextual variables can also be classified according to their measurement characteristics as factual (for example, information on number of students at school or students' sex), attitudinal (for example, students' attitudes towards learning) or behavioural (for example, students' involvement in school activities).

212 Different conceptual frameworks for the analysis of educational outcomes have frequently pointed out the multi-level structure inherent to the processes that influence student learning (see for example Travers & Westbury, 1989; Travers, Garden, & Rosier, 1989; Scheerens & Bosker, 1997; Scheerens, 1990; Schulz et al., 2008; Fraillon, Schulz, & Ainley, 2013). The learning of individual students is set in overlapping contexts of school and out-of-school learning, which are both embedded in the context of the wider community that comprises local, national, supra- regional and international contexts. For the contextual framework of SEA-PLM it is proposed to distinguish the following levels:

- Context of the individual: This context includes the characteristics of the individual learner, as well as the processes of learning.

- Context of home and immediate out-of school environment: This level relates to the student's background and is associated with family, home and other immediate out-of-school contexts and the learning processes that occur at this level.

- Context of schools and classroom: This context includes background and process-related factors that are related to the school and the classroom level.

- Context of the wider community: This level describes the wider context in which learning takes place and comprises local community contexts (for example, remoteness), characteristics of the education system and the country, as well as supra-national and global contexts.

213 It should be noted that within each of these broader levels it is possible to distinguish sub-contexts. For example, within the school / classroom context one can differentiate school from

classroom factors; within the home and immediate out-of-school context, home-related from peer-related variables; and within the wider community context local, regional and national aspects. The nature of this mapping does allow us to make more fine-grained distinctions in further iterations of the contextual framework, but we prefer to propose a simplified structure at this stage of the development process.

214　In addition, it is important to recognise the status of contextual factors within the learning process. Factors can be classified either as antecedents or processes:

- Antecedents are exogenous factors that condition the ways in which learning takes place. They are contextual factors that are not directly influenced by learning-process variables or outcomes. However, it should be recognised that antecedent variables are level-specific and may be influenced by antecedents and also processes found at higher levels. Variables like socio-economic status of the student's family, school or home resources would fall into this category.

- Processes are those factors that directly influence learning. They are constrained by antecedent factors and factors found at higher levels. This category would comprise variables such as opportunities for learning during class, teacher attitudes towards study tasks or students' learning environment at home.

215　Both antecedents and processes need to be taken into account when explaining variation in learning outcomes. Whereas antecedent factors shape and constrain the processes of learning and hence their outcomes at each level, process factors can be influenced by the level of (existing) learning outcomes.

216　Exhibit 29 illustrates the basic classification of antecedent and process-related contextual factors in their relationship with outcomes located at the different levels. Each type of factor at each level is accompanied by examples of variables that have the potential to influence learning processes and outcomes.

Exhibit 29: Contexts for primary learning and learning outcomes
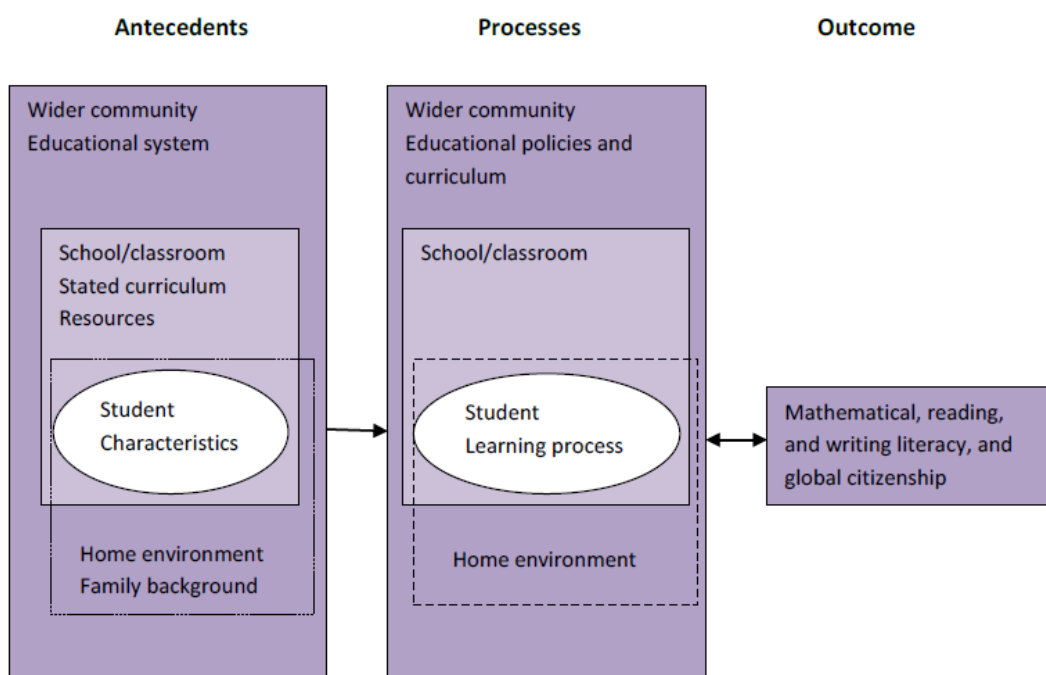
217 The double-arrow in the figure between the process-related factors and outcomes emphasises the possibility of feedback between learning process and learning outcome. For example, the learning process within a classroom could be positively influenced by the level of already acquired knowledge about the subjects of its students. The single-headed arrow between antecedents and processes, in turn, indicates the assumption within the SEA-PLM contextual framework of a uni-directional association at each contextual level.

218 Based on this general conceptual framework, it is possible to locate potential contextual factors on a two-by-four grid where antecedents and processes constitute the columns and the four levels constitute the rows. Exhibit 30 shows examples of the contextual variables that could be collected by the SEA-PLM contextual instruments for each of these cells.

Exhibit 30: Mapping of example contextual variables to framework grid

Level of …	Antecedents	Processes
Wider community	For example, structure of education systems	For example, status of numeracy, literacy and global citizenship in the national curriculum
School / classroom	For example, school characteristics	For example, teaching policy and practice
Student	For example, sex and age	For example, individual learning activities at school
Home environment	For example, home resources	For example, learning at home

219 Contextual factors that pertain to the level of the individual student and the home/out-of-school environment could be collected through a student questionnaire. It is planned to review the feasibility of administering a parent questionnaire as part of the pilot study. Those variables located at the school / classroom level could be derived through school and student questionnaires. Contextual factors at the level of the wider community may be measured from published sources or specifically designed consultations with national research centres, and with regard to the local community through school and student questionnaires.

Contextual levels and variables

The wider-community context

220 The different levels of this context all have the potential to affect student learning at school or at home. Conceptually, this context has different sub-levels:

- Local communities, where, for example, remoteness may have some effect on learning outcomes.
- Regional and national contexts, where educational structures, curricula and general economic and social factors may be of importance.
- Supranational or international contexts, where common cross-national practices or curricular approaches and cultural commonalities could exert an influence on learning outcomes.

221　International comparative research shows relatively strong association between the general socio-economic development of countries and student learning outcomes. SEA-PLM may select national (and where appropriate possible sub-national) indicators related to the general human development status regularly reported by the United Nations Development Programme (UNDP HDR, 2014). Examples of these indicators are gross domestic product per capita, access to education and health statistics.

222　The structure of the education system is also of importance and relevant indicators are related to the length of schooling, age–grade profiles, educational finance, the structure of school education (for example, study programs, public/private management), as well as the autonomy of educational providers.

Process-related variables

223　The process-related variables on SEA-PLM related educational policy of potential interest include:

- The definition of the education policy and its provision
- The main aims and goals of the primary education
- The place of literacy, numeracy, writing and global citizenship in primary education curricula
- The influence of different institutions or groups on decisions relating to those goals and aims.

224　Countries take different approaches to the implementation of literacy, numeracy and global citizenship education in their curricula. While numeracy and literacy tend to be closely related to specific subjects, have a clear relationship with one subject, but rather be integrated into different subjects or conceptualised as a cross-curricular learning area. There are variations in the explicitness with which curricula and learning outcomes are described across countries. In some countries there are explicit described curricula and learning outcomes and in others it is described as an implicit curriculum through it being referenced across curriculum documents in different learning areas.

225　Another important process-related variable at the system level is the development of teacher expertise. Teacher education programs often provide trainee teachers with opportunities to develop required competencies. It is also of interest to have information about the extent to which primary education is part of pre-service or initial teacher education, on the availability of in-service or continuing professional development, on the providers of these activities and how it is expected that teachers learn about developments in primary education.

226　To understand the learning outcomes of SEA-PLM, it will be important to take these variables into account that may not be readily accessible in published sources but could be collected through specifically designed consultations with participating countries.

School / classroom context

227　When studying students' acquisition of literacy, numeracy and global citizenship, the context of schools and classrooms plays a key role. Factors associated with the school and classroom context could be collected through the school questionnaire, which is completed by the school

principal or a delegate. In addition, the student questionnaire could include some questions gauging student perceptions of classroom practices and the school environment. In addition, the student questionnaire could include some questions gauging student perceptions of classroom practices and the school environment.

Antecedent variables at the school / classroom level

228 At the school level, it is important to take basic school characteristics into account. The school questionnaire should collect information on enrolments of students and teachers, the range of grades, the location of the school as well as school facilities, number of shifts, provision of text books, teaching aids, school health program, school feedings programs, and school management (public or private) and financing, or parental involvement in school management.

229 The background and experiences of staff have the potential of playing a role influencing the acquisition of student knowledge. The school questionnaire should collect information on the general professional background of teachers (for example their educational qualifications, employment status, or years of experience).

230 The learning process at schools is constrained by the stated school curriculum and policies. The school questionnaire should collect data on a variety of factors including the extent to which the school has policies and procedures regarding the development of literacy and numeracy (for example, the offering of remedial classes).

Process-related variables at the school / classroom level

231 Schools and classrooms will vary to the extent to which teachers use different teaching approaches. The school questionnaire should ask about principals' perception of teaching and learning activities, as well as students' involvement in learning activities at school. Furthermore, the student questionnaire should collect students' perceptions of classroom management, practices and activities.

Home and immediate out-of-school context

Antecedent variables at the home and immediate out-of-school level

232 The influence of student home background on students' acquisition of knowledge has been shown in many studies. Previous research shows that much of the variance in student performance relates to student-level factors such as socioeconomic status of the home, attitudes (for example, liking of mathematics) and practices (for example, homework effort). Factors that have been shown to be associated include parental socio-economic status, use of test language at home, immigrant and ethnic background.

233

234 There is a large body of literature showing the influence of students' socio-economic background on student achievement in a variety of learning areas (Sirin, 2005; Saha, 1997; Woessmann, 2004). To assess the parental socio-economic status, the SEA-PLM student questionnaire could include questions on:
- the highest educational levels of parents
- home resources
- the number of books at home.

235 The cultural and language background of students has often been found to be associated with their educational performance (see for example Elley, 1992; Kao, 2004; Kao & Thompson, 2003; Stanat & Christinsen, 2006). To measure these aspects of student background, the SEA-PLM student questionnaire should include questions about the country of birth of students and their parents, their ethnic background, as well as the language spoken most frequently at home.

Process-related variables at the home and immediate out-of-school level

236 Potential factors related to the home environment with a potential influence on the learning process are primarily learning through interaction with family members. The student questionnaire should include questions about the extent to which students receive help with homework and learning tasks from family or friends, as well as out-of-school activities (for example, reading or civic activities).

Individual context

Antecedent variables at the individual level

237 Antecedent variables at the level of the individual student consist of basic background characteristics that may influence their knowledge and skills in literacy and numeracy. Relevant factors in this category are age, sex and educational aspirations.

238 The student questionnaire should collect students' age. While students' knowledge and skills generally increase with age, when collecting data from students in the same grade within an education system, for some countries research has shown a negative association between age and achievement. This can be explained by retention and progression policies that cause older students in the same grade to be those with lower achievement (see for example Schulz, Ainley, Fraillon, Kerr, & Losito, 2010).

239 The student questionnaire also should collect data on students' gender. Studies on educational achievement in numerous learning areas have found considerable differences by gender (female, male). In particular, with regard to reading literacy, cross-national research has shown larger sex differences in favour of females (Mullis, Martin, Kennedy, & Foy, 2007; OECD, 2010b). On the other hand, males have traditionally shown to be somewhat more proficient in mathematics and science, but there is some evidence of a declining male–female gap in these learning areas (Mullis, Martin, & Foy, 2008; OECD, 2010b).

240 Individual aspirations with regard to education are a further variable that should be taken into account when analysing variation in students' literacy and numeracy. The student questionnaire includes a question asking about which level of educational qualification students expect to reach in the future. Categories for this variable will be defined according to the international classification of educational qualifications ISCED (UNESCO, 2006) and adapted to national contexts.

Process-related variables at the individual level

241 Process-related variables at the individual level consist of attitudinal as well as behavioural factors. Self-beliefs regarding learning are often viewed as central to its process and is likely to have a reciprocal association with knowledge and skills. Behavioural variables are related to the use of cognitive skills for different purposes and needs, with a potential of facilitating student learning through frequent practice.

242 According to Bandura (1993), students' confidence in their ability to carry out specific tasks in an area (self-efficacy) is strongly associated with their performance as well as perseverance, emotions and later study or career choices. The student questionnaire could include items designed to measure the extent to which students express confidence in doing a range of tasks related to mathematics, reading and writing.

243 A related construct is students' self-concept, which reflects global judgments of students about how they generally perceive their ability to cope with a certain learning area (Branden, 1994; Marsh & Shavelson, 1985). The enjoyment of dealing with a learning area also has the potential of facilitating the acquisition of knowledge and skills (Pekrun, Goetz, Titz, & Perry, 2002). The SEA-PLM student questionnaire could gather data on students' enjoyment of learning reading, writing and mathematics by including a question where students rate their agreement with statements reflecting enjoyment of these tasks, as well as their self-beliefs about how they cope with the subject matters. A further benefit of including this kind of question in the SEA-PLM student questionnaire is that engagement in reading, writing and mathematics are identified in several of the national curriculum documents as important elements of student learning in the subject area in their own right: engagement in reading, writing and mathematics are regarded in these curricula as goals of education, as well as being instrumental in improving cognitive achievement.

Contextual questionnaires and possible content

Student context questionnaire

244 The student context questionnaire will be completed by each tested student and used for three main purposes:

1. To analyse and examine the relationships between student-level factors and measured proficiency;

2. To provide descriptive information about proficiency across and within countries;

3. To provide information about student self believes and attitudes towards learning.

245 The student context questionnaire is designed to provide the following types of variables:

- Student characteristics, such as
  - Age (in years),
  - Gender,
  - Preschool attendance,
  - Number of siblings,
  - Ethnic background,
  - Parental status (single parent or parents),

- – Primary language spoken at home (test language or others),
- – Number of hours worked by children per week (paid or unpaid).
- Home socioeconomic background (regarding the place where they stay during the school week), such as
  - – Parents/guardians (e.g. education, employment status),
  - – Resources at home (e.g. number of books, ICT),
  - – Household possessions (to obtain measure of family wealth and members),
  - – Radio, TV or social medias,
  - – Participate in income generating activities or household chore engagement,
  - – Number of meals per day
- Students' school, such as
  - – Distance from home to school,
  - – Perceptions of classroom practices specific to subject areas,
  - – Classroom climate,
  - – Homework,
  - – Safety at school.
- Students' perceptions of learning domains,
  - – Self-concept in different learning domains (e.g. mathematics or reading),
  - – Interest in learning domains (e.g. mathematics or reading),
  - – Activities related to learning domains (e.g. reading for pleasure).

School questionnaire

246   The SEA-PLM school context questionnaire will be completed by the school principal or designate and used for the following purposes:

1. To analyse and examine the relationships between school-level factors and measured proficiency;
2. To provide descriptive information about school characteristics and learning context within and across countries;
3. To provide school-level data about domain-specific teaching policies and practices within and across countries.

247   The SEA-PLM school context questionnaire will be used to obtain the following types of variables:

- Characteristics of the school principal, such as
  - – Gender,
  - – Age,
  - – Qualification of principal,
  - – Number of years in post,
  - – Job satisfaction.
- School characteristics, such as
  - – School size,

- – Contract teachers or state teachers (including qualification),
- – School location,
- – School climate (e.g. principals' perceptions of the sense of belonging of students and teachers to school),
- – Private/public school management,
- – School type.
- School facilities and resources, such as
  - – Qualifications of teaching staff,
  - – Library resources, and other basic equipment, including textbooks and learning materials,
  - – ICT resources,
  - – Laboratories,
  - – Higienic facilities at school (safe drinking water, hand washing station, soap, and functional toilet),
  - – Sports facilities,
  - – Any facilities or support provided for students with disabilities and/or additional learning support.
- School teaching practices and policies, such as
  - – Teacher's absenteeism,
  - – Emphasis on learning areas,
  - – Remedial and advanced classes,
  - – Professional development for teachers.
- Community context (e.g., social context), such as
  - – Facilities in local community,
  - – Social tensions in local community,
  - – Community engagement in school activities.

Parent questionnaire

248   Given the relatively young age of Grade 5 students, the implementation of a (very short) parent questionnaire is under consideration. Having data directly from parents may improve the measurement of home background variables. Such a questionnarie should ideally be completed by one parent of each of the sampled students.

249   However, logistics would be demanding and could create additional burden for assessment. Furthermore, it is often problematic to obtain good response rates and adminstration would require additional procedures. Within some contexts within SEA-PLM countries it may also be expected that some parents may not be able to complete the questionnaire themselves given their own levels of literacy. Information sessions with parents prior to the testing could be used to implement guided administration for the group of all parents in a sampled class. The implementation of a parent questionnaire for SEA-PLM would depend on reviewing its feasibility during the pilot study.

250 The parent questionnaire would have to be very short and could include questions designed to gather data on the following variables:

- Parental education and occupation;
- Parental status (single or both parents);
- Home resources (e.g. household possessions, educational material, ICT);
- Home learning (e.g. help with homework specific to learning domains, discussions about social issues).

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ANNEX I

Cluster and booklet design

251   The cognitive instruments for each administration of the survey comprise a total of 90 minutes of material for each of the three cognitive domains (mathematical literacy, reading literacy andwriting literacy). This amount of assessment material allows good coverage of each domain. While there is a total of 270 minutes of cognitive instrumentation, each student only completes 60 minutes of assessment in two of the domains (30 minutes for each), as well as 30 to 40 minutes of questionnaire material, comprising 10 minutes of background questionnaire and 20 to 30 minutes of attitudes and values relating to global citizenship in questionnaire format. For each sampled student, this equals a total of one hour and 30 to 400 minutes of administration. Our recommendation is that students be given a short break after the one-hour cognitive assessment, before undertaking the questionnaire-style section.

252   The cognitive material is arranged in six clusters of tasks per domain, with each cluster representing 15 minutes of testing time. The item clusters are placed in test booklets according to a rotated test design, in which each booklet contains two 15-minute clusters each of two of the cognitive domains, followed by one 10-minute cluster of background questionnaire and one 10-minute cluster of global citizenship attitude questions.

253   Exhibit shows a possible rotated booklet design for a one-hour session of the cognitive assessment. M1 to M6 represent the six 15-minute mathematical literacy clusters, R1 to R6 represent the six 15-minute mathematical literacy clusters, and W1 to W6 represent the six 15-minute writing literacy clusters.

Exhibit 31: Example rotated booklet design for a one-hour cognitive session: 15-minute clusters of mathematical literacy, reading literacy and writing literacy

Book 1	Book 2	Book 3	Book 4	Book 5	Book 6	Book 7	Book 8	Book 9
M1	R2	W2	M3	R4	W4	M6	R6	W5
M2	R3	W3	M4	R5	W5	M1	R1	W6
R1	W1	M2	W3	M4	R3	R5	W6	M5
R2	W2	M3	W4	M5	R4	R6	W1	M6

254   Some beneficial features of this design are as follows:

• Two clusters from the same domain always appear consecutively, so the student does not have to keep 'switching gears'.

• Each cluster appears twice, in two different positions (blocks), thus reducing the likelihood that the difficulty of an item is influenced by where it appears in a booklet;

• Each cluster appears with two other clusters from the same domain, so that all the items in the domain's instrument can be equated and calibrated on the same scale;

- Each cluster appears with four clusters from other domains, so that the covariance between the domains can be calculated.

255 The test will be followed by a questionnaire which will include questions related to student background, school perception and issues related to global citizenship. It is expected that questions regarding student background and school perceptions will take 10 minutes for students to complete, and those related to global citizenship will take a further 10 minutes to complete. For the pilot study it is planned to use different questionnaire forms to trial a wider range of material. Details will be provided once decisions about the scope of the pilot material have been made.

ANNEX II

Documents consulted for curriculum review

Brunei

SPN21 Curriculum for Mathematics:

1. Framework and Guidelines for Curriculum & Assessment – Year 3 Mathematics Syllabus
2. Framework and Guidelines for Curriculum & Assessment – Year 4 Mathematics Syllabus* revised
3. Framework and Guidelines for Curriculum & Assessment – Year 5 Mathematics Syllabus
4. Framework and Guidelines for Curriculum & Assessment – Year 6 Mathematics Syllabus

SPN21 Curriculum for English:

1. Framework and Guidelines for Curriculum & Assessment – English Language for Year 3
2. Framework and Guidelines for Curriculum & Assessment – English Language for Year 4
3. Framework and Guidelines for Curriculum & Assessment – English Language for Year 5
4. Framework and Guidelines for Curriculum & Assessment – English Language for Year 6 (2010)
5. 5.4 Primary English Language Themes – Pre School to Year 6

Cambodia

Policy for Curriculum Development 2005-2009

Khmer Basic Curriculum Standards

Basic Education Curriculum Khmer Grades 1 – 9

Basic Education Curriculum – Mathematics Grades 1 - 9

Three National Assessment Reports: Grade 3 2008, 2009 and Grade 6 2008

Laos

Primary and Secondary Curriculum of Laos

Lao Language Curriculum

Mathematics (draft) Curriculum

National Assessment of Student Learning Outcome (ASLO III) Grade 3

Malaysia6

KURIKULUM STANDARD SEKOLAH RENDAH (Primary School Curriculum Standard) (KSSR) Mathematics Year Three

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6   Note that at the time of the review conducted as a preliminary to SEA-PLM assessment framework only mathematics curricululm materials were available to ACER.

KURIKULUM STANDARD SEKOLAH RENDAH (Primary School Curriculum Standard) (KSSR) Mathematics Year 4

KURIKULUM STANDARD SEKOLAH RENDAH (Primary School Curriculum Standard) (KSSR) Mathematics Year 5

KURIKULUM STANDARD SEKOLAH RENDAH (Primary School Curriculum Standard) (KSSR) Mathematics Year 6

Philippines

K to 12 Curriculum Guide MATHEMATICS (Grade 1 to Grade 10)

Mother Tongue Curriculum Guide for Grades 1-3

English Curriculum Guides Grades 1-10

Thailand

Basic Education Core Curriculum B.E. 2551 (A.D. 2008)

Basic Education Curriculum – Mathematics Grades 1 - 9

ANNEX III

Curriculum references in SEA-PLM reading assessment framework

1   A review of six Southeast Asian countries' curricula was undertaken as a prelude to developing the assessment frameworks. This Annex provides an illustration of the ways in which the assessment framework specifically references elements of the curriculum documents consulted. Reading is used as the example. For this domain, the curricula of Brunei, Cambodia, Laos, Philippines and Thailand were consulted.7

Defining the domain

2   The SEA-PLM definition of reading corresponds with definitions of reading literacy within the curriculum documents of all five countries. For example, in the Brunei Framework and Guidelines for Curriculum & Assessment, a key assumptions about learning English Reading is that it requires the application of a wide range of word- sentence- and text-level processing skills. These skills increase in breadth and depth as students progress. By the end of Year 4, for example, the reading standards refer to reading 'increasing fluency, confidence and understanding' and being able to 'construct meaning and locate information in texts' (p.26), while by Year 5, 'learners read independently, intensively and extensively.' (p.8) According to the Khmer Basic Education Curriculum, in Grades 4-6, 'In reading activities, students read, discuss and analyse a wide range of more complex texts … Through reading, students extend their understanding of the world and of themselves, and understand more about the meaning of cultural beliefs and values.' (p.3). The Lao language curriculum states, 'Through studying Reading, students will be able to read and understand a variety of common types of texts. They will be able to apply their skills to access information in their life, and for future study. The students will take pleasure in reading texts to obtain information, explore ideas, and think imaginatively and critically.' (p.3) The the Philippines Grade 5 Grade Level Standards for English state that 'The learner demonstrates interest in reading to meet various needs' (p.67). The Thai Language Standard for Reading (TH1.1) matches well the literacy approach outlined in the SEA-PLM framework: 'Application of reading process to build knowledge and thoughts for decision-making and problem-solving to life' (p.12).'

Content: text type

3   The use of text type as a major classificatory feature reflects it use in the SE Asian curriculum documents, whether explicity – as (for example) instructions, narratives, descriptions – or or implicity, within broad categories like letters, stories, poems, recounts and advertisments. For example, Brunei's Year 5 standards for English reading refer to the use of 'various types of texts including short and non-sequenced texts, stories, factual recounts, [including] non-chronological' (p.8). The Grade 5 Khmer outcomes state that students will be able to 'read independently and comprehend a range of stories, poems and non-fiction texts' and to 'read, comprehend and identify the intended audience and purpose of examples of different non-fiction text types …

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7   The language curriculum of the sixth country, Malaysia, was not available at the time of the initial curriculum review

including newspaper articles, multi-step instructions, information notices and simple timetables' (p.23).

Process: locate information

4   The reading skill of locating information is specified at at Grade 5 in all curriculum documents reviewed, though using a variety of terms. For example, Brunei's EL Syllabus Year 3 refers to 'locat[ing] information from texts' (p.15); the Grade 6 Khmer test results summary report to 'reading details' (p.4); the Lao document to 'access[ing] information' (p.3); the Thai Grade 2 Reading Standard 'Identify[ing] details from what has been read' (p.55).

Process: interpret

5   The reading skill of interpreting is specified at Grade 5 in all curriculum documents reviewed. For example: 'Infer the character feelings and traits in a story read (Philippines); 'reading to oneself for comprehension and for acquiring thinking skills in analysing and synthesising knowledge from the readers' (Thailand), 'construct meaning … from texts' (Brunei Darussalam)

Process: reflect

6   The reading skill of reflection is referenced within the curriculum documents of all countries. For example, in Brunei students are expected to 'Identify and discuss issues locating their evidence from the text and gradually to draw their own conclusion (Standards 3.3, EL Syllabus Year 3 2001, p.15). In Cambodia they are expected to 'Predict developments...of simple narrative texts by answering what, who, where, when, why and how questions', to 'Identify simple examples of and read and comprehend different text types, and to … identify the intended audience and purpose of examples of different non-fiction text types that contain polysyllabic words... (Khmer Basic Curriculum Standards, Reading, Grades 3 and 6)

Process: recognise words

7   Being able to read and understand words is defined as a basic reading skill in all the curriculum documents examined. For example, in this context the Lao Language curriculum document describes the variety of skills and strategies used thus: 'To develop basic literacy skills, students will develop their knowledge of letter–sound relationships. They will use this knowledge to read unfamiliar words. To improve reading fluency, they will learn to use indicators in illustrations, in headings, in knowledge of sentence grammar, and so on, to predict and check meaning. For reading fluency, they will also build up their reading vocabulary, so that they recognise many words by sight, without having to read each letter.' (Lao Language (draft), p.4) The Philippines English curriculum inlcudes 'Vocabulary Development' as of its 10 Grade Level Standards (K to 12 Curriculum Guide: English). The Thai Basic Education Core Curriculum includes the indicator 'Explain meanings of words' [in a variety of contexts] in its Reading Standards for Grades 2 to 6 (p.46).

8   While the terms used for contexts in the different curriculum documents vary, it is evident that students are expected to read texts that fall into each of the contexts identified for SEA-PLM reading: personal, local and wider world. contexts. For example, in Brunei Darussalam, students are taught to read and write based on themes referenced, ranging from 'Myself' (personal) in Year 1, through 'Celebrations/Festivals/Events '(local) in Years 2 to 4, to 'Celebrations/Festivals/Events in ASEAN' in Year 5 and Celebrations/Festivals/Events Throughout the World (wider world) in Year 6 (5.4 Primary English Language Themes – Pre School to Year 6, p. 114). In Cambodia, Grade 5 students are taught to read (and write) narratives, poems and diary entries (personal), letters and instructions (local) and newspaper reports and biographies (wider world). The Thai language curriculum includes writing about feeling and imagination (personal), texts such as letters to friends, relatives and teachers (local), and notes and reports from study and research (wider world).