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USING CONTEXTS FROM THE SEA-PLM FRAMEWORK TO DESIGN PERIODIC ASSESSMENT QUESTIONS AND EXERCISES FOR GRADE 5 MATHEMATICS IN VIETNAM

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ABSTRACT

This paper examines the application of the contextual framework of the Southeast Asia Primary Learning Metrics (SEA-PLM) programme to the design of periodic assessment questions and exercises for Grade 5 Mathematics in Vietnam. The findings clarify the characteristics of three categories of context, namely personal contexts, surrounding environment contexts, and broader environment contexts, while also identifying their alignment with the General Education Mathematics Curriculum and the three assessment levels specified in Circular No. 27/2020/TT-BGDĐT. Based on these findings, the paper proposes a number of principles for selecting appropriate contexts and developing illustrative assessment questions grounded in real-world situations. The proposed system of assessment questions demonstrates that the SEA-PLM approach contributes to a more comprehensive evaluation of students' mathematical knowledge, skills, and competence in applying mathematics, thereby enhancing the authenticity and effectiveness of periodic assessment in Grade 5 Mathematics.

KEYWORDS: Primary mathematics, Mathematics education, SEA-PLM, Grade 5 mathematics, Periodic assessment.

1. INTRODUCTION

As general education increasingly shifts from a content-based approach to a competency-based approach, the assessment of students' learning outcomes in mathematics should place greater emphasis on their ability to apply mathematical knowledge and skills to solve real-world problems. The Southeast Asia Primary Learning Metrics (SEA-PLM) programme provides an appropriate framework by constructing mathematical tasks within a variety of contexts, including personal contexts, surrounding environment contexts, broader environment contexts, and intra-mathematical contexts. This approach not only measures students' mastery of mathematical knowledge but also creates opportunities to assess their ability to analyze information, select appropriate solution strategies, and interpret mathematical results.

In Vietnam, both the General Education Mathematics Curriculum and Circular No. 27/2020/TT-BGDĐT emphasize competency-based assessment and the integration of learning with authentic real-world situations. However, the selection and use of contexts in periodic assessment questions and exercises for Grade 5 Mathematics have not yet been systematically investigated. Therefore, this paper analyzes the different categories of context employed in the SEA-PLM framework, proposes principles for their application, and illustrates these principles through a number of assessment questions and exercises that are aligned with the expected learning outcomes of the Grade 5 Mathematics curriculum in Vietnam.

2. AN OVERVIEW OF SEA-PLM

a) What is SEA-PLM?

The Southeast Asia Primary Learning Metrics (SEA-PLM) programme is a regional large-scale assessment initiative established by the Southeast Asian Ministers of Education Organization (SEAMEO), the United Nations Children's Fund East Asia and Pacific Regional Office (UNICEF EAPRO), and their regional partners [3].

b) Characteristics of the SEA-PLM programme [3]

- SEA-PLM is a large-scale regional assessment programme. In addition to the member countries in Southeast Asia, it involves a wide range of international partners, stakeholders, and non-member participating countries that collaborate in its implementation.

SEA-PLM is conducted on a regular five-year cycle, enabling participating countries to monitor the progress of their education systems toward achieving the goals of basic education, particularly primary education.

- SEA-PLM is the first international assessment programme to measure writing proficiency across multiple writing systems using a common assessment scale, reflecting the cultural and linguistic diversity of participating countries.

- SEA-PLM collects information from students, schools, teachers, and parents through paper-based assessment instruments and questionnaires. Computers and digital devices are intentionally excluded from the data collection process to ensure that the assessment of reading, writing, and mathematics among primary school students aged 10 to 12 is not influenced by unequal access to digital technology, particularly for students from disadvantaged communities and remote or rural schools.

c) Types of contexts used in SEA-PLM mathematics tasks

The SEA-PLM framework employs four categories of context: personal context, surrounding environment context, broader environment context (national and international), and intra-mathematical context.

- Personal context focuses on the individual. The problem or challenge primarily affects a single person, and solving the task requires students to consider situations directly related to themselves.
- Surrounding environment context emphasizes interactions between individuals and other people or elements of their immediate environment. Situations in this category typically involve everyday activities at home or school, within the local community, or in the workplace.
- Broader environment context (national and international) focuses on situations beyond students' immediate surroundings. These situations concern issues that may affect communities, countries, or society at the global level.

Intra-mathematical context refers to problems in which all relevant elements are purely mathematical and do not refer to real-world situations or external contexts.

3. Regulations on periodic assessment of subjects and educational activities in Vietnam

a) What is periodic assessment of subject learning?

"Periodic assessment of subject learning refers to the evaluation of students' learning outcomes after a defined period of learning and practice. It aims to determine the extent to which students have achieved the expected learning outcomes specified in the subject curriculum" [4].

"The results of periodic assessment are used to measure, analyze, and evaluate students' learning progress and achievement over a specified period and are conducted according to the assessment schedule prescribed for each semester" [4].

b) Regulations on periodic assessment of subjects and educational activities

On September 4, 2020, the Minister of Education and Training promulgated Circular No. 27/2020/TT-BGDĐT on the assessment of primary school students. According to Clause c, Article 7 of the Circular, questions and exercises used in periodic assessment of subjects and educational activities are classified into three assessment levels.

- Level 1 (Recognition). Students recognize, recall, or describe previously learned knowledge and apply it directly to solve familiar situations or problems encountered in learning.
- Level 2 (Understanding). Students connect and organize previously learned knowledge to solve problems with similar characteristics.
- Level 3 (Application). Students apply previously learned knowledge to solve new problems or provide appropriate responses in learning and everyday life.

4. Applying SEA-PLM techniques to the design of periodic assessment questions and exercises for Grade 5 Mathematics

4.1. Principles for designing questions and exercises

Principle 1. Ensuring the authenticity of real-world contexts in the design of assessment questions and exercises based on SEA-PLM techniques

One of the distinguishing characteristics of the Southeast Asia Primary Learning Metrics (SEA-PLM) programme is that assessment tasks are constructed around situations that are meaningful to students and reflect activities encountered in their everyday lives, families, schools, communities, and wider social environments.

Principle 2. Integrating mathematical content with real-world contexts

The close integration of mathematical content and real-world contexts is a fundamental principle in the design of assessment questions and exercises based on the SEA-PLM framework. Mathematical knowledge should not be presented independently of context; instead, it should be embedded in meaningful situations that allow students to recognize the practical relevance of mathematics and apply their knowledge in authentic settings.

Principle 3. Emphasizing the assessment of students' ability to apply mathematical knowledge and skills in real-world situations

One of the central orientations of the SEA-PLM programme is to assess students' ability to apply mathematical knowledge to solve problems rather than merely evaluating their ability to recall knowledge or perform calculations. Accordingly, assessment questions and exercises should provide opportunities for students to mobilize their mathematical knowledge, skills, and prior experience to analyze situations, select appropriate solution strategies, perform suitable mathematical operations, and interpret their results within real-world contexts.

Applying this principle requires assessment tasks to go beyond asking students to produce a correct answer. They should also encourage students to explain their reasoning, justify their choice of mathematical operations, interpret their results, or make decisions based on authentic data. Teachers are therefore encouraged to design multi-step tasks or tasks that integrate several requirements, such as reading and interpreting information, performing calculations, making comparisons, and providing explanations, so that students can demonstrate their thinking processes.

Principle 4. Ensuring alignment with students' cognitive characteristics and the requirements of the General Education Mathematics Curriculum

Assessment questions and exercises designed according to the SEA-PLM framework should be appropriate to the cognitive characteristics, prior experiences, and learning abilities of Grade 5 students. At the same time, they should be aligned with the expected learning outcomes and competency-oriented objectives of the General Education Mathematics Curriculum.

4.2. Designing periodic assessment questions and exercises for Grade 5 Mathematics

In this study, the contextual framework of the SEA-PLM programme is applied to the design of assessment questions and exercises. The proposed tasks are developed within personal contexts, surrounding environment contexts, broader environment contexts, and authentic real-world situations. The assessment level assigned to each task follows the three-level classification for primary school assessment specified in Circular No. 27/2020/TT-BGDĐT.

Example 1. In response to the national campaign "One Million Trees for the Environment," the Youth Team of Ngọc Liệt Primary School organized a tree-planting activity for Grade 5 students. Class 5A planted 32 trees. Class 5B planted 8 more trees than Class 5A. Class 5C planted a number of trees equal to the average of those planted by Classes 5A and 5B. Class 5D planted 5 fewer trees than Class 5C. How many trees did the Grade 5 students of the school plant altogether?

Analysis. The problem is situated within the context of the national "One Million Trees for the Environment" campaign, which is implemented on a nationwide scale. However, the mathematical task does not require students to process data related to the national campaign itself. Instead, students work with data describing the numbers of trees planted by four Grade 5 classes within their own school. Tree planting is a familiar activity that students may have experienced directly or observed, making the context meaningful and accessible while remaining consistent with the contextual design principles of the SEA-PLM framework.

Item specification

	Constructed response	Grade: 5
Answer		Solution The number of trees planted by Class 5B is: $32 + 8 = 40 \text{ (trees)}$ The number of trees planted by Class 5C is: $(32 + 40) \div 2 = 36 \text{ (trees)}$ The number of trees planted by Class 5D is: $36 - 5 = 31 \text{ (trees)}$ The total number of trees planted by the Grade 5 students is: $32 + 40 + 36 + 31 = 139 \text{ (trees)}$

			Answer: 137 trees.	
Item specification	Content strand	Cognitive process	Difficulty level	Context
	Problem-solving practice	M3	Relatively easy	Surrounding environment
Description	<i>"Solve problems involving up to four computational steps related to operations with natural numbers."</i> [1]			

Example 2. Circle the letter corresponding to the correct answer.

In 2001, Phong Nha–Kẻ Bàng National Park covered an area of 85,754 hectares [5].

In 2013, the boundary of Phong Nha–Kẻ Bàng National Park was expanded, increasing its total area to 123,326 hectares [5].



Figure 1. Phong Nha–Kẻ Bàng National Park (Quảng Trị Province)

a) In 2001, the area of Phong Nha–Kẻ Bàng National Park was:

- A. 85.754 km² B. 85.754 km C. 857.54 km² D. 857.54

b) In 2013, the area of Phong Nha–Kẻ Bàng National Park was:

- A. 1,233.26 km² B. 1,233.26 km C. 123.326 km² D. 123.326 km

Analysis. This task is based on authentic real-world data. In 2025, Phong Nha–Kẻ Bàng National Park (Quảng Trị Province) was recognized by UNESCO as a transboundary World Heritage Site. The assessment requires students to apply their understanding of area units in a meaningful real-world context.

Item specification

	Multiple choice test	Grade: 5		
Answer		a) Option C - Option A: incorrect conversion of measurement units. - Option B: represents a unit of length rather than a unit of area. - Option D: represents a decimal number rather than a measurement of area. b) Option A - Options B and D: represent units of length rather than units of area. - Option C: incorrect conversion of measurement units.		
Item specification	Content strand	Cognitive process	Difficulty level	Context
	Measurement	M1	Relatively easy	Broader environment
Description	- “Recognize the units of area: square kilometre and hectare” [1].			

Example 3.

Mai's family lives in Hanoi. During this summer vacation, her parents organize a family trip to Nha Trang. Mai's family consists of her grandparents, both over 70 years old, her father, her mother, and Mai. They visit VinWonders Nha Trang at 9:00 a.m.

Ticket Type	 Guests 140 cm and taller	 Guests from 100 cm to under 140 cm	 Guests over 60 years old	 Guests under 100 cm
 Standard Admission Ticket + Round-trip Cable Car	1,050,000 VND	800,000 VND	800,000 VND	FREE
 Admission Ticket after 4:00 p.m. + Round-trip Cable Car	700,000 VND	550,000 VND	550,000 VND	FREE

Figure 2. Admission ticket prices for VinWonders Nha Trang [6]

How much does Mai's family have to pay for the admission tickets to VinWonders Nha Trang? Assume that Mai is 138 cm tall.

Analysis. This problem is based on an authentic real-world situation. The context is familiar to primary school students, as it involves travelling with family and purchasing admission tickets. Students are placed in a situation that they may have experienced themselves or can easily imagine. The required calculation supports a family's spending decision rather than addressing an issue at the community or societal level. Therefore, the task is situated within a personal context.

Item specification

	Constructed response	Grade: 5
Answer		Solution The total admission fee for Mai's grandparents is: $800,000 \times 2 = 1,600,000 \text{ (VND)}$ The total admission fee for Mai's parents is: $1,050,000 \times 2 = 2,100,000 \text{ (VND)}$ The total admission fee for the whole family is: $1,600,000 + 800,000 + 2,100,000 = 4,500,000 \text{ (VND)}$ Answer: 4,500,000 VND.

Item specification	Content strand	Cognitive process	Difficulty level	Context
	Measurement in practice	M3	Relatively difficult	Personal context
Description	“Perform calculations involving the use and exchange of money” [1].			

Example 4. Read the chart and complete the following statements.

a) The chart shows _____.

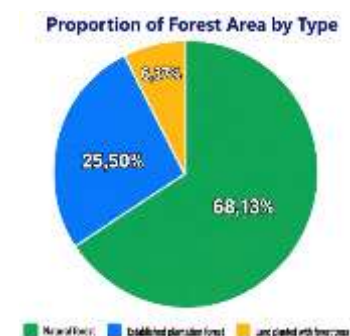
b) The proportion of natural forest is _____.

The proportion of successfully established planted forest is _____.

The proportion of newly planted forest is _____.

c) The largest forest area is _____.

The smallest forest area is _____.



Analysis. This problem uses authentic data presented in a pie chart [7]. Students apply their knowledge and skills related to pie charts to read, interpret, and describe the information displayed.

Item specification

	Fill in the blanks	Grade: 5
Answer	Read the chart and fill in the blanks.	a) The chart shows the proportions of different types of forest area. b) The proportion of natural forest is 68.13%. The proportion of successfully established planted forest is 25.50%. The proportion of newly planted forest is 6.37%. c) The largest forest area is natural forest. The smallest forest area is newly planted forest

Item specification	Content strand	Cognitive process	Difficulty level	Context
	Statistics	M3	Easy	Broader environment
Description	- “Read and describe data presented in a pie chart.” - “Solve simple problems involving data presented in a pie chart” [1].			

Example 5. The revenue from transportation services in Lạng Sơn Province in January 2026 was as follows [8]:



Figure 3: Illustration of transportation revenue in Lạng Sơn province in January 2026

- Arrange the modes of transportation in ascending order of revenue.
- By how many billion Vietnamese dong does the revenue from freight transportation exceed that from passenger transportation?
- What was the total transportation revenue of Lạng Sơn Province in January 2026?

Analysis. This problem reflects an economic activity of Lạng Sơn Province. Although students do not participate directly in transportation services, they are required to use authentic data to analyze

information, perform calculations, and solve the given problems. Therefore, the task is situated within a broader environment context.

Item specification

	Constructed response	Grade: 5		
Answer		Solution		
		a) Freight transportation; warehousing and transportation support services; passenger transportation; postal and courier services. b) The revenue from freight transportation exceeds that from passenger transportation by: $197.06 - 29.38 = 167.68 \text{ (billion VND)}$ Answer: 167.68 billion VND. c) The total transportation revenue of Lạng Sơn Province in January 2026 was: $29.38 + 197.06 + 134.45 + 22.89 = 383.78 \text{ (billion VND)}$ Answer: 383.78 billion VND.		
Item specification	Content strand	Cognitive process	Difficulty level	Context
	Decimal numbers and decimal calculations	M2	Relatively easy	Broader environment
Description	- “Arrange decimal numbers in ascending order within a group of four decimal numbers” [1]. - “Solve problems involving one or several computational steps related to operations with decimal numbers” [1].			

5. CONCLUSION

Applying the contextual framework of SEA-PLM to the design of periodic assessment questions and exercises for Grade 5 Mathematics represents an appropriate approach that is consistent with the

current direction of educational reform and competency-based assessment in Vietnam. The findings indicate that personal contexts, surrounding environment contexts, and broader environment contexts can be selected flexibly to transform mathematical knowledge into meaningful assessment tasks. Such tasks assess not only students' ability to recall knowledge and perform calculations but also their competence in interpreting data, reasoning mathematically, selecting appropriate solution strategies, and explaining results within authentic contexts.

The illustrative assessment tasks concerning tree planting, forest areas, admission ticket purchases, and transportation revenue demonstrate that Grade 5 mathematical content can be embedded in a wide range of real-world situations while remaining fully aligned with the expected learning outcomes of the curriculum and the three assessment levels specified in Circular No. 27/2020/TT-BGDĐT. Therefore, teachers should select contexts purposefully, prepare clear item specifications, and regularly pilot and refine assessment tasks in order to enhance their reliability, validity, and practical relevance.

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