

Primary Section – Keynote I

**Mathematical Literacy – What, Why, and How?**

Dr Fong Ho Kheong (Founding President of AME)

**Synopsis**

The lecture will address the theme: Mathematical Literacy from three different perspectives - pragmatic values, mathematization and application of mathematical knowledge. The demand from societal communities has made mathematics educators review and recommend mathematics curricula that caters to societal needs besides other 'mathematical' values. How the young are to be molded and the ways institutions, curriculum developers, schools and teachers cater to these needs will be addressed in this presentation. The presentation will include examples that develop mathematical literacy and assessment items that could be used in school examinations.

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Primary Section – Keynote II

**Relating Literacy to Mathematics Learning**

A/P Douglas Edge (MME/NIE)

**Synopsis**

The term 'literacy' is typically related to some notion of competence that will allow someone to function at some acceptable level in his or her daily and work-place life. Literacy therefore must be understood in terms of one's culture. But cultures are not static. Mathematical literacy then can be examined in the context of change. Four categories of change are highlighted for discussion: content (statistics, activity-based geometry, and algebra as pattern seeking), process (problem solving now to include modeling and representation), technology (computers, calculators, and web-based learning), and communication (use of language in projects and journals). Changing assessment options must also be considered if curriculum changes are to be effective. In this presentation curriculum changes will thus be examined and illustrated in relation to the new primary school curriculum changes.

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Secondary Section – Keynote I

**Mathematical Literacy – The Case of Quantitative Reasoning**

Dr Liu Yan (CRPP/NIE)

**Synopsis**

Quantitative literacy is commonly referred to as the capacity to deal effectively with quantitative aspects of life. However, this capacity is also referred to by other terms, such as numeracy, mathematical literacy, quantitative reasoning, and sometimes just plain

“mathematics”. Although quantitative literacy has gained increasing recognition of its importance in the teaching of mathematics, there is little agreement on just what it is.

In this lecture, I will start by discussing the meaning of quantitative literacy and move on to quantitative reasoning, a more well defined and more researched concept. I argue that it is more useful for teachers to study and to understand what it is and how to teach quantitative reasoning as it is the foundation for algebraic and statistical reasoning. After discussing the meaning and importance of quantitative reasoning, I will present an empirical study in which a group of 16 Singapore primary and secondary students’ quantitative reasoning is investigated. The students’ reasoning about a quantitative situation will be unpacked and analyzed to highlight the complexity and difficulties of reasoning quantitatively. I will conclude the lecture by discussing the possible instructional strategies that enhance quantitative reasoning.

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### Secondary Section – Keynote II

#### Multiple “Literacies” of Representations – The Case of the Model Method and Letter Symbolic Algebra

A/P Ng Swee Fong (MME/NIE)

##### **Synopsis**

Knowledge of letter-symbolic algebra is vital for algebra is the gateway to higher mathematics. In Singapore, secondary students are literate with multiple modes of representation, including that of the model method. Because of their knowledge, letter-symbolic algebra may not be the tool of choice to solve linear algebra word problems. Because of the power of letter-symbolic algebra, teachers are concerned by students who continue to use the model method, a more rudimentary form of representation. In this talk, I will use findings from a number of related studies to explore the links between the two methods, and how these links could be exploited such that students are encouraged to use letter-symbolic algebra.

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### Junior College Section – Keynote I

#### Reading and Writing Mathematics

Dr Tay Eng Guan (MME/NIE)

##### **Synopsis**

Leong [1995] observed that when one says that mathematics is a language, he does not mean the visual or even oral aspect of it. Just imagine a universal linguist (AUL for short) who is able to read any written human language on earth. Given a proof of a mathematical statement, would AUL be able to understand it? Would the mathematical statement itself make any sense to her? More importantly, would she be able to tell

whether the proof is correct? Steen [1999] stated that ‘quantitative literacy – or numeracy, as it is known in British English – means different things to different people’. He then proposed that quantitative literacy is both more than and different from mathematics – at least as mathematics has traditionally been viewed by school and society.

Surely, quantitative literacy by any definition must include the abilities to read and write mathematics [Whitin and Whitin, 2000]. Perhaps the debate should focus on the level of mathematics. Would an adult who can understand a chart published in the financial section of a newspaper but is unable to comprehend a written proof for the infinitude of primes be considered literate in the quantitative sense? Just as English literacy, as an example, has levels ranging from Enid Blyton to William Shakespeare, we would expect different levels of quantitative literacy. Following this analogy, we would expect a somewhat Shakespearean level for the quantitative literacy of mathematics majors in junior college and university. However, anecdotal knowledge suggests that undergraduate students generally do not and often cannot read mathematics textbooks and journals.

This lecture discusses the possibility, or even the need, for teaching reading and writing of mathematics at the junior college and university levels. It also suggests some modes of assessment borrowed from the traditional teaching of language.

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Junior College Section – Keynote II

**Singapore’s Junior College Students’ Literacy and Competence in Mathematics**

Ms Jenny Loong Choo Juan (Balestier Hill Secondary School) &  
A/P Berinderjeet Kaur (MME/NIE)

**Synopsis:** Loong (2004), in her study investigated the literacy and competency in mathematics of 223 junior college students. Using an adapted version of the TIMSS 1995 Population 3 instrument and a survey, she was guided by four research questions that helped her to compare the performance of JC students with their international peers as well as amongst themselves. During this lecture Loong and Kaur will share with participants the findings of the study and implications for JC mathematics teachers.