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Guest Editorial

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Guest Editorial:

Mathematics teaching and learning in Malaysia: Contemporary issues and challenges

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In the broadest sense, this issue is related to mathematics education in Malaysia. One of the major aims of having this special issue is to disseminate and share the latest empirical and theoretical findings in Malaysia. All the articles cover different research areas in mathematics education such as assessment, gender, textbook analysis, mathematical modeling, teaching and learning of specific content areas in mathematics such as multiplication and complex numbers. These studies were performed in Malaysia and involved different levels of mathematics ranging from primary schools to university. Even though these research studies were based in Malaysia, the research findings may be relevant to other parts of the world with an aim to improve the teaching and learning of mathematics.

The process of teaching and learning of mathematics is complex and it can be explored from many different perspectives. Hence, this issue has articles with a variety of research areas and methods so as to expose international readers to some of the research projects that are currently being pursued by the mathematics education community in Malaysia. The underlying universal aim for all these articles is to improve the teaching and learning of mathematics globally in particular Malaysia.

The first article by Sia and Lim aimed to compare the knowledge state in the learning of time among primary pupils from different types of schools in Penang, Malaysia. This study involved two hundred and sixty-nine Primary Six pupils from 11 primary schools. The instrument used was the Cognitive Diagnostic Assessment(CDA) that consists of 35 items. The findings found that most common knowledge state in each cognitive model for each type of school was similar but with Chinese vernacular school performing slightly better than the rest.

The second article by Zaleha, Tan and Mira conducted a quantitative study to examine the numeracy competency of primary-school aboriginal students and investigate the relationship

between their performances in written and oral tests. 87 aboriginal students in Johor participated in this study that involved them taking the written numeracy test. The results showed that the students were at the moderate level in numeracy. Furthermore, there was a statistical significance between the student's written and oral tests. This study suggests that continuous efforts to improve numeracy competency among aboriginal students should be given serious attention

In the third article by Kor And Lim explored the use of photovoice, a reflection technique on what is good mathematics lesson as perceived by primary pupils. Six 11 year old pupils were selected as participants and they were interviewed to gather information. This study found that primary pupils valued "concrete examples", "drill and practice", and "board work" as characteristics of a good mathematics lesson. Using photovoice provided an alternative approach for researchers to elicit pupils perspective.

The fourth article written by Leong and Tan focuses on mathematical modelling competencies of secondary students in the state of Selangor. This was done using a qualitative analysis of 20 students responses in a modelling task. The three modelling competencies that were tested include (1) making assumption; (2) computing and interpreting solution; and (3) mathematical reasoning. The findings indicated that most students were basic users while a small percentage reached the proficient users level.

The fifth article by Suppiah Shanmugam examines the the presence of gender Differential Item Functioning (DIF) for mathematics computation items among non-native speakers of English. In addition, the study also examines the relationship between gender DIF and characteristics of mathematics computation items. The sample consists of 988 boys and 1381 girls from 12 secondary schools in Penang and 5 schools in Perak. The findings revealed that seven items were considered as DIF, with two items considered moderate DIF while one item was a large DIF. Interestingly, the computation items with one step operation that assesses lower-order thinking skills favour girls, while items that assess higher-order thinking skills favour boys.

The sixth article by Jiew and Chin intends to exemplify a framework based on an empirical study that explored how a mathematics expert teacher makes sense of multiplication. This was done by interviewing an experience mathematics teacher with over 30 years of classroom teaching. The findings suggested that when changes of meaning occur, supportive or problematic conceptions might arise and these either support or inhibit learners from building a coherent understanding. This study also showed that supportive conceptions might contain problematic aspects and problematic conceptions might contain supportive aspects.

The seventh article by Velayutham compares the ideational meaning of visual forms in worked examples from the Grade 7 mathematics textbooks in Malaysia and Singapore. The study focused on the Lines and Angles chapter only. Document analysis and coding were used in analysing the 57 geometrical diagrams found in the textbooks used in a 20-year period. The Malaysian textbook contained several narrative diagrams while the Singapore textbook gave importance to conceptual diagrams. The findings provide valuable information for educators in general to 'read' the ideational meaning of geometric diagrams and to construct better visual representations, especially in school textbooks.

The eighth article by Low and Chew investigated the perceptual flexibility with mathematical elements without explicit hints. Two fundamental mathematical tasks involving linear equations were administered to 147 fresh pre-university students from a private college. The emergent textual responses were qualitatively classified and the frequencies of the various types of response evaluated. The findings suggests that the participants' lack of flexibility in mentally reconfiguring perceptual elements using the perceptual perspective of Gestalt psychology. Thus, the article proposed instructional efforts that may enhance students' perceptual flexibility.

The ninth article by Lee, Lim and Leong discussed the use of mathematics writing workbook as a practical approach to guide the students in the problem solving process. Thirty foundation students were involved in this six week study of writing to solve mathematical problems. This study used the exploratory case study analysis to analyse the written contents of the participants' mathematical writing workbook, the performance of their formal test as well as their perceptions of mathematical writing. In short, mathematical writing assisted students in visualizing and recognising their problem solving behaviours in words.

The tenth article by Chin and Jiew proposed the notions of knowing and grasping of a mathematics concept. This study illustrated how these notions can be used to describe the understanding of students regarding complex numbers. Data was collected through questionnaires and follow-up interviews of two third year undergraduate mathematics students to illustrate the subtle distinctions between "knowing" and "grasping". This study found the importance of creating the necessary experience for learners to make sense of complex numbers so that learners can build from their existing knowledge in real numbers which may conflict with complex numbers.

The final article by Chia intends to characterise the pedagogical practices of mathematics teachers at the primary level. This study involved 45 primary mathematics lessons taught by 24 mathematics teachers in six national primary schools (SK) and six Chinese vernacular primary schools (SJKC). Using the qualitative data observed from two main activities in the classroom, which are teacher's activities and pupils' activities. The results showed that mathematics lessons conducted by SK teachers focuses on pupils in individual seatwork so as to assess pupils' understanding. Conversely, SJKC teachers were more involved in explaining mathematical concepts to help the pupils build up their conceptual understanding.