

AN INVESTIGATION OF FACTORS THAT CONTRIBUTE TO RURAL STUDENTS' MATHEMATICS ACHIEVEMENT: A STRUCTURAL EQUATION MODELING APPROACH

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Abstract

The purpose of the study is to examine the direct and indirect effects of basic concepts of mathematics, mathematics problem solving abilities, prior knowledge of mathematics, and attitudes towards mathematics on students' mathematics achievement in the rural schools of Sabah, Malaysia. A Structural Equation Modeling (SEM) approach is used to propose a direct and indirect effects structural model to predict students' mathematics achievement. The research findings bring some meaningful implications to those who are directly or indirectly involved in the research and development of mathematics education and training of mathematics teachers especially in the rural schools of Sabah, Malaysia.

Background of the Study

The progressiveness of a nation is very much dependent on the generation of new ideas which will act as a catalyst to the development of the nation. In an effort to achieve the status of a developed nation, the Malaysian government had initiated and documented a vision to be achieved by the year 2020. Among the nine strategic challenges identified, the sixth strategic challenge is to establish a scientific and progressive society, a society that is innovative and forward-looking, one that is not only a consumer of technology but also a contributor to the scientific and technological civilization of the future (Mahathir Mohamad, 1991). The core of this vision needs Malaysian to possess high scientific and technological skills to enable the people to be involved directly and indirectly in the up-stream and down-stream of science and technology activities.

The most fundamental and powerful human resource is intelligence where it is important not only to have a good brain but also to have the ability to use it and to ensure that it is functioning effectively. Hence, mathematics plays a very important role to prepare and equip Malaysian students with appropriate cutting edge knowledge and skills to enable them to realise our nation's vision as a developed nation in the year 2020.

Researchers in the field of mathematics education had proposed a few factors which showed significant relationships with mathematics achievement. Among these factors are prior knowledge of mathematics (e.g. Yee, 1995; Norhannan, 1998), basic concepts of mathematics (e.g. Sufean, 1987; Norhannan, 1998; Zuraidi, 1999), problem solving skills (e.g. Norrahidah, 2000; Maizan, 2001; Stevens et al., 2004), and attitudes towards mathematics (e.g. Aranador et al., 1998; Zuraidi, 1999; Stevens et al., 2004).

The Study

Problem Statements

Malaysia took part in the Third International Mathematics and Science Study – Repeat, TIMSS-R (1997 – 2000) organized by the 'International Association for the Evaluation of Educational Achievement' (IEA). 38 countries from all over the world took part in this study. In the Malaysia context, the study was conducted in October 1998 and 5,713 Form Two students at average age of 14.4 years were involved as respondents. Some of the important findings were as follows:

- i) Malaysia was at the 16th place for mathematics with average score of 519. This score was significantly different from the international average score, 487;
- ii) Generally, Malaysians students' overall performances in mathematics were low especially for the 'highest 10%' and 'upper quartile' benchmarks as compared to countries like Singapore and Japan.
- iii) Malaysia was at the 9th place for 'Fractions and numbers'; 16th place for 'Measurement and geometry'; 17th place for 'Algebra' and 22nd place for 'Data representation, analysis and probability'.

Based on the TIMSS-R (Ministry of Education, 2000) results, several issues which need to be addressed emerged. Some of the issues are: Why were our students' mathematics achievement not satisfactory as compared to students from other countries such as Chinese Taipei, Singapore, Japan, Korea, and Hong Kong? In the Malaysian education system, problem solving and thinking skills are given much emphasis in the teaching and learning of Mathematics. However, are students' mathematics achievement influenced by their basic concepts, prior knowledge, problem solving abilities, and attitudes towards mathematics? To what extent