Research Summary

Students at the pre-university level need to be equipped with adequate level of mathematical and scientific thinking. Teachers trying to tailor their instructional activities and strategies to develop thinking skills often wonder whether they have succeeded in improving students' thinking. Hence, the purpose of this study is to assess the pre-university students' level of mathematical and scientific thinking and teachers' practice towards developing students' mathematical and scientific thinking in Malaysia and Japan. Besides that, this study also assessed Malaysian and Japanese students' perception toward Chemistry and Physics. The study is aimed at finding answers to the following questions: 1. What is the level of mathematical thinking of pre-university students in Malaysia and Japan? ; 2. What kind of tasks given by pre-university teachers in Malaysia and Japan help in developing students' mathematical thinking?; and 3.What are the process of teaching and learning of pre-university teachers in Malaysia and Japan for providing and not providing students with task that help in developing mathematical thinking? 4. What are the Malaysian and Japanese students' perception towards Chemistry? 5. What is the level of performance in solving Physics problems among Malaysian and Japanese pre-university students? Both quantitative and qualitative methods were used in this study to collect data. Respondents were students from two schools in Japan and Malaysian students undergoing a preparatory course for entry into engineering course in Japan. The findings showed that in both of countries more than 70% of the pre-university students were at the procedural and conceptual knowledge stage in Mathematics. The existing style of teaching and learning of pre-university teachers in Malaysia and Japan are very much teacher centered. For Chemistry, Malaysian students preferred to explain electronic structure of metals to account for differences in reactivity whereas Japanese students preferred to explain using ionization. For Physics, it was found that Japanese students approached Physics problems by first determining the concepts, while Malaysian students decided on the formula to apply. The amount of information presented in rather massive. Students in both Malaysia and Japan regarded Mathematics as the most interesting subject followed by Chemistry and Physics. Another finding is that students in both Malaysia and Japan noted the importance of essay questions but still exhibited a preference for answering short structured questions in test. The overall findings are significant in helping educators prepare pre-university Malaysian students for further study in Japan.

Keywords: Mathematical thinking, Chemistry, Pre-university students, Procedural, Conceptual, Spatial Reasoning, Teacher –Centered.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

1. Presenting paper at Faculty of Education Seminar, 15 August 2008, Mathematical Thinking Among Malaysian and Japanese Pre-University Students.

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

Mathematical and Scientific Thinking of Pre-University Students in Malaysia and Japan (In process of Printing). McGraw Hill: Kuala Lumpur

Book (Publisher and Date of the Book, Title and Author of the Book, etc.)

Assessing Mathematical and Scientific Thinking of Pre-University Students (In process of arranging materials)