Enhancing STEM Education during School Transition: Bridging the Gap in Science Manipulative Skills

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The lack of exposure to practical work in primary schools leads to incompetency in manipulative skills and students may carry this problem with them to secondary school. To address this issue, an in-depth qualitative study was conducted during transition from primary to secondary school. The research involved 10 primary school students (grade 6) who were interviewed again in secondary school (grade 7). Manipulative skills during transition can be described by understanding of technical skills and functional aspects of performing laboratory tasks. Findings indicated that students’ cognitive knowledge did not reflect their true ability in manipulative skills. Further collaboration between primary and secondary schools should be considered in order to bridge the gap during transition.

Keywords: experiments, functional aspect, science manipulative skills, STEM education

INTRODUCTION

In line with Malaysian aspirations to be a fully developed and industrialized nation by 2020, much emphasis has been placed on the importance of science and the effective teaching and learning of science in schools. The creation of a scientific and progressive society that is innovative, creative, and able to contribute to future technological development is high placed on the national agenda. Under the Ninth Malaysia Plan (2011-2015), the Malaysian government continues its effort toward attaining the status of K-economy (knowledge-based economy) advancing from P-economy (production-based economy). With the advent of information technology and a knowledge-based economy, the mastery of science and technology among school students is vital to produce knowledgeable and competent human capital with adequate capabilities and creativity to lead this nation in attaining developed nation status by 2020. Through science, technology, engineering and mathematics (STEM) education, technological development can be further upgraded to meet the present challenges.

Science education in Malaysia is facing a great challenge. In regard to international studies, for example, the trends in International Mathematics and Science Study (TIMSS) have shown disturbing trends among Malaysian students. The findings from the TIMSS suggest that the declining attitudes toward science education constitute an international trend. In Malaysia, the TIMSS science score in 2007 has decreased radically to 471 points, 40 points lower than the score of TIMSS 2003. Amongst 59 countries taking part in TIMSS 2007, the cumulative score of science achievement for Malaysia Form 2 (grade 8) students show the most significant decline compared to other countries. TIMSS 2011 revealed the same trend with science decreased to 456 points, 45 points lower than the score in 2007 (IEA, 2012).

Besides the poor performance in international studies, we also have not achieved the 60:40 policy. The Higher Education Planning Committee aims for 60% science stream and 40% art stream students at upper secondary school. This issue is clearly evident when only 20% of the 472,541 students who sat for the Malaysian Certificate of Education or commonly known at SPM (a national examination taken by all grade 11 students in Malaysia) in 2012 were science-stream students. The decrease in the number of students in the science stream is alarming. At tertiary education, statistics indicated that...