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# PARENTAL ROLE AND CHALLENGES IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM)

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### *Abstract*

The decline in interest for science, technology, engineering and mathematics (STEM) is a critical concern and parents said to hold the key to the issue. An up-to-date examination of the literature regarding parents' involvement in STEM needed. Thus this paper presents an overview of the literature on parental role in STEM. Two themes have emerged from the literature review: i) parents as the best influencer towards children interest in science, ii) parental academic expectation and parental support. Besides, this paper also to bring to the light challenges of supporting parents with STEM in Malaysia. In order for parents to play their role properly in increasing the number of students choosing STEM stream, parents have to be expose with STEM and parents need to be informed about why STEM is importance. The information can be spread through PIBG at school and programmes with parents. It is very importance to make the parents more aware and understanding a clearer picture of the government's desire as set out in PPPM 2013-2025.

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## 1. Introduction

Like other developed countries, Malaysia called for experts in Engineering, Science, Medicine, Technology and related sector. According to Education Minister Dr Maszlee Malik, there will be new STEM careers by 2020. These careers consist of technicians, doctors and the Industrial Revolution 4.0 careers, such as programmers and data scientists (Chin, 2019).

However, lack of interest in Science will affect government initiatives to boost innovation and technology in order to be one of high-income countries in the future. Therefore, among the efforts made by the Ministry of Education Malaysia (MOE) to increase the resources of skilled labour and experts in research and industry is through strengthening STEM education (Bahrum et al., 2017). STEM education can be defined as a lifelong education that includes the integrated learning of STEM-based on informal curriculum through co-academic activities and co-curriculum and informally through indirect learning for every level age of group, starting from the early childhood, primary education, lower secondary education, secondary education, tertiary education, and industrial level or community (Pimthong & Williams, 2018).

Formerly STEM education known as SMET (Science, Math, Engineering and Technology). Later, the National Science Foundation (NSF) changed the term to 'STEM', an abbreviation from the words of 'Science, Technology, Engineering and Mathematics' to make it easier to articulate and enhance its meaning for each element. In the context of Malaysia, STEM refers to the educational policy and choice of the school curriculum to enhance the competitiveness of science and technology for students. This reflected in the Malaysian Education Development Plan 2013-2025 (PPPM 2013-2025) which emphasizes STEM education at the school level through curriculum and co-curricular activities with the support of various stakeholders (Lah, 2018).

## 2. Problem Statement

According to Education Minister Dr Maszlee Malik in his keynote address at the Bett Asia Leadership Summit and Expo 2019, the total of students taking science, technology, engineering and math (STEM) subjects drops every year. Based on reported statistics, 44% of Malaysian students took STEM fields compared to 49% in 2012 and this denotes an average reduction of about 6,000 students every year (Bernama, 2019a). The decreasing attentiveness in STEM showed in the 2018 Sijil Tinggi Persekolahan Malaysia (STPM) outcomes. According to the analysis report by Malaysian Examination Council STPM, 4,566 students took science subjects in the 2018 STPM, compared to 5,475 students took in 2017 (Chin, 2019). The Energy, Science, Technology, Environment and Climate Change Ministry (MESTECC) is concerned over the decreasing trend for students' interest in STEM subjects (Bernama, 2019c).

The decreasing number of students in STEM is a serious issue. According to Chairman of the National Stem Movement, Datuk Prof Dr Noraini Idris, the problem comes from various factors, including the parents who took the safer way by choosing art stream to guarantee that their children success in the Sijil Pelajar Malaysia examination (Bernama, 2019a).

Parents are contributing to the decline in the number of students taking STEM subjects. In 2018, merely 23% of students in upper-secondary schools were choosing pure science. The decline in interest for

STEM is a critical concern and parents hold the key to the issue, where they have to boost their children about the value of science and technology (Bahrum et al., 2017).

Based on the above, parents said to be the key to the problem concerned. Thus, the aim of this paper is to give an overview of literature on parental role and challenges of supporting parents with STEM in Malaysia. An up-to-date examination of the literature regarding parents' involvement in STEM needed for further research.

### **3. Research Questions**

Research questions in this study:

3.1. What are the main role played by parents in STEM?

3.2 What are the main challenges of supporting parents with STEM in Malaysia?

### **4. Purpose of the Study**

This conceptual paper aims to gain adequate understanding on parental role in STEM that said to be the key in the issue of downtrend number of students in STEM stream. Besides, this paper also aims to bring to the light challenges of supporting parents with STEM in Malaysia.

### **5. Research Methods**

In this study, for literature overview, researchers' use secondary sources such as published research work, research articles, conference papers, dissertation and books.

### **6. Findings**

#### **6.1. Parental Role in STEM**

##### **6.1.1. Parents as the best influencer**

Parents play an important role in the educational decisions of their children (Milner-bolotin, 2018). According to Sultana and Rosli (2016), parents were the best influential social agents on children. They have the power to decide on which school their children should attend (Butler & Hamnett, 2012). Their role is very important in influencing and motivating their children to success (Fletcher et al., 2010).

Besides, pervious researchers found that parents advice was sought frequently compared to advice sought from teachers and friends (Nugent et al., 2015; Sahin et al., 2015; White & Harrison, 2012). They are able to shape their children interest towards science (Buday et al., 2012; Halim et al., 2018; Maltese & Tai, 2011; Nugent et al., 2015; Rice et al., 2013; White & Harrison, 2012). Parents' inspirational attitudes towards science will influence children enrolment in the science stream (Maltese & Tai, 2011).

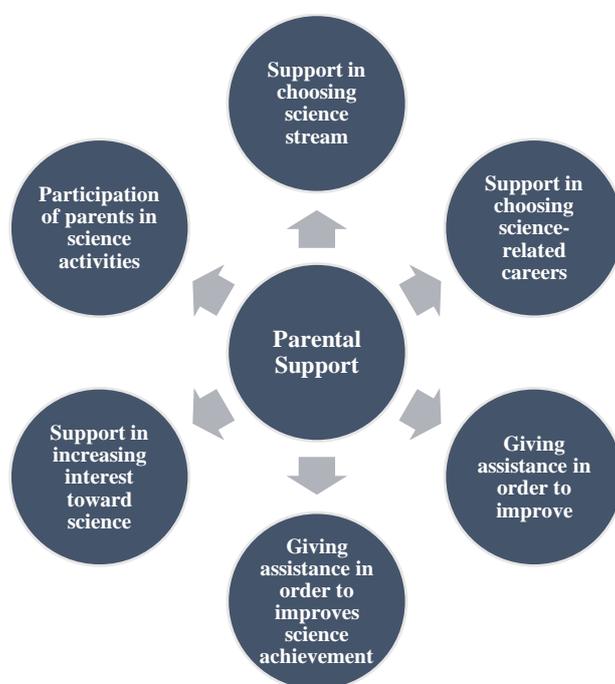
According to Lukaš (2015), parents who can influenced their children are parents who have enough info and assist their children in the progress of making right decisions. Therefore, parents have to understand the importance of STEM subjects. With that, parents can help shape their children, which will

then assist policymakers to better structure programs to bridge the gap between society and science at large (Romlee, 2019).

Dustmann (2004) found that the parental background for example parents' working environment, job, and peer group of parents seem to play vital roles for children's education. The expectations and perceptions of parents in choosing education for their children are also subject to the demographic characters or background of the parents (Edmark et al., 2014; Butler & Hamnett, 2012; Fletcher et al., 2010).

### 6.1.2. Parental support and parental expectation

According to Halim et al., (2018) parental role in the growth of interest toward Science can be categorized into two factors: a) parental academic expectations; where parents observe and aware of their children achievement, and b) parental support; which can be divided into six (See figure 1).



**Figure 01.** Parental Support towards Science

As shown in Figure 01, it is understood that parental support can be in many ways. Parents can support their children in terms physically or mentally in order to growth their children's awareness towards science. Physically, parents can provide tuition classes, send their children to science programme, provides necessities for science activities and participate together with children in any science programme. They also can support mentally by giving motivation and participate in children activities in school.

## 6.2. Challenges of supporting parents with STEM in Malaysia

### 6.2.1. Parents' limited awareness about STEM:

The 2008 survey led by the Malaysian Science and Technology Information Centre (MASTIC) found that public awareness of selected science and technology is lower in Malaysia if compared to USA,

Europe, South Korea, and India. Academy of Sciences Malaysia chief executive officer Hazami Habib said Bernama that parents were sending out the “wrong signals” on STEM, thus killing their children’s interest in these subjects (Bernama, 2019b).

### **6.2.2. Perceived difficulty of STEM subjects:**

Some parents believed STEM subjects are difficult to success compared to Arts. This results in their children choosing the Arts stream instead of the Science. They give advice to their children to take “easier” subject in order to excel in SPM. The perception of parents needs to change. The mindset such as science subjects are difficult to score should be shifted to science can be fun (Romlee, 2019).

### **6.2.3. Perceived limited STEM job opportunities:**

There are parents who believed job opportunities are restricted when the children graduate from science programmes at universities (Sani, 2019). Previous research showed that, in Malaysia, more girls are pursuing their study in higher education learning if compared to boys. However, the total of girl in STEM field is less compared to boys (Halim et al., 2018). There is also perception that STEM related career only suitable for men. Women are said not good enough compared to men (Chin, 2017).

## **7. Conclusion**

As a conclusion, based on previous literature, there is no doubt that parents’ have an important role in nurturing their children to be interested in science and related subject. Parents are the best influencer and have the authority to decide on their children education. However, as mentioned by Lukaš (2015), parents who can influence their children are those who have information. If we look back to the challenges of supporting parents with STEM, parents in Malaysia have lack of awareness about STEM and have wrong perception about STEM. With those problems, parents cannot influence their children correctly. That is why parents tend to give “wrong signal” to their children about STEM as mentioned by Academy of Sciences Malaysia chief executive officer Hazami Habib (Bernama, 2019b).

Therefore, in order for parents to play their role properly in increasing the number of students choosing STEM stream, parents have to be expose with STEM and parents need to be informed about why STEM is importance. The information can be spread through PIBG at school and programmes with parents. It is very importance to make the parents more aware and understanding a clearer picture of the government's desire as set out in PPPM 2013-2025.

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