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Global Conferences Series:
Social Sciences, Education and Humanities (GCSSSEH), Volume 4, 2020
International Conference on Special Education In South East Asia Region 10th Series 2020
DOI: https://doi.org/10.32698/GCS-04321

Implementing Inclusive Pedagogical Approach in Stem Learning for Under-Enrolled School in Malaysia

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Abstract: What do you understand by inclusive? While inclusive has many meanings, Malaysia Education Plan 2013 – 2025 has put under-enrolled schools in the inclusive education programmes as one of its targeted mission to enable equity education for all in Malaysia. Nevertheless, as reported in the Malaysia Education Plan 2013 – 2025, Malaysia is also facing a declining in Science, Technology, Engineering, and Mathematics interest among school children. This article aims to review the literature on inclusive pedagogical approach for Science, Technology, Engineering and Mathematics learning practices that focus on the under-enrolled schools in Malaysia, which account for 7% of total primary school enrolment. This article further discusses six pedagogical strategies in under-enrolled schools. The strategies are (i) flexible method, (ii) group and individualize teaching & learning method, (iii) Class teaching & learning method, (iv) Peer coaching teaching & learning method, (v) contextual teaching & learning method, and (vi) the same level of ability teaching & learning method. It is claimed that these pedagogical strategies would help teachers to prepare their classroom activities, especially for Science, Technology, Engineering, and Mathematics learning practices. Thus, it is essential to be cleared that the strategies proposed by the Ministry of Education are to uplift teachers' knowledge for the under-enrolled schools' classroom activities. Finally, it was discussed on the impact of these pedagogical approaches for the learners.

Keywords: Stem Learning; Inclusive Pedagogical Approach; Under-Enrolled School

INTRODUCTION

The Ministry of Education of Malaysia (MOE) aims to increase participation and student interest in STEM through the STEM Strengthening Initiative highlighted in the Malaysian Education Development Plan (PPPM) 2013-2025. Through this initiative, MOE aims to ensure that the number of pupils eligible to join the area of STEM at the tertiary level would satisfy the MOE blueprint. It is also stated that the implementation of the STEM approach aims to generate human capital that possess knowledge, skills, values, and cultivate the STEM culture in the workplace (PPPM 2013 -2025).

This implementation will also involve under-enrolled schools concerning multigrade classes in Malaysia although the number of students are fewer than 30 . The multigrade classes structure is also known as combination classes. Vincent & Ley (1999) suggested that multigrade classroom defined as two adjacent grade levels in one classroom. As in the context of Malaysia, Year 4 combines with Year 5, and, Year 2 combines with Year 3. The combination classes is within the framework of an inclusive approach to education, where learning environments are fostered and individual needs are met, and every student has the opportunity to succeed. (UNESCO, n.a.).

Within 2018 and 2019, a supervision were conducted to ensure teachers and school leaders would organize classes accordingly.

According to UNESCO, inclusive education is seen as "a process that addresses and responds to the diversity of needs of all learners by increasing participation in learning, culture, and community, and by reducing exclusion from education and within education." The aim is to ensure that the entire education system facilitates learning environments in which teachers and learners embrace and welcome the challenge and benefits of diversity. In the context of this study, under-enrolled school is also part of inclusive education in Malaysia.

Research Problem

Whether or not a multigrade classroom will provide sufficient learning experience, all depends on the capabilities of the teachers. As reported in the newspaper, teachers claimed that they are time constraint to cater for both two grades simultaneously. Teachers neglected one grade, while the other group get the opprtunity to learn. The scenario goes vice versa.

Parents find it a critical issue as to how much their child learns in the combination classroom. However, research conducted by Veenman (1995) found that there were no consistent differences in student achievement between multigrade and single-grade classes, as his conclusion was:

... parents, teachers, and administrators need not worry about the academic progress or social-emotional adjustment of students in multigrade or multiage classes. These classes are simply no worse, and simply no better, than single grade or single-age classes (Veenman, 1995).

Inclusive pedagogical approach for STEM learning in Malaysia played a vital role, especially in IR 4.0, as stated in the MEB 2013 – 2025. Many teachers are lacking in Pedagogical Content Knowledge (PCK) on the STEM education itself, Subsequently, the Teachers Professionalism Division (BPG) has put a tremendous effort to help teachers to enhance both their knowledge in STEM and inclusive education.

Therefore, the study aims to :

(i) review the literature on inclusive pedagogical approach for Science, Technology, Engineering, and Mathematics learning practices in under-enrolled schools in Malaysia.

METHOD

In this conceptual paper, researchers reviewed the literature using a semi – systematic approach that focuses on the under-enrolled schools. The purpose is to overview the research area on STEM learning and inclusive pedagogical practices, as well as to track development over time.

The study uses the PICO (Population, Intervention, Control, Outcome) framework to help researchers focus on the research question.

Six pedagogical approaches developed by the BPG trainers were introduced to under-enrolled school teachers. Several pieces of training were conducted from 2016 until 2018. In 2019, BPG, together with officers from the State Education Office and District Education Office, had conducted supervision to all the respective schools chosen for this initiative

FINDING AND DISCUSSION

The research finding showed that many past research has found that STEM education in Malaysia and in other countries as well are facing challenges especially relating real world experience with the teaching and learning activities in the classroom. Findings also showed that STEM education is not just presentation and dissemination of information and cultivation of techniques, rather it is a process of teaching and learning in order to make sense of the world and take charge of their learning (Omar, 2019). Students are less dependent on teachers to dissiminate information and knowledge in the classroom.

Under-enrolled School

A total of 393 schools had 30 pupils or less. This gives us about 7% of all schools in Malaysia are under-enrolled schools. Table 1 shows information on the numbers of under-enrolled schools in Malaysia, including from Sabah and Sarawak

Table 1. Under-enrolled schools information as of 2017

State	SJKC	SJKT	SK	JUMLAH
JOHOR	20	23	15	57
KEDAH	12	21		33
KELANTAN		1		1
MELAKA	2		1	3
NEGERI SEMBILAN	5	9	1	15
PAHANG	4	11	10	25
PULAU PINANG	2		1	3
SABAH	4		38	42
SARAWAK	24		82	107
SELANGOR	3	11	1	15
TRENGGANU	1			1
TOTAL	105	126	163	393

Source : BPG, 2017

Having the same curriculum as the mainstream schools, their teachers have special pedagogical training to conduct a multigrade or combination classroom. Typically, students under-enrolled school require specific lesson plans either by grade level or by an individual. Usually, the teachers in an under-enrolled school are so overwhelmed, just trying to keep up with the education standards, that they have sometimes forgotten the social needs of these students. Kathryn (2019) pointed out that inclusive classroom practices promote and support the success of a diverse population of students.

For this reason, MOE, especially the Teachers Profesionalisme Division has come up with the initiative 40 of PPPM (2013 – 2025) to assist teachers of the under-enrolled school enhancing their pedagogical skills and their excellent teaching and learning practices in the classroom. STEM learning in the under-enrolled school was not implemented as desired by the MOE. In relation to this situation, MOE has produced a module on the pedagogical approach which are appropriate for the multigrade classroom activities.

Pedagogical approaches

Six pedagogical approaches were developed to assist teachers in their teaching and learning practices in the classroom.

i. Flexible group TnL method : can be implemented using class teaching strategy or school year strategy
ii. Self –directed and group method : the skills and techniques of students to achieve a high degree of independence and productivity in learning independently or in conjunction with other students.
iii. Class and Group Teaching method (Similar theme or topic for multiple intelligence): to be implemented during the induction set activities
iv. Peer coaching method – appropriate for teaching similar topic and same cognitive level
v. Contextual learning method – skills and techniques to achieve daily experience in their teaching and learning practices
vi. Same Level Of Ability Teaching Method – the skills and techniques of students to perform for the enrichment and remedial classes.

STEM learning

Education is always changing, and in Malaysia, the focus on STEM learning is increasing across all levels in school. Malaysia National STEM Centre encourages teachers to expand their knowledge through courses and webinars prepared for them. We are now in the period of IR4.0, and all pupils need to be aware of this phenomenon. Pupils need to be proficient in STEM learning to cope with increasingly STEM activities globally.

STEM learning consists of three phases, which include identifying and planning the teaching strategies, setting problems to boost ideas, and increase interest among the pupils. Lastly, is to evaluate and assess

on pupils' performance. Teachers will have to engage STEM learning and the inclusive pedagogical learning methods together to create interesting activities where appropriate.

Researhers found that the pedagogical approach presented in this article are capable creating STEM learning as it involves the 4 C's of the higher thinking skills , communication, creative, critical and collaboration. Inclusive pedagogical approaches can also developing differentiated learning environment.

DISCUSSION

Many under-enrolled schools in Malaysia are trying to avoid being label as the under-enrolled school. Training for teachers does help them to teach in the multigrade classroom. Typically, it featured a small-scale schooling but practices mainstream curriculum and school management. Teachers are encouraged to collaborate with each other to preprare teaching materials. Working in an under-enrolled school requires serious and hardwork. Ongoing teacher training will help teachers uplift their teaching practices as their prior teaching training were based on the whole-class instruction and small group instruction.

Parents and stakeholders are always wondering whether under – enrolled school has a negative effect on pupils' performance. Nevertheless, supervision conducted by trainers and officers from MOE indicates that pupils' performance is a subjective criterion as it needs commitment and hard work from teachers, school leaders, and pupils as well. Many under-enrolled schools show tremendous success in both academic and co-curricular activities.

CONCLUSSION

Under-enrolled school is not a new trend or an experiment. It exists due to economic and geographic necessity. Teaching practices in the under-enrolled school can be more challenging compared to the mainstream school. Teachers' skills and behaviour may be different and to prepare creative and innovative activities are more difficult.

In the combination classroom, more time needs to spent in organizing and planning for instruction so that pupils will be meaningfully engaged especially to developing STEM learning activities in the classroom. As mentioned by Johnson (2019),

..... 'Inclusive teaching practices preserve and enhance the diversifying student population by creating a supportive environment that provides a variety of approaches to success.

Under-enrolled school teachers, therefore, must be well-organized, resourceful, and able to develop self-directed students. This behavior can be nurtured by providing students with opportunities before, during, and after instruction to control their learning (Vincent, 1999). So, teachers, do you think this can be done in your school? It is hoped that teachers will always have the opportunity to use the six suggested teaching methodology in assisting them in classroom activities to create a better classroom environment.

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