

# The Suitable Strategies to Implement Science in Teaching and Learning More Effectively In Malaysian Secondary Schools

Deviki Muniandy and Hasimah Alimon

*Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris (Malaysia)*

**Abstract:-** Form Three Assessment (PT3) in Malaysia has been introduced in less than a decade, replacing the Penilaian Menengah Rendah (PMR). Since the first batch of PT3 implementation had ended their written examination in 2014, no clear findings with regard to PT3 holders' low performance in science subject and it's not have been discussed widely. Thus, this study emphasized on the strategies can be used by students, teachers, policy makers and school administrators towards the teaching and learning of Science subject. A qualitative approach has been applied. Interview protocols was constructed and validated by three experts. The pilot test was carried out for the reliability. The respondent were chose using purposive random sampling. All the strategies come together under four sub-topics namely training, coaching or facilitating, management and effective teaching and learning. Training strategy consist of effective refreshment courses by district and state officers, courses for all the teachers during school holidays, senior teachers need courses, workshops for teachers at school level and quality delivery of in-house training. Coaching and facilitation are consists of effective monitoring system, peer coaching, own exploration, teachers learn from seniors, sharing experience among senior teachers and youngers and teachers must upgrades themselves. Management included laboratory assistant roles. The effective teaching and learning consist of types of assessment and project work, emphasize on practical work, fun methods during intervention programs and quality of intervention program. This study conclude that the policy makers, school administrators, students and teachers should realize their role and responsibility to ensure the effectiveness in teaching and learning Science and the development of education in Malaysia.

**Keywords:** Form Three Assessment (PT3), PT3 implementation, Science, Strategies Scope (Please state): Science Education

## I. INTRODUCTION

Malaysia currently has high stake and centralized examinations such as UPSR, SPM and STPM. The results show better performance year by year which make us assumed that the education system in our country is at the standard until Malaysia decided to take part in international examinations such as PISA (- Programme For International Student Assessment) and TIMSS (Trends In International Mathematics and Science Study) which are held for 15 years old students who are nearly going to complete their compulsory schooling. One of the main purpose to have international examination such as this was to examine the

level of student's problems solving skills in daily life which we called as higher order thinking skills. The result of PISA examination which was coordinated by OECD held in our country in 2010 shocked everyone, especially those involved directly in Malaysia education system. Forty three percent of students who took part in this examination failed to achieve minimum skills in Science literacy (Educational Blueprint 2013-2025 Ministry of Education (2012). A research by Higher Education Leadership Academy (AKEPT) in 2011, shows that 50% of lesson delivered was insufficient due to more passive lecture content delivery which focused to prepare students for summative examination rather than cultivating higher order thinking skills. In addition, graduate employability (GE) was 75% in 2013. Feedback from employer states that our graduates do not meet employer requirement such as attitude, ability to solve problems, lack of communication skills (Transforming Education System, 2010). Currently, only 29.2(2012), 29.1(2013) and 28.7(2014) percentage of the secondary school students are studying in science stream (Statistics of Malaysian Education Ministry, 2000-2014). We are still a long way to achieve the target of 60-40 percent of science-art students, which undermines the goals of the human capital roadmap of science and technology for a developed nation status by 2020. Efforts should be made to effectively improve students' interest in science through many strategies such as encouragement from parents and family, teaching quality, school management effectiveness, ease infrastructure, science-based academic extra-curricular activities, peer influence, financial provisions and incentives. Since the PT3 results show poor performance of science subject, the students as well as parents become unconfident whether their children are entitled to continue their studies in science field. According to the statistics from the Ministry of Education, the percentage entrance students in science stream form 4 in the year of 1981-2010 was lessening compared with other fields. The highest was 31.22% in 2005(Statistics of Malaysian Education Ministry, 2000-2014). Furthermore, although the questions for all PT3 subjects contain higher order thinking skills, science subject shows the lowest performance. This creates confusion among teachers and those involve directly in PT3. Many questions arise; do teachers lack of knowledge to teach science? Why do students not interested in learning science? So far very few researches

are focusing particularly on the low performance of Science subject in PT3 and the problems faced by the teachers and students which contribute to the poor performance of students in Science subject.

## II. STRATEGIES TO IMPLEMENT SCIENCE IN TEACHING AND LEARNING MORE EFFECTIVELY

The implementation of Science in teaching and learning can be more effective if new appropriate strategies are implemented. The current study shows that there are many strategies according to the roles of the stakeholders including policy makers, school administrators, teachers as well as the students. All strategies suggested by the stakeholders could be come under four sub-topics namely training, coaching or facilitating, management and effective teaching and learning.

### *Training*

Professional learning and classroom practice must be connected to optimize learning. The teachers should expose themselves with current knowledge regarding teaching and learning. The ministry should play their roles to give courses for the teachers accordingly. The courses attended by teachers also must be efficient. Followed by courses for all the Science teachers during school holidays. In common practice, the courses which are held for Science teachers will be attended by a representative from each school. When they come back from the courses, they will organize the in-house training for other teachers at their school. Usually the content of the attended courses is not fully delivered during in-house training, leading to misunderstanding of what is supposed to be understood. As suggested, this can be avoided by having the courses or training during school holidays, of which all teachers have the chances to attend and discuss the content of the courses. The Malaysian schools have around ten weeks of holidays. So, the holidays can be used wisely which can contribute to the efficiency of teaching and learning process. The seniors or the qualified teachers can lead the others to get knowledge with preparing courses for them. The involvement of all teachers will make the teachers become more knowledgeable and the teaching and learning Science will be more efficient as well as able to increase students' performance. The senior teachers who is consider senior at schools needs courses. According to Andrea, (2102), older teachers tend to engage less in professional development than younger teachers. Likewise, in Malaysian schools almost all courses for the teachers will be attended by junior teachers because they are new and they are oriented by the senior teachers. When return from attending courses, the juniors usually feel uneasy to give the in-house training to their seniors resulting in ineffectiveness of the programs. Thus, the senior teachers are left out without current knowledge and information that they should know. The senior teachers should be informed and follow the current methods of teaching and learning especially the usage of technology and 21st century elements in teaching and learning. The administrators at school must plan for the professional development of teachers.

Currently, the Malaysian schools teachers' have to attend the professional development at school level around 7 days per-year. Compare with our neighbor Singapore 100 hours per year and Finland 3 hours per week as school-based. Shanghai have 240 hours of professional development for 5 years of time (Summit, 2015). In conjunction with that, the Malaysia Education Ministry should encourage the Science teachers to involve themselves with more professional development courses mainly at school level. The administrators must have exposure regarding and prepare such courses and workshop for the Science teachers. The in-house training which held at schools related with Science subject should be effective in such a way that the content can be fully delivered. The busy schedule of the teachers, a day for a course should be heavy for them. The content of one day course can be delivered in a few hours' time but in quality way which will make everyone can get the information without spending too much of time. In-house training is cost effective. It can be schedule at our convenience. This training should more focused, consistent and relevant to your needs. The travelling and accommodation costs also can be reduced.

### *Coaching and Facilitation*

The monitoring system or more to classroom observation implemented at Malaysian schools. This monitoring system handle by school administrators including principals, senior assistants, and senior teachers towards teachers teaching in the classroom. According to this research data, the monitoring system at Malaysian schools not really effective. Since the monitoring system became one of the most important mechanism to guide the Science teachers towards their teaching and learning in the classroom, it should be handle wisely. The Administrators should check teachers' lesson plan and guide them the way it should be written correctly. After each observation, they should have observation meeting together. They should discuss about the teaching for the day together with students performance. The administrators should always guide the teachers not as mechanism of evaluation which will make the teachers tension. The same administrators should have follow up with the teachers two to three times per year to improve the teachers teaching. Motivation also should be given to the teachers for them to accept the critic. In many countries, large numbers of teachers leave teaching due to their sense of isolation and lack of support (Summit, 2015). Facilitators are person who have better knowledge and able to guide the others. In conjunction with that, Education ministry should prepare a group of people who can able to guide the teachers at schools. They must be given schedule to be follow. They should come and guide the teachers at least three time per year. The ministry or state department can create mentor mentee system. So, the particular person will be able to arrange their schedule and guide the teachers. Every subject should have different mentor. Facilitators also should be given proper guide and professional development courses so that they have enough knowledge to guide the others. The system should be as

guiding not as inspection. Senior teachers are the ones who have better experience compare with other young teachers. They can help and guide the other younger teachers. Japanese teachers have desks grouped by subject matter (Roll-Hansen, 2012). Administrators already have a system called NQPEL (National Professional Qualification for Educational Leads) which prepare guides for them. All the administrators specially the principals must attend this course. But this is only for the principals of school. The other administrators such as senior teachers, senior assistant and also head of department should be given courses. The principals should guide them as well they were guided. Other than that, the guides should always need to be continue by the other officers from district and state level.

Peer coaching can be apply to teachers as well as students. Teachers can have peer coaching among their friends to improve teaching and learning whereas students can have peer coaching to improve their performance in studies. According to Munro, Craig (2011), there were increase of teachers' burnout and shortages more and more which contribute teachers leaving the field under pressure. In conjunction with that, peer coaching can play a very important role to reduce the teachers' pressure towards teaching and learning. Peer coaching offer opportunity to learn from their own colleagues. Peer coaching also create less pressure to the teachers towards observation system. The respondent of this study also claimed that they will feel happy if observe by their friends. They can have joint observations, sharing teaching and learning resources, lesson plans and also assessment practices. Peer coaching is one of the strategy should be implement in the classroom by student to increase their performance in academic goal. Peer coaching was emphasized in 21<sup>st</sup> century teaching and learning. Peer coaching strategy focus on two students working together. The excellent student will guide the weak student. They will be in pair. While teaching and learning process, the student who understand the content very well will guide the friend who is weak. They can have the same pair for all the subject or the different pair for different subject. Peer coaching became important for the students who is not supported by their families for their academic goals. Peer coaching also can be used for the Science subject in PT3. The student who is weak always have fears to ask question to the teachers. With their peers they might able to talk without fears. It consider as an unofficial guides which is not professional. This can be done with guides of teachers. The peer coaching can be at school hour or after the school hours.

Exploration is a fantastic word. Exploration started when we start to play toys until we close our eyes for the last time. The exploration at school level by students can be done with their own effort. The teacher should always encourage the students to explore themselves. Each and every sub-topics, teachers must provide the website address for the students. Teacher must always pay attention to their students' achievement. Teacher also must always discuss what had been explore by their students. Flipped classroom method can be widely used

as well as VLE frog. Teachers can upload the information for them. The teachers' themselves should have the self-exploration. They should always explore to get more information for the students. Although 21<sup>st</sup> century method, teachers just act as facilitators, but they still have to run their duty as guides. The exploration by teachers became vital to get all the students to involve in exploration. Teachers have very busy schedule every day at schools. Their time almost spend for the teaching at class and also doing other workloads. Cooperation among teachers became necessary. Furthermore, the teachers should prepare themselves for the current teaching and learning. Exchange of educational materials, general discussions of learning with other teachers and attending team conferences. Moreover, deeper level of exchange of ideas and practices through joint or team teaching, observation others' classes and providing feedback, engaging in joint activities across classes. There will be no "stand-alone" teaching which traditional teaching was. Regular interaction among colleagues in the teachers' room gives new teachers access to their more experienced colleagues and communication during school days. After the school hours, they will have a meetings and the teachers will discuss together about that days lesson study. In conclusion, teachers should cooperate among them to increase their knowledge regarding teaching and learning which contribute students' better performance. Teachers are the key-propeller of the school. The reputation of an occupation is a key in attracting people into the field. In many countries, teachers' job satisfaction has decreased in recent years. There is no single best ways of teaching. In 2004, Prime Minister of Singapore in a speech introduced the idea of "Teach Less, Learn More" (Andrea, 2012). The idea came out with the meaning of teachers should teach less, so that the student can learn more. The teachers should become facilitators and let the students look for the information on their own. In conjunction with that, the teachers should upgrades themselves with all the current methods of teaching and learning. Malaysian Science teachers should further their studies on research based. Moreover, they should attend conference such as STEM conference, HOTS workshops to gain more knowledge regarding current teaching and learning tools and methods.

### *Management*

The administrators should play their roles better with their teachers. Cooperation with teachers became very important. Any decision making regarding teachers must involve teachers as their panels. The administrators should restructure the use of time to encourage professional collaboration. They also must promote career ladders for improvement such as excellent teachers promoted to be senior assistant and so on. The administrators also must focus resources on schools most in need in order to raise the quality of teaching and learning. In British Colombia, the curriculum was reduced the volume of curriculum materials in order to allow time for students to go deeper on a smaller number of topics and to create time for

teachers collaboration and innovation in pedagogy. Laboratory assistant are the important person who will prepare all the equipment needed for the teaching and learning Science in the laboratory. They are person who help the teachers to carry on the lesson. Most of the laboratory assistant just prepare the apparatus and materials. They can perform their duty more than which can contribute to increase the performance of the students. Besides the preparation of apparatus and materials, the laboratory assistant can provide general assistant to the teaching staff in order to enable the smooth running of teaching within the department. They also can play active role in developing practical, innovative and inspiring practical Science. Moreover, their duty is to assist staff in practical classes with demonstrations and provision of equipment. Furthermore, they must always ready to assist the teachers when the practical work and make sure the students follow the safety precautions whenever the practical session on (MONKTON, 2014). The laboratory assistant who are senior also can guide the junior teachers in teaching and learning.

#### *Effective Teaching and Learning*

Malaysian education needs a better type of assessment. Project work also one of the part of assessment in learning Science. This can be done individually or in small groups. Project work must be given few weeks of study. Teacher cannot continue with another lesson until they finish their project. Otherwise the student will be confused. Practical work is time consuming. Teachers busy to fulfill the requirement of curriculum and also with other workload until lack of time to planning and carrying the practical work at schools. The teachers should have less demonstration and more the students try. On the other hand, the large class will faced difficulties. The school need to provide enough apparatus and materials to handle the practical work. Example a class with 40 students in a laboratory with one fume cupboard not enough for them. Laboratory also should have enough space. Some of the teachers perceived that practical demonstrations allowed students more opportunity to focus on the scientific theory. Teachers must ask students to think and design the experiment. Scientific investigations must be handle over a period of several weeks. Student can go into a lot of depth and are independent. Moreover students also can have their own lab book to record data of experiment.

Andrea (2012), school administrators should carry out the intervention program way the students can achieve better performance. Below is a diagram shows the ways intervention program can effectively done. The intervention program must

be implemented after school get the aligning instruction with external standards. Followed by setting school goals for student performance. The teachers will set the goals according the standards of their students. After each and every assessments, the teachers will measure progress against those goals. The teachers will make adjustments in the school program to improve performance. This must be carry out according to the level of the students. So, the students must be categorized according to standards of weak, medium and excellent. The improvement plan will be based on the progress of students. Currently the intervention programs at school more to practice the questions, quiz and so on. According to this research data, the students felt boring with the type of programs. So, this type of programs should be fun to make the students better involvement. The Science will have trial examinations before a month of time. So the teachers can identify their students' weaknesses. Teachers can arrange fun methods of programs according to their category. Teachers already have the knowledge of fun teaching which attract students to learn. The methods such as group discussion, role play. Debate, searching and presenting information, concept map.

### III. CONCLUSION

The teaching and learning in Science can be so effective in such a way where all the stakeholder fulfil their responsibilities accordingly. Policy makers, school administrators, teachers and also students should work together to make this teaching and learning process to achieve its objectives. Suitable strategies should be followed by all the stakeholders to make sure the teaching and learning Science more effective.

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