

## **ASSESSMENT PRACTICES OF SCIENCE PROCESS SKILLS IN THE CLASSROOM: AN EVALUATION**

**Hamimah Abu Naim\*<sup>1</sup> Rohaya Talib<sup>2</sup> and Norlly Mohd Isa<sup>3</sup>**

<sup>1, 2, 3</sup> Fakulti Pendidikan, Universiti Teknologi Malaysia.  
(hamimahnaim@utm.my, rohayatalib@utm.my, eefa\_aish@yahoo.com.my)

### **ABSTRACT**

This study aimed to assess the overall implementation of the practices of Science Process Skills Assessment (SPSA) in the classroom for subjects of science Form 2 in terms of dimensional context, input, process and products and its relationship with student's level of mastery based on model CIPP. Evaluation on the dimensions of the context is the assessment carried out on its parallels the implementation of SPSA in the classroom with the policies, principles and methods of implementation. Input dimension assessment was conducted on valuation provided input in terms of curriculum content, availability and competency of teachers and infrastructure that help in the implementation of the SPSA. The assessment of the dimensions of the process is the evaluation of the processes and implementation of SPSA by teachers in the classroom. Product dimensions evaluation emphasizes the effectiveness of implementation of SPSA on the level of Science Process Skill (SPS) students. Researchers using qualitative and quantitative affiliate review. Qualitative method used in the evaluation context, input assessment and evaluation process. Interview Protocol and checklist for official documents is an instrument used in qualitative methods. Interviews will be conducted on the study participants consisted of teachers who teach Science subjects Form 2. Quantitative methods were used in the assessment of the inputs, processes and products. Instrument in use is Science Process Skill Test to be administered to the formers.

**KEYWORDS:** Science Process Skills Assessment, Evaluation, Science Process Skill, Classroom Assessment.

### **INTRODUCTION**

Improve the quality of education in the country, a number of transformation steps were performed as redesigning the curriculum for primary and secondary schools in accordance with international standards. One of the biggest transformation is done by increasing the assessment framework for adding items to test higher-order thinking skills and the use of reference standards in public examinations and expand the School-Based Assessment (SBA). Making efforts to intensify support for teachers to ensure that the written curriculum is correctly impliment into teaching and learning in the classroom [1]. The goal of science curriculum for secondary schools is to provide students with knowledge and skills in science and technology, and enable them to solve problems and make decisions in life based on scientific attitudes and values. Science emphasizes inquiry and problem solving, where scientific skills and thinking skills are used. Scientific skills are important in any scientific investigation such as conducting experiments and projects. Inculcation of scientific attitudes and values should be integrated into all learning activities [2]. To ensure that these goals have been received by the students, an assessment should be done to measure the extent of

achievement. The process of obtaining this information should be done through assessment during and after the process of teaching and learning is done.

## **STATEMENT OF PROBLEM**

Assessment in science teaching and learning to take into account what students can do on the level of development and what students can do to increase the level of potential. Assessment, teaching and learning approaches in the classroom should be tailored to the goals of science education in secondary schools that make students more responsible for their learning [3]. Scientific knowledge is gathered and built from the science. Process refers to the way science works when practiced by scientists collect and interpret information that is also known as the scientific method. Before using the scientific method scientists must first master the scientific skills. Scientific skills encompass science process skills (SPS) and manipulative skills. SPS is a way of thinking, and manipulative skills is a way to work during the process of science is conducted. SPS is divided into two parts: the basic science process skills (BSPS) and integrated science process skills (ISPS). BSPS include observation, classification, measurement and use of numbers, the relationship of time and space, making inferences, predicting, and communicating. While ISPS involves skills such as controlling variables, interpreting data, operational definition and build hypothesis [4].

Malaysian education system is examination-oriented emphasis on answering the questions in most teaching and learning of science. Teachers need to spend time in the school syllabus set by the Ministry of Education. This in turn causes the teachers are only concerned with the mastery of knowledge and science concepts, but do not prioritize mastery of scientific skills [5]. In addition, the teaching and learning process more focused on centralized examinations like the *Penilaian Menengah Rendah* (PMR) and *Sijil Pelajaran Malaysia* (SPM). The activities of teaching and learning based on the assessment needs to be improved in order to form meaningful information sharing to enhance the skills of students. To ensure the implementation of practices and assessments carried out by the implementing accurately, teachers must master the concepts related to assessment, evaluation, measurement and testing. Previous researchers have conducted studies on the level of SPS among educators as well as among students. However, these studies were not conducted simultaneously. The correlation between the level of teacher appraisal practice and proficiency among the students have never been studied. Whether a teacher who can dominate with good SPS, will be able to practice with a good SPS assessment and lead to pupils who have a good level of SPS also or vice versa. Therefore, a study is to be carried out to see SPS assessment practices and the level of skills among the teachers, and their relationship to the level of SPS students. In addition, we also explore whether there are significant differences based on gender, teaching experience, and training options in terms of the level of services and SPS assessment practices.

## **OBJECTIVES OF STUDY**

The objectives of this study is to identify the level of implementation of the School-Based Assessment (SBA), Science Process Skills (SPS) Assessment practice in the classroom among form two science teachers and find the relationship between the level of implementation of SBA and SPS assessment practices in the classroom among form two science teachers. Other objective is to identify the level of competence of SBA and SPS among form two science teachers and then evaluate the relationship between the level of SBA competency of teachers with the implementation of the SBA, the relationship between the level of teacher SBA competency with SPS assessment practices and the relationship between the level of SPS competency teachers with SPS assessment practices in form two science teachers.

This study also use to identify the level of SPS achievement among form two students and evaluate the relationship between the level of implementation of SBA, SPS assessment practices, level of teacher SBA competency and the level of teacher SPS competency with SPS achievement among form two students. After all, researcher will build the SPS Assessment Model to enhance the effectiveness of the method of assessment for learning science form two.

## THEORETICAL FRAMEWORK

The model guiding this evaluation is the CIPP model originally developed by Donald Stufflebeam in 1971. The CIPP acronym was formalized in 1983 and updated most recently in 2002 [6]. The CIPP acronym stands for the core concepts of the model, context, inputs processes and products. Context evaluation reflects the environment, identifies needs, and forms goals and objectives. Input evaluation assesses the competing ways to achieve the goals specified in the context evaluation. Process evaluation reviews how the program operates. Product evaluation focuses on program results, connecting outcomes with the other measurements taken in the earlier areas of evaluation. This model was chosen for two main reasons, 1) the model places emphasis on guiding planning, programming, and implementation efforts and 2) the model emphasizes that the most important purpose for evaluation is improvement [6].

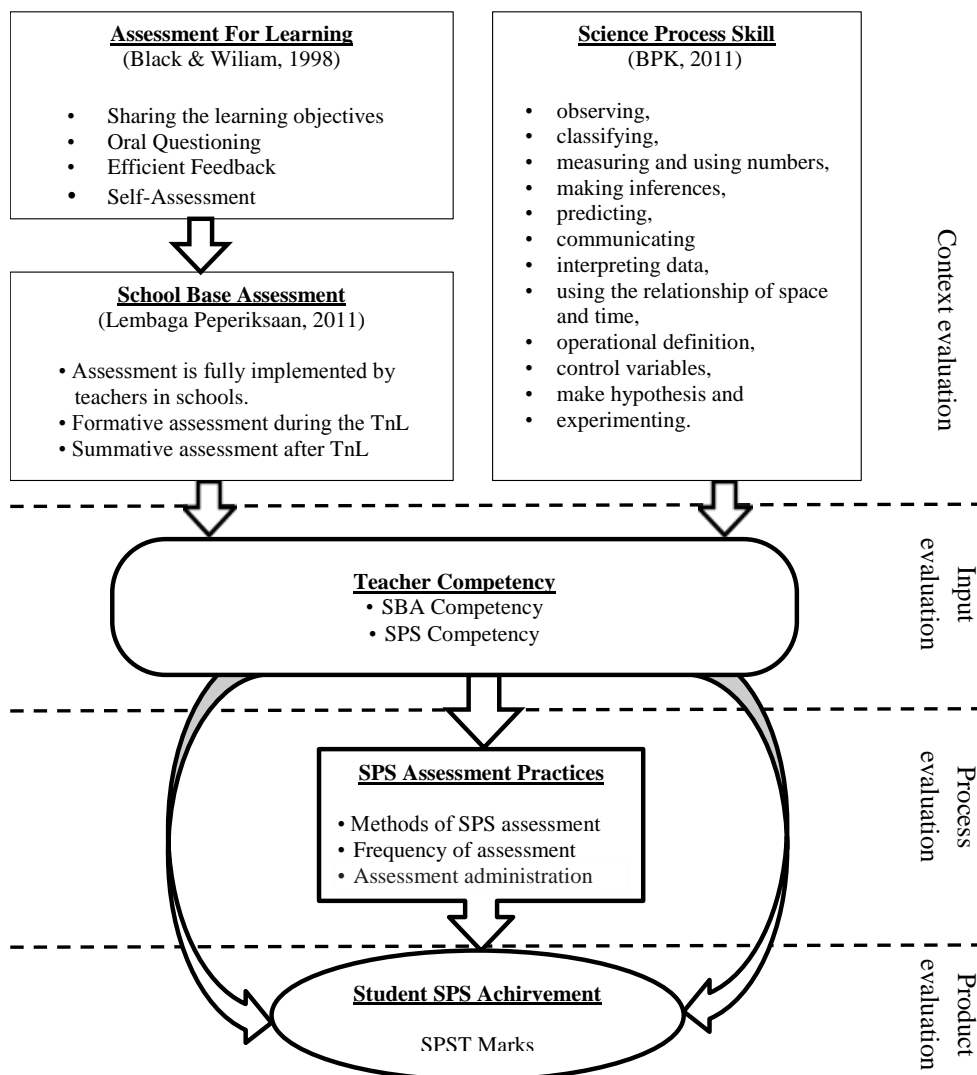


Figure 1: Framework of study

Evaluation	Objectives	Methodology
Context	<ul style="list-style-type: none"> <li>Identify the level of implementation of the School-Based Assessment (SBA) in the form two science teachers</li> </ul>	<ul style="list-style-type: none"> <li>Official documents analysis.</li> <li>Literature review</li> </ul>
Input	<ul style="list-style-type: none"> <li>Identify the level of competence of SBA among form two science teachers</li> <li>Identify the level of competence of SPS among form two science teachers</li> </ul>	<ul style="list-style-type: none"> <li>Survey instruments which include demographic, SPS assessment practices, SPS competencies and assessment competency.</li> </ul>
Process	<ul style="list-style-type: none"> <li>Identify the level of implementation of the School-Based Assessment (SBA) in the form two science teachers</li> <li>Identify the Science Process Skills (SPS) Assessment practice in the classroom among form two science teachers</li> </ul>	<ul style="list-style-type: none"> <li>Survey instruments which include demographic, SPS assessment practices, SPS competencies and assessment competency.</li> <li>Interview protocol and official documents analysis</li> </ul>
Product	<ul style="list-style-type: none"> <li>Identify the level of SPS achievement among form two students</li> </ul>	<ul style="list-style-type: none"> <li>Science Process Skills Test (SPST)</li> </ul>

## METHODOLOGY

The study will be conducted in the form of research is descriptive quantitative detection of a correlation between variables. However, for each of the data supports the qualitative methods are used [6]. According to Fullan, [7] research can be considered as a process to solve a problem through the planning, collection, analysis and interpretation of data systematically. In this study, researchers will conduct studies using causal modeling. Correlational study is classified as one of the quantitative study. Correlational study can be used to describe the relationship between two or more variables, or make assumptions about the outcome. The researcher will carry out a series of tests and questionnaires on a sample of data for the study. The main methods used to obtain information in this study is a survey method using questionnaire. This method is particularly suitable for measuring the opinions, attitudes and behaviors. Qualitative methods using various instruments such as interviews, document analysis and observations have been performed to support the results of a survey [6]. The combination of both quantitative and qualitative methods will strengthen the study [8], as well as provide more detailed findings [9].

### Sampling

Sampling methods used in this study is using a combination of purposive sampling and on cluster random method. With purposive sampling, each individual selected has the same characteristics of the various aspects [10] . This will reduce sampling error and to ensure that the selected sample is truly representative of the population [10]. This study was conducted to teachers who teach form two science subject in secondary schools (SMK) in state of Johor. The actual number of population science form 2 teachers can not be expressed exactly as changes often happen on schedule by the school administrators. To address this problem, cluster random sampling of clusters[10] should be done. Sampling is done is through cluster random sampling of clusters starting from the state (JPN), district (PPD), schools (SMK) and finally using purposive sampling to select teachers who teach science form 2. There were 229 ordinary secondary schools throughout the state of Johor which is governed by 10 District Education Offices (PPD). Results from the process 47 schools were selected. Selection 20.5 per cent sample of the population SMK Johor is the capacity of the administration and mobaliti researchers and based on a minimum number of samples to obtain the normal pattern of correlation study of 30 samples [10,11]. After determining the school for the study, all teachers who teach science form 2 will be selected as the respondent. It is estimated that there are between one to three form 2 science teachers from each school depending

on the size of the school and number of students. The number of respondents who selected an estimated 100 people.

After the selection of the samples is completed, the sample selection of students will be done. Student sample was composed of 30 students form 2. Selection of 30 students will be done independently by the teacher on the basis of trust and integrity of the teacher. Considering the time constraints, workload and factors existing facilities in each SMK. Total of 30 students from each teacher also is based on the minimum amount required for the study of correlation. Judging from the number of teachers and their students, the students who obtained the sample estimate was 3,000. This large number is expected to give a smaller error in the findings [6].

## **Instrumentation**

In this study, researchers used a combination of quantitative and qualitative methods. This study was conducted through a survey with the objective to review the appraisal practice SPS in the SBA system. Two different instruments used for teachers and students involved with the SBA science subjects. The first instrument is the questionnaire that will be distributed to form 2 science teachers instruments which include demographic, SPS assessment practices, SPS competencies and assessment competency. This instrument will be administered on 100 respondents. Questionnaires were used to enable the researchers looked at the distribution of the sample according to a set of items and constructs.

The second instrument is the Science Process Skills Test (SPST) which will be administered on a sample of 3000 students, which is pencil and paper test consists of 30 items. Each item will test students' mastery level towards the SPS. There are seven basic science process skills (BSPS) of observing, classifying, measuring and using numbers, making inferences, predicting, and communicating, and five integrated science process skills (ISPS) includes interpreting data, using the relationship of space and time, operational definition, control variables, make hypothesis and experimenting.

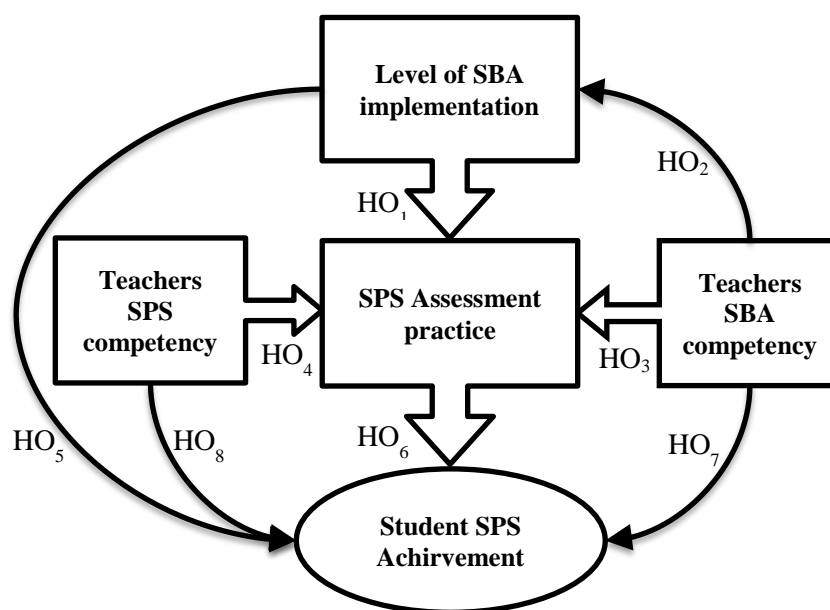
Qualitative methods used in the evaluation context, the evaluation input and evaluation process. Interview protocol and official documents analysis is an instrument used in qualitative methods. Interviews will be conducted on 10 participants consisted of teachers who teach science subjects in form 2. Official documents that will be studied are circulars, SBA User Management, Science Assessment Document Standard Form 2, Science syllabus in Form 2 and other documents related.

## **Data analysis**

The findings from this study will be analyzed using methods appropriate to the instruments used. Analysis of data from documents and studies will be conducted qualitative interviews were analyzed using Atlas Ti software version 7.0, while the analysis of questionnaires and SPST be done quantitatively using Rasch measurement model approach.

## **CONCLUSIONS**

From this study the researchers expect to be able to develop a model linking the relationship between science teacher competency in the school-based assessment and science process skills will influence the level of school-based assessment and science process skill assessment practice and also will affect the achievement of form 2 students' science process skills.



**Figure 2: Science Process Skill Assessment in School-Based Assessment Model**

## REFERENCES

- [1] Bahagian Perancangan dan Penyelidikan Dasar Pendidikan. *Dasar Pendidikan Kebangsaan (Edisi Ketiga)*, Kementerian Pelajaran Malaysia (2012).
- [2] Lembaga Peperiksaan. *Panduan Pengurusan Pentaksiran Berasaskan Sekolah (PBS)*, Kementerian Pelajaran Malaysia (2012).
- [3] Eftah Moh@Abdullah dan Othman Lebar. Measuring the effectiveness of assessment-based model for the topic matter among form one students. *Jurnal Sokongan Penyelidikan* 25(3) (2012).
- [4] Pusat Perkembangan Kurikulum. *Pulsar Modul 2: Kemahiran Sainifik*, Kementerian Pendidikan Malaysia (1994).
- [5] Mohd Ali Samsudin, Kamisah Osman & Lilia Halim. Kesan penggunaan perancangan kognitif dalam Pembelajaran Berasaskan Masalah terhadap strategi metakognitif, pemikiran saintifik dan pencapaian pelajar dalam mata pelajaran fizik. *Jurnal Pendidikan*, 27 (1), (2007),101-11-8.
- [6] Stufflebeam. D. L.. The CIPP model for evaluation. Presented at the 2003 Annual Conference of the Oregon Program Evaluators Network (OPEN). Portland, Oregon, (2003).
- [7] Creswell, J.W.. *Educational research – planning, conducting and evaluating quantitative and qualitative research*. New Jersey, U.S.A.: Pearson Education, Inc. (2002)
- [8] Fullan, M., & Stiegelbauer, S. *The new meaning of educational change*. 2nd ed. New York: Teachers College Press, (1991).
- [9] Schmidt, F. & Hunter, J. *The validity and utility of selection methods in personnel psychology: Practical and Theoretical Implications of 85 years of research findings*. Psychological Bulletin, 124(2), 262-274, (1998).
- [10] Cohen, L., Manion, L. and Morrison, K.. *Research Methods in Education Sixth edition*. London: Routledge, (2007).
- [11] Mohd. Najib Abd. Ghafar. *Reka Bentuk Tinjauan Soal Selidik Pendidikan*. Johor Bharu: Universiti Teknologi Malaysia, (2003).
- [12] Azizi Yahaya, Shahrin Hashim, Jamaludin Ramli, Yusof Boon and Abdul Rahim Hamdan. *Menguasai Penyelidikan Dalam Pendidikan*. Johor Bharu: Universiti Teknologi Malaysia, (2007).