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### SCHOOL-BASED ASSESSMENT PRACTICES AMONG PRIMARY SCHOOL MATHEMATICS TEACHERS BASED ON TEACHING EXPERIENCE

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#### Abstract

School-based assessment (SBA) is part of a transformation of the Malaysian education system that is used to interpret the academic and non-academic fields as well as to empower teachers to carry out a school-based formative and summative assessment. This study was therefore conducted to identify the use of SBA among elementary school mathematics teachers. Approximately 37 mathematics teachers (12 males and 25 females) were selected to become a sample of this analysis in a district in Malaysia. This study was carried out using the survey method and a questionnaire was used during the data collection process. To answer research questions, the findings of this study were analyzed through descriptive statistical analysis and inferential statistical analysis. Based on the study, the overall mean score of SBA practice among elementary mathematics teachers was strong. However, it was found that there was no significance difference between SBA and teaching experiences based on the results of a one-way ANOVA test. This research furthers SBA and serves as a guide for other mathematical teachers in their respective schools.

#### Introduction

Along with the country's transformation program to produce world-class human capital, the Malaysian Ministry of Education (MOE) implemented School-Based Assessment (SBA) in 2011 for Year 1 and in 2012 for Form 1 students. SBA is a comprehensive form of assessment to review cognitive, affective, and psychomotor aspects in line with the National Education Philosophy and National Primary School Curriculum (Ministry of Education, 2014). SBA not only assesses the academic field but also involves the non-academic field where it is implemented in schools in a planned manner

according to the guidelines set by the Malaysian Examinations Board (Curriculum Development Division, 2016). Under this system, teachers are given greater responsibility to form quality assessments that are consistent with learning outcomes because they are the most appropriate people to assess students and they have a better understanding of their students. The system also provides an opportunity for teachers to monitor their students and provide constructive feedback to improve student learning ability (Hassan & Talib, 2013).

In 2016, the MOE decided to enlarge the role of SBA by decreasing the weight of the national evaluation of primary schools to 60% and making SBA account for the further 40%. These changes were made to change society's views regarding the recognition of academic achievement alone and to reduce the pressure on students, parents, and teachers to achieve excellence in examinations in particular (Malaysian Examinations Board, 2014).

In Malaysia, SBA consists of four components, namely School Assessment; Central Assessment; Physical Activity, Sports, and Co-Curriculum Assessment; and Psychometric Assessment. Therefore, teachers in schools are provided with Curriculum and Assessment Standard Documents to help them assess students based on their mastery of the subject (Malaysian Examinations Board, 2014). Teachers can use a variety of methods to assess, and the evidence that students have mastered the subject does not necessarily have to be worksheets but can be from observations, exercise books, and workbooks as well as other reasonable tools (Seman & Kimi, 2014). In addition, improvements have been made in the SBA system to create a Standard Reference Assessment to provide information on the development of students in their learning. Thus, teachers and parents can identify the extent of their children's understanding and knowledge of the teacher's lesson (Mahmud et al., 2020).

There are two important elements in the SBA: collecting information that has been measured and using that information to improve the abilities of individuals or an institution (Dunphy, 2011). Cotton (2013) stated that assessment is a part of learning that offers different meanings for teachers and students. From the teacher's point of view, assessment refers to the information gathered about their teaching, while from the student's point of view assessment is a process that tells them about what they are learning (Mahmud & Yunus, 2018). Therefore, assessment refers to the process for teachers to gather information and is used by teachers to measure the ability of students and students also use that information to find out what has been learned and what needs to be improved.

SBA is used to interpret academic and non-academic fields as well as give recognition and autonomy to teachers to implement school-based formative and summative assessments (Varatharaj, 2015). Current assessment practices are said to be more focused on formative assessment (Veon, 2016). This is because summative assessment is less valid because student performance is seen through examinations and tests alone (Talib et al., 2014). In addition, Clark (2012) stated that the practice of diversifying the purpose of assessing students is a factor that formative assessment to be an option in the field of education today. For example, in America, assessment is used to review student progress, receive feedback from teachers and students, and then use the feedback to drive changes in their practice in the classroom. Similarly, according to Mutalib and

Ahmad (2012), assessment that can provide feedback to students on what they have learned is formative assessment, and effective assessment includes clearly seeing the goals and targets in teaching and learning around the classroom, students' work displayed in the classroom, and students being actively involved in group collaboration with peers or with teachers in line with 21st century teaching practices.

To ensure the implementation of SBA in Malaysia is effective and able to achieve the objectives that have been outlined by the ministry, teachers and students need to play a key role in achieving the objectives (Mahmud, 2019). In this case, the teacher acts as a facilitator and motivator and makes observations on student assignments, obtains information from activities and assignments performed by students, and finally gives feedback. Overall, teachers need to help improve student learning holistically by implementing SBA in schools transparently and effectively so that the implementation of SBA in Malaysia really has a positive impact on the development of education in the country.

### **Problem Statement**

In the UN Education Index, Malaysia ranks 98th out of 181 countries in the education system. PISA, which tests 15-year-olds in mathematics, science, and reading, shows that Malaysia is ranked 55th out of 74 countries. In 2011, Malaysia experienced a drop in TIMSS Mathematics and Science in 1999 and 2011 (Ministry of Education Malaysia, 2013). For Mathematics in 2011, Malaysia was ranked 26th with an average score of 440 while in Science Malaysia was ranked 32 with an average score is 426. Both scores are below the average of the marks set by the OECD average of 500. Thus, drastic changes have been made by the MOE to the education system to transform the field of education by creating a National Education Assessment System (SPPK). The SPPK was developed to replace the old system, which was an assessment with tests and examinations, with a new assessment that is more holistic (Malaysian Examinations Board, 2014)

Changes from the summative assessment to the focus on formative assessment recommended in the implementation of SBA have led to the emergence of various grievances, especially from teachers (Mutalib, 2015). This seems to indicate that teachers do not agree with implementing formative assessment during the teaching and learning process. This has led to the use of formative assessment continuing to be at a low level because most teachers still do not understand the correct method, especially in integrating formative assessment techniques into the teaching and learning process (Moss & Brookhart, 2019).

As this is a new system, teachers have not yet mastered this method of assessment (Abdullah et al., 2015). Moreover, many improvements have been made by the MOE and the Malaysian Examinations Board to facilitate the work of teachers in schools. In the early implementation of the Integrated Primary School Curriculum (KBSR), teachers did not fully understand the concept of SBA and do not have the expertise to assess their students (Ramlah, 2016). Ramlah (2016) also stated implementing SBA is not an easy task. She also stressed that there are three factors contributing to the failure of conducting assessments, namely, (a) schools cannot interpret and understand assessments regarding aspects that bring improvement in learning and teaching in schools, (b) schools have to face the needs of the public which prioritizes good results in public examinations, and (c) there are human factors where teachers do not

provide or equip themselves with SBA-related knowledge and skills as an important part of the School-Based Curriculum development process.

An investigation on teachers' assessment practices indicates that teachers are not ready to meet the demand for assessment in the classroom because they do not have adequate training (Mahmud et al., 2020b). In terms of standardized tests, Talib et al. (2014) stated that there are also teachers who help students during the test by adding test time, giving clues, and changing students' answers; this is raising the issue of a lack of transparency in SBA in schools. In addition, teachers also find it difficult to interpret standardized test results and the formative test results that have been conducted (Bennett, 2011).

However, very little is known about the extent to which mathematics teachers actually implement SBAs as set by the ministry. Therefore, this research on SBA practices among primary school teachers aims to see the level of practice of SBA has been carried out according to the needs and requirements outlined by the MOE, in particular in the SBA of mathematics. Moreover, the study of Abdullah et al. (2015) on teachers found that there is no significant relationship between the dimensions of the product in SBA with teaching experience. In fact, Yusoff et al. (2016) suggests that good practice of SBA is due to training or courses attended by teachers to improve their teaching and learning style based on SBA. Therefore, this study also wants to see if there are differences in SBA practices among primary school mathematics teachers based on their teaching experience

### Methodology

This study is a quantitative study that uses survey methods. A questionnaire was used in the study as an instrument to collect data on SBA practices among elementary school mathematics teachers and find the differences in the practice of SBA based on the experiences of teaching mathematics. The study sample was primary school mathematics teachers who teach Year 1 to Year 6 mathematics in schools in a district of Negeri Sembilan, Malaysia. A total of 37 mathematics teachers were selected using a simple random sampling method. This sampling method was used to ensure that every mathematics teacher in that district had the same opportunity to be selected to be a respondent in this study (Cohen, Manion, & Morrison, 2013). The procedure is conducted by listing the names of mathematics teachers and labeling each teacher with numbers. Samples were then selected using a random number table.

A questionnaire was used in this study because it involves a lot of samples and it saves costs and time. Questionnaire items were built based on the adoption process from the study by Adnan (2014). The questionnaire consists of two parts, part A and part B. Part A is related to teacher information (10 items), while part B is about SBA practices (20 items). This questionnaire used a 5-point Likert scale: 1- strongly disagree (STS), 2- disagree (TS), 3- less agree (KS), 4- agree (S), and 5- strongly agree (SS).

The obtained value of reliability of this questionnaire is Cronbach's alpha (0.74). This value was obtained during the pilot study and is suitable due to its high reliability (Pallant, 2011). This questionnaire was validated by referring to a set of experts: university lecturers in the field, officer of the Pahang State Education Department (JPNP), and an officer of the District Education Office (PPD). Data is analyzed by using statistical tests of One-Way Anova to see the

differences in SBA practices among primary school mathematics teachers based on their teaching experience.

### Findings

In this section, the demographic information that will be discussed is gender, teacher's professional qualification, and teaching experience. In terms of gender, 12 (32.40%) mathematics teachers are male, while 25 (67.60%) are female, for a total sample of 37 people. This indicates that most teachers involved in the study are female teachers.

In terms of the professional qualifications of the teachers, there were 14 (37.80%) teachers with a Diploma in Education, 22 with a Bachelor's Degree (59.50%), 1 was a Master's Degree (2.70%); there were no teachers with a Teaching Certificate in academic qualifications. In addition, regarding the teaching experience of primary school mathematics teachers, the study found that there were 4 (12.12%) teachers with teaching experience of less than 5 years, 11 (27.70%) teachers with experience teaching mathematics of 5–10 years, 13 (35.10%) teachers with teaching experience of 11–20 years, and the remaining 9 (24.30%) teachers with teaching experience of more than 21 years. Therefore, most of the study sample has between 11 years to 20 years of experience.

Table 1: Respondent Demographics

Demographics		Number	Percent
Gender	Male	12	32.40%
	Female	25	67.60%
Professional qualification	Teaching Certificate	0	0.00%
	Diploma in Education	14	37.80%
	Bachelor's Degree	22	59.50%
	Master's Degree	1	2.70%
Mathematics teaching experience	Less than 5 Years	4	12.12%
	5 To 10 Years	11	27.70%
	11 To 20 Years	13	35.10%
	Over 21 Years	9	24.30%

### *Level of SBA Practices Among Primary School Mathematics Teachers*

The interpretations of mean score are outlined in Table 2. Data were analyzed by obtaining the mean score for SBA practices among primary school mathematics teachers (Table 3).

Table 2: Interpretation of Mean Scores of SBA Practices

Min Score	Interpretation	Level
1.01 -2.33	Low	Weak
2.34 -3.66	Medium	Medium
3.67 -5.00	Very High	Good

Source: Mohd Najib (2003)

Table 3: Mean and Standard Deviation of SBA Practices Among Mathematics Teachers

No.	Item	Min	Score	Mean
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			Level	Standard Deviation
1	I know about the SBA objectives for the subject of Mathematics.	4.05	High	0.229
2	I conduct assessments on students for each skill taught.	4.03	High	0.552
3	I inform the students about the level of skills that they have mastered after SBA is conducted.	3.84	High	0.602
4	Assessment practices to students can be done more than once.	3.62	Medium	0.545
5	I use a variety of instruments when assessing. For example: writing, reports, and photos.	3.92	High	0.640
6	I set the elements to be assessed before doing the assessment.	3.95	High	0.524
7	I provide an explanation of the instruments or methods used during the assessment	3.76	High	0.495
8	I refer to the Performance Standard Document to create assessment evidence.	4.16	High	0.553
9	I use the mathematics workbooks available on the market so that it is easy to do an assessment.	4.19	High	0.701
10	I understand the implementation of SBA in schools very well.	3.59	Medium	0.644
11	I built myself a task to assess students.	3.84	High	0.727
12	I make observations on student behavior when assessing.	3.62	Medium	0.594
13	I evaluate students' work based on the Performance Standard Document.	4.08	High	0.595
14	I help students who have failed their assessment before re-assessing	3.76	High	0.435
15	I diversify assessment methods.	3.92	High	0.433
16	I use a checklist form to record student achievement.	4.05	High	0.468
17	I give students the opportunity to ask questions when being assessed.	4.11	High	0.567
18	I diversify methods of questioning when doing SBA.	4.00	High	0.471
19	I use the information from the responses of students to improve student performance.	3.57	Medium	0.502
20	I evaluate student work and inform their weaknesses or strengths.	4.05	High	0.329
Overall Mean		3.91	High	

Table 3 shows that the mean score for each item in SBA practices among primary school mathematics teachers are at a high and medium level based on the interpretations of mean scores (Table 2). Sixteen items for teachers' practice in implementing SBA have a high mean score while four items have a moderate mean score. The item with the lowest mean, which has a moderate mean score, is "I use information from student responses to improve student performance" (Mean = 3.57 and SP = 0.502). This shows that teachers have implemented good practices with SBA and only some

teachers use the information from the responses of students to improve student performance. Overall, the mean of SBA practices by mathematics teachers is high ( $N = 37$ , overall mean for SBA practice = 3.91).

### ***School-Based Assessment Practices Among Primary School Mathematics Teachers Based on Teaching Experience***

The equality of variance, referred to as homogeneity of variance, was carried out using a Levene test before the one-way ANOVA analysis was conducted. The results of the Levene test were not significant, showing that the variance values of the dependent variables in each group of study samples are almost the same (Pallant, 2011). The analysis of the Levene test can be seen in Table 4.

Table 4: Levene Test Results

Value F	df1	df2	Significant
0.665	3	33	0.580

The results of the Levene test,  $F(3, 33) = 0.665$ ,  $P = 0.580$ , indicate that they are not significant ( $p > 0.05$ ). The findings of this test also show that the variance values of the dependent variables in each group of study samples are almost the same. Therefore, the study data complied with the terms of the one-way ANOVA test. The results of the one-way ANOVA test analysis are presented in Table 5.

Table 5: One-Way Analysis of SBA Practices with Teaching Experience

	Total Squared	df	Mean Square	Value F	Significant
Between Groups	28.264	3	9.421	0.393	0.759
In Group	790.763	33	23.963		
Total	819.027	36			

Significant at the  $p < 0.05$  level

One-way ANOVA tests were conducted using the SPSS program to see the differences in SBA practices among mathematics teachers between four groups of teaching experience, namely less than 5 years, 5 to 10 years, 10 to 20 years, and 21 or more years. The value of  $F$  obtained is 0.393,  $P = 0.759$  is insignificant at the level of  $p < 0.05$  ( $F(3,33) = 0.412$ ,  $p > 0.05$ ). Thus, one-way ANOVA test results show that there is no significant difference between SBA practices and teaching experience.

## **Discussion**

### ***Level of SBA Practices Among Primary School Mathematics Teachers***

The findings indicate that the overall mean score for SBA practices among teachers of mathematics is at a high score level (overall mean score = 3.91). This finding is consistent with the findings of studies conducted by Abdul Khalil & Awang, 2016; Jamaluddin (2007) and Mahamod (2015). Similarly, the findings of Suzana and Jamil (2012) stated that the use of various techniques by teachers prove that primary school teachers should use a variety of formative assessment techniques in their efforts to assess student learning. However, there are some items that were at a moderate level which need to be improved based on the analysis of the mean score level in each item: SBA of students can be done more than once, observing students' behavior when assessing, and using information from student responses to improve students' performance.

SBA is optimized to assess academic and non-academic fields by empowering and informing teachers to implement formative and summative assessments. Therefore, the practice of assessment by teachers should not focus on tests or examinations only but the assessment should be holistic and continuous (Suah & Ong, 2011). This is consistent with the findings of Talib et al. (2014), which state that teachers should be responsible for monitoring progress continuously, give constructive feedback, understand the development of the environment so that they can assess students' learning outcomes accurately and fairly. In addition, based on the findings about mathematics teachers, SBA practices are still at a moderate level. Therefore, teachers, especially mathematics teachers, must really understand the assessment practices conducted in SBA so that there are no errors in assessing students. It is very important in ensuring that the information obtained related to students' learning really reflects their ability levels and cognitive skills (Brown, 2011). This study also found that teachers should be more creative in their SBA practices by providing a variety of instruments and assessment methods to test the students' abilities to master a skill. This needs to be done continuously to improve the skills of teachers to conduct assessments in the classroom (Abdullah et al., 2015). This will not only help improve the skills of teachers in doing assessments but indirectly also help teachers achieve the desired objectives through the implementation of effective practices of SBA.

Nevertheless, the mean scores for "observing students' behavior while assessing" is still at a moderate level (3.62) and gives the impression that most teachers are still following the examination-oriented assessment. This contradicts the SBA that should be implemented by teachers by performing a comprehensive assessment because SBA not only measures students' cognitive aspects but also their affective and psychomotor aspects (Curriculum Development Division, 2016). This finding is also supported by the Malaysian Examination Board which states that the focus of SBA is to assess the process and outcomes for formative and summative through practice assessment for Learning and assessment of learning. Thus, in the practice of SBA, teachers should make observations on the development of students' behavior and not just focus on cognitive development.

In addition, the SBA practice of mathematics teachers related to using information from students' responses to improve student performance also shows a moderate mean score value. Using information from student responses to improve students' performance is one of the tasks that teachers need to perform in implementing assessments of student (Mahmud & Yunus, 2018). The information obtained from the student responses allows teachers to identify the students' potential and to make plans to improve student performance and plan more effective teaching. Information from student responses is also able to play a role in providing immediate information about the development of students' learning to teachers, school administrators, parents, and any stakeholders as a basis for discussion on actions to improve student performance.

In conclusion, the level of SBA practices among primary school mathematics teachers is at a high level based on the interpretation of the overall mean score obtained (3.91). However, there are some items that need to be considered by primary school mathematics teachers based on items that obtained a moderate mean score level. Therefore, teachers should equip themselves with adequate knowledge and skills in SBA so that the assessment process is genuinely effective in measuring students' knowledge and skills as well as to help teachers identify students' strengths and weaknesses in learning.

#### ***School-Based Assessment (SBA) Practices Among Primary School Mathematics Teachers Based on Teaching Experience***

According to the results of the one-way ANOVA, there was no significant difference between SBA practice among primary school teachers in terms of teaching experience. Thus, teaching experience does not influence the SBA practices implemented by primary school mathematics teachers. There are some studies that support the notion that teaching experience does not lead to differences in SBA practices among teachers in schools.



The study by Abdullah et al. (2015) is consistent with the findings of this study which suggest that there is no significant relationship between the input dimensions in the implementation of SBA in Science subjects with teaching experience. In addition, Abdullah et al. (2015) stated that the practice of SBA can be strengthened by undergoing training in more specific services such as practicum. This method has been used by developing countries such as Hong Kong. This supports the findings that the differences in the practice of SBA are not influenced by teaching experience but depend on the skills of teachers in implementing SBA with the training received. Insufficient information or a lack of understanding and a lack of relevant training is a challenge in the practice of SBA in schools. Teachers do not have adequate skills to build a variety of assessment instruments that are different from the usual tests (Abdul Khalil & Awang, 2016). This proves that teaching experience does not contribute to differences in practices of SBA by mathematics teachers in schools.

The SBA concept is not new as the same methods have been used before, namely quizzes, classroom training, homework, and projects. However, the way of implementing SBA is different from the assessment in the New Primary School Curriculum (KBSR), where everything must refer to the Reference Standards and be recorded based on the Reference Standards in the site provided. Therefore, teaching experience is not required, both experienced mathematics teachers and novice mathematics teachers need to build new knowledge on SBA in primary schools to be implemented in or outside the classroom. Teachers need to be more creative in constructing assessment instruments based on the contents of the specified learning (Mahmud et al., 2020a). Thus, we can see that the practice of SBA performed by mathematics teachers in primary schools is through training provided either at the school level or higher (Abdul Rashid, 2016). The number of teachers who are not ready to implement SBA in school also shows why teaching experience does not have a significant relationship with the differences in the practice of SBA by mathematics teachers. This is because the main challenge in implementing SBA in schools is that teachers are less prepared to accept new ways of implementing assessments (Yusof, 2013). Therefore, primary school mathematics teachers should be given adequate in-service training related to SBA as well as motivation to have a high level of preparedness to implement appropriate SBA practices in teaching and learning

## Conclusion

This study has shown that primary school mathematics teachers have indeed tried to carry out the practice of SBA well. A high level of understanding and implementation methods, which coincides with the approach given by the MOE, indicated mathematics teachers have welcomed the efforts made by the MOE to improve the quality of education in Malaysia. The new assessment introduced aims to obtain information on student performance to fully develop the potential of people to become harmonious and balanced human capital in line with the aspirations of the National Education Philosophy. It is hoped that this study can help and be a guide to other mathematics teachers to improve their practices in SBA at their respective schools

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