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Logistics Regression Analysis of Teacher Perceptions on the Implementation of School Based Assessment in Teaching Mathematic

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Abstract: Over the years, the issue of SBA in Malaysia continues to gain attention. The issue that highlighted in this study is the reliability and validity of SBA as an assessment system. It is an unquestionable fact that teachers are given power to assess their students; however, due to lack of information, training, materials, guidelines and infrastructure in executing the SBA, it has led to a subjective evaluation. Thus this article intend to examine teachers' perception on the effectiveness of SBA practiced in secondary schools. The researcher investigated teachers' perceptions of the role of SBA in teaching and learning mathematics. The nature of the study will be a quantitative approach. A questionnaire with three different parts was designed to collect the data. The descriptive statistics, logistic regression analysis and Pearson correlation were used to answer all respective research questions in this quantitative study. Results and findings led to the conclusion that the teachers who responded "SBA is effective" have a higher probability to have a positive perception on the students' achievement in Mathematics.

Keywords: School Based Assessment (SBA), Mathematic, Logistics regression.

INTRODUCTION

School Based Assessment is an assessment which is embedded in the teaching and learning process. According to the Malaysian Examination Syndicates [1], SBA is a planned assessment which follows the procedures of the Examination Board. SBA is carried out by the schools and the assessment is implemented via the subject teachers on an on-going basis throughout the teaching and learning process. SBA emphasises the assessment of a wide range of abilities which offers a comprehensive appraisal of students' performance. By integrating learning and teaching with assessment, it helps students to recognize their strengths and weaknesses through quality feedback from teachers [2, 3]. SBA also reduces dependence on the results of public examinations and boosts students' confidence and motivation to learn and enhances autonomous learning [4].

SBA is an effort by the government to build a holistic human capital, which was implemented in phases which started in the early 2011 by the Ministry of Education. An officer from MES, Sharifah Hadjarah, stated that the SBA is an assessment that accesses the various aspects of the students as a whole; including the cognitive, affective, emotional, spiritual and physical aspects [5]. According to the Ministry of Education Malaysia [6], SBA stressed on mastering knowledge, building intellectual capital, nurturing a culture of progressive attitude and encouraging the practice of high moral characters and values [7]. The school assessment, centre assessment, co-curriculum activities assessment and psychometric assessment are four important components to be evaluated via SBA. SBA was presented to evaluate and gauge students' achievement in both academic and non-academic fields to improve the development of holistic human capital. Generally, the SBA is dependent on the students' level of schooling.

In an effort to make the SBA efficient, Assessment of Reference Standard was introduced by using performance standards as a source of reference by all parties; which involve the education field directly and indirectly. Performance standards were used to observe the progress and growth of students' learning and performance. Thus, students will be assessed fairly and equitably based on their ability, aptitude, talent, skills and potential without being compared with the others. In addition, SBA is the process to obtain information on the extent of students' level of knowledge and their understanding on what they have learnt based on statement of performance standards that set by levels of achievement

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[8]. The standard statement was placed in categories according to their bands; Band 1, Band 2, Band 3, Band 4, Band 5 and Band 6 which were sorted according to the hierarchy and explained with descriptors specifying the detailed performance that can be observed and measured in determining the performance of each student.

Previously, students are given mid-year and end-year examinations for easy standardizations and school ranking practices. These examinations assume that all schools studied the same materials and covering the similar topics. While this should be true, the fact that some schools did not get to cover every topic due to unexpected situations or due to students' inability to complete the study in any particular area. On the other hand, SBA can be tailor-made to include only what had been accomplished by the students and the scores will reflect what the students had actually learned, instead of what they were supposed to learn [9].

Morever, the SBA provides an excellent opportunity for students to get feedback, conduct self-assessment, apply their knowledge and skills, and improve their learning and achievement. Instead of assessing students' level and achievement, they are also given the opportunity to ask for a progress report to their teacher [10]. At the same time, teachers can identify their own level of teaching by observing students' achievement in SBA. As a result, the teachers will also better understand their students' needs and will always be willing to take certain steps in the teaching and learning process.

SBA for secondary schools is given attention by all parties in line with the objective to improve Malaysian assessment method. The impact of this new formative assessment process on teachers, students and the curriculum has been systematically researched and evaluated. SBA has also become a topic in many studies. Previous studies reported about the importance and the acceptance of the SBA in teaching and learning in secondary schools [11, 7]. Typically, the studies emphasized on the strengths and weaknesses of the SBA. However, SBA effectiveness depends on factors such as teaching and learning process, as well as training, knowledge and skills in the field of educational assessment among teachers. Therefore, the researcher seeks to investigate the perception of teachers on the effectiveness of SBA practiced in their classrooms which focus in academic aspect only.

This study uses logistic regression analysis which involves discrete variables. Logistic regression methods are essential to any data analysis, which attempts to identify the relationship between a response variable and any number of predictor variables [12]. For instance, in this study, the outcome might be effectiveness or ineffectiveness of the SBA as practiced in secondary school. There are several predictor variables in this study including the teacher's backgrounds and school's location. Thus, the aim of the present study is to investigate the teacher's perception on the effectiveness of SBA practiced and subsequently to highlight the student's achievement in mathematics subject.

STATEMENT OF PROBLEM

Over the years, the issue of SBA in Malaysia continues to gain attention. The issue that highlighted in this study is the reliability and validity of SBA as an assessment system. It is an unquestionable fact that teachers are given power to assess their students; however, due to lack of information, training, materials, guidelines and infrastructure in executing the SBA, it has led to a subjective evaluation [13]. According to Marva [14], the countries with high levels of infrastructure, authority and consensus will make the continuous assessment to be more efficient. The SBA innovation will be more successful with adequate planning, resources, services and educational training. The idea of SBA was inferred from other advanced countries, so that MOE needs to provide a complete infrastructure and facility first before SBA was introduced in Malaysia [11]. Since SBA was introduced, there arose many complaints from teachers who also feel the burden with the incomplete and unconducive infrastructure especially in rural public schools.

Due to the differences in the teachers' assessment of the students' achievement, some schools have developed their own methods and ways to measure the students' academic achievement. There are different practices in different schools due to the lack of external monitoring from the Ministry officers and insufficient guidelines of the SBA [15]. Some schools had totally abolished the monthly tests and final exams while some still retaining it. SBA stressed more on the process of learning, more students concentrate in the class and somehow, causing students to have no effort to achieve the goal in their study because they did not required sitting for examinations. As they no longer feel examination pressure, students have lost their driving force and their enthusiasm in learning has also declined [16]. The students ended up feeling bored and with the loss of capacity to compete to be the best, thus affecting their academic achievements in school.

In the assessment of mathematics, the policy makers have noticed that many students were quite able to learn the necessary formula and apply them to the limited range of textbook and test situation, but when faced with novel problem, they fell short and showed that they were far from having understood the relevant concepts and conceptual relations [17]. Therefore, an effective assessment is needed to promote students' mastery of mathematical thinking through SBA. Without appropriate assessment and grading system in assessing students, we cannot know how effective

and efficient such assessment for students. All these are real issues currently present in Malaysian schools as teachers play an important role in assessing their students. This study sought to recognize the teachers' perception of the SBA effectiveness in increasing students' achievement in mathematics.

RESEARCH OBJECTIVES

The main objective of this study is to examine teachers' perception on the effectiveness of SBA practiced in secondary schools. The researcher investigated teachers' perceptions of the role of SBA in teaching and learning mathematics. Specifically, the study sought to understand the teachers' perception on the assessment use to assess students' achievement in mathematics. This study investigated the current SBA practices of lower secondary school mathematics teachers in ten selected schools in Kedah. Thus, the following research questions are used to focus on this research:

- Do the teachers agree that the practice of SBA has been effective in their classroom?
- Do the teachers agree that students' achievement in Mathematics has improved via SBA?

LITERATURE REVIEW

School-Based Assessment In Mathematics

According to the Curriculum Development Centre [18], the Malaysian mathematics curriculum has shifted from focusing on skills and calculation towards more on emphasising on the understanding and application of basic Mathematics skills as Malaysia is gearing towards becoming a future developed country. Mathematics curriculum is leaning more towards creating a student thinking with more attention given to the mathematical process. The curriculum now gives a greater emphasis to the problem solving, communication, mathematical reasoning, and mathematical relationships and allocation [19]. Through SBA, the contents of the Mathematics subject are tested critically. Thus, teachers and students need to be more creative in solving Maths problems so that students will be more motivated in learning and achieving the target in Mathematics curriculum.

The research done by Lewis [20] presented the community's perception on the SBA in mathematics. The objective of this research is to explore the role of SBA in Mathematics since it does not involving written exams only. In this research, Lewis said that both policy makers and teachers agreed that the rational of SBA is to assess those objectives of the curriculum which are not appropriately, adequately and validly assessed in an external examination. The topics in Mathematics for secondary school were found to be suitable for SBA, which include geometry, trigonometry, measurement and statistics. In his findings, he found out that there is a high probability that SBA has the potential to go far in mathematics curriculum. He also emphasized that SBA is able to increase teacher's pedagogical skills in teaching Mathematics content rather than only teaching for exams.

In Malaysian education, teaching and learning Mathematics through Standard Curriculum Secondary School (previously known as KSSM) has been focusing on students' knowledge and understanding, which enable students to apply the concepts, principles and processes in Mathematics that they have learned starting from the year 2011 [21]. Emphasis on aspects of the students' development in Mathematics was built and developed through teaching and learning process based on principles such as problem solving, communication, reasoning, making representations and the use of technology in mathematics [21]. According to Webb [22], the nature of the assessment plays an important role in Mathematics subject in school. Teachers need to use assessment to help students to achieve their goal in Mathematics curriculum taking into account of what they have learnt over a long period of time. Therefore, Mathematics assessment of student learning should not be construed as an end point in the learning experience for students, but it serves as a way to achieve specific educational goals [23].

For SBA in Mathematics, as well as any other subjects, a Standard Referenced Assessment will be used by teachers to report a student's achievement guided by the Standard Referenced Assessment that was given by MES [1]. In reporting students' achievement, Document of Performance Standard (DSP) is formulated by the ministry for teachers to carry out the Standard Referenced Assessment [1]. The DSP for Mathematics subject are as follows:

Table-1: Standard Referenced Assessment of Mathematics

Band	Standard Referenced Assessment
1	Know the basic knowledge of mathematics.
2	Know and understand the concept in mathematics.
3	Know, understand and apply the basic knowledge of mathematics.
4	Know, understand and can solve the mathematics problems systematically.
5	Apply mathematics knowledge and skills in solving complicated problems by various methods.
6	Master and apply the knowledge and skills of mathematics in a creative, innovative and effective.

Source: Curriculum Development Division, District Education Office, Alor Setar [24]

Teachers will be assessing students' understanding of subjects taught in class by using a variety of strategies and appropriate assessment instruments. Teachers can also perform an assessment informally, for example, using the method of observation, where the teachers assess each student on an on-going basis about what they know, understand and able to do [25]. This explanation was proven by Kwek, Hoo & Tan [26] who set out that assessment for student understanding can only be done by using a variety of assessment instruments such as problem solving, discussions, tasks, projects, scrapbook, investigation, training and testing. Assessment for different types of achievements can then be achieved by mastering Mathematics as the reasoning skills and problem solver [19].

Logistic Regression

Park [27] explained well the concept of logistic regression in his article. Logistic regression is also known as logistic model or logit model. Logistic regression analysis is applied for this research to observe the predictors of each of the variables and the outcomes by estimate the probability of each event occurring. This analysis can be done by examining the relationship between each independent variable and the log odds of the dichotomy outcomes. He further explained that the log odds ratio is the ratio of two odds, or in other words, it is the summation measure of the relationship between these variables [27].

Many researchers utilized the logistic regression analysis in their study. For instance, Hashim [28] applied the logistic regression technique to investigate factors that influence the perception of the appraisal system among secondary school teachers in Terengganu state. The general aim was to assess the level of teachers' perception on system performance evaluation in terms of features assessment. Lim and Ong [29] used logistic regression analysis to assess two subjects (English and Malay languages) for the national public examinations at all levels. This study was conducted to determine whether a source of differential achievement is a result of language differences or is a result of real differences due to the students' ability. The result of their study showed that the tests in different languages did not exhibit psychometric equivalence.

Abdull Sukor *et al*., [30] analysed the logistic regression method to explore the teachers' perception of fairness in performance evaluations at school. He also examined the relationship between two fairness performance assessment with an evaluation of school organizational performance as measured by job satisfaction and academic achievement of the school. The results in this study showed that the performance evaluation of justice aspect is at the medium level. On the other hand, he found out that the respondents did not have high job satisfaction. In terms of the relationship between justice and academic achievement of the performance evaluation, it was found that these two aspects are correlated positively and significantly. Overall, the results showed that the fairness of performance evaluation can contribute to the organization's efforts to improve job satisfaction among teachers and school academic achievement.

Besides, the study of Mohamad Azhar and Shahrir Jamaluddin [31] was done to determine the factors that lead to such practice in any assessment that used by teachers in teaching and learning process. The researchers were utilized the survey research method in their study. The samples of 813 teachers selected in 40 schools to participate in this study. The frequency tables were used to presents the data, whereas logistic regression was used to analyse the data. The findings showed that the teachers employ the assessment practices frequently; including sharing of learning objectives between teachers and students, questioning, and providing feedback. The teachers also use self-assessment and peer-assessment as their practices in class. Several factor that affecting students' assessment of learning were also found in this study, which were teachers' perceptions toward the importance of basic foundation of assessment, teaching experience, and school location. Logistic regression method is suitable in predicting the factors leading to such practice in teaching and learning.

Furthermore, Hussain [32] applied logistic regression model on the in-service to predict their assessment literacy. There are six variables that were considered in his research, which are attitude towards educational measurement, self-perceived confidence in educational measurement, in-service assessment training, gender, major, and years of teaching experience. The participants were selected from a random sample of 40 public schools at Muscat educational region in Oman. The findings indicated that only four variables were reliable as the predictors of assessment literacy. Logistic regression analysis revealed that attitude towards educational measurement, self-perceived confidence in educational measurement, in-service assessment training, and teaching experience were the only reliable predictors of assessment literacy. Implications for professional preparation in educational measurement as well as recommendations for future research were also discussed.

Finally, research by Saha [12] applied logistic regression model in analysing the school examination results (scores) which were assumed as dependent variable. There are 6 independent variables in his study namely gender, medium of instruction, board of examinations, type of school, category of schools and location of schools. He evaluated the odd ratio to compare the score obtained in two examinations, which are matriculation and higher secondary. He discovered that females are always showing better performances in both the examinations. But their performance is found

to be better in matriculation. He also added that the performances of English medium schools are found to be more satisfactory in higher secondary examination. Similarly urban schools always showed better performance in higher secondary examination.

In summary, logistic regression is well suited for describing and predicting the relationship between a categorical outcome variable and one or more categorical or continuous predictor variables. The researcher concluded that the teacher's perception on SBA as the categorical outcome variable, and mathematics achievement as the interval variable.

METHODOLOGY

Researcher employed quantitative method for this study. An Instrument were distributed to the selected sample in this study.

Sample Size

In this logistic regression study, a total number of 50 Mathematics teachers were given a set of questions (n=50). In terms of the adequacy of the sample size, the literature has not offered specific rules applicable to logistic regression [33]. According to Askar [34], several authors on multivariate statistics had recommended small sample size for this kind of research. The respondent is calculated by taking into consideration the minimum ratio (sample size/ predictor variables) of 10 to 1, with a minimum sample size of 50 or 100, plus a variable number that is a function of the number of predictors [34, 33]. Due to these requirements, the number of respondents was appropriate for this study.

Instrument

The nature of the study will be a quantitative approach. A questionnaire with three different parts was designed to collect the data. A self-report questionnaire namely "Teacher's Perception on SBA Questionnaire" (TPSQ), which consisted of three parts was used in this study. Part 1 of the questionnaire contains the demographic data was self-constructed by the researcher. The items in Part 1 include the school's name, teacher's gender, age, years of teaching, race, marital status, highest qualification and area of specialization. Part 2 of the questionnaire is related to the teacher's perception on the SBA effectiveness in school in increasing students' achievement in Mathematics. Part 3 of the questionnaire is the data on ten students' scores in Mathematics (top 5 and bottom 5) that selected by each teacher.

DATA ANALYSIS

The descriptive statistics, logistic regression analysis and Pearson correlation were used to answer all respective research questions in this quantitative study. Firstly, descriptive statistics were used to analyse the percentage and frequency of the respondents' demographic data. Then, the researcher utilized a logistic regression analysis to explore the teachers' perception on the SBA effectiveness in school and to determine whether it was related to students' achievements in Mathematics. The dependent variable in this study was a binary outcome: "yes" or "no", for the teachers' perception on the SBA effectiveness in school. The teachers' perception on the SBA effectiveness in school was coded "0" for the response "SBA is not effective" and likewise "1" for the response "SBA is effective".

The students' achievements in Mathematics were treated as a continuous variable. Data on 10 students' achievements in Mathematics (top 5 and bottom 5) were taken from teacher's record based on their latest examination result, which is mid-year examination result. The logistic regression model can be used not only to identify the outcome but also to predict the probability of success. This regression is useful when the dependent variable is dichotomous. Lastly, Pearson correlation was used to investigate the relationship between the teachers' perception on the SBA effectiveness and the students' achievements in Mathematics. All the data and marks gathered were analyzed by using the Statistical Package for the Social Sciences (SPSS) version 17.

The model

Let us consider the indicator variable $Y_i = 1$,

$$Y_i = \begin{cases} 0, \text{No} \\ 1, \text{Yes} \end{cases}$$

Assuming that $P_r(Y_i=1) = \theta = 1 - P_r(Y_i=0)$

Where, θ can be written as,

$$\theta = \frac{e^{(\alpha+\beta x)}}{1 + e^{(\alpha+\beta x)}}$$

Where,

α = the constant of the equation

β = the coefficient of the predictor variable X.

An alternative form of the logistic regression equation is:

$$\ln (ODDS) = \ln[\frac{\theta(x)}{1-\theta(x)}] = \alpha + \beta x$$

The goal of the logistic regression is to correctly predict the category of outcome for individual cases using the most cautious model, and to accomplish this goal, a model is created that includes various predictor variables that are useful in predicting the response variable [35]. Logistic regression calculates the probability of success over the probability of failure, and the result of the analysis is in the form of an odds ratio. Based on Saha [12] study, the odds ratio is a measure of the effect size, describing the strength of association or non-independence between two binary data values. It is used as a descriptive statistics, and plays an important role in logistic regression. Unlike other measures of association for paired binary data such as the relative scores, the odds ratio treats the two variables being compared symmetrically, and can be estimated using some type of non-random samples [34].

The odds ratio may be presented as,

$$\text{ODDS} = \left[\frac{Pi}{1 - Pi}\right] = e^{\alpha+\beta x}$$

With $P_i = P_r [X_i = 1] = 1 - P_r [X_i = 0]$, where X_i is the independent variable corresponding to i^{th} category for $i = 1, 2, \ldots, n$.

In this study, the logistic analysis was a log odds ratio (β) of the event occurring. When raising *e* to the power of the log odds, it will converted to exp (*B*). In other words, the Exp(*B*) values give the change in odds for a one unit change in the predictor variable.

FINDINGS

In the beginning, the output included only the intercept (which is called the constant). The results show of the 50 teachers, 36 of them (72%) responded "SBA is effective" while 28% responded "SBA is not effective".

Table-2: Classification of Teacher's Total Agreement

	Observed		Predicted		
			Effectiveness		Percentage Correct
			No	Yes	
Step 0	Effectiveness	No	0	14	.0
		Yes	0	36	100.0
	Overall Percentage				72.0
a. Constant is included in the model.					
b. The cut value is .500					

In order to investigate teachers' perception of the SBA effectiveness, the proportion of the observe odds were analyse. It is apparent from the Table 3, the intercept-only model is ln (odds) = 0.944. If we were to exponentiate to both sides of this expression, the predicted odds [Exp (B)] = 2.571. That means the odds ratio of the respondents was 2.571 observed to response for the SBA effectiveness in Mathematics. This was indicated through the 36 responses for "SBA is effective" as practiced in school and 14 responses for "SBA is not effective", so that the observed odds are 36/14 = 2.571. In other words, the teachers from ten schools who responded that "SBA is effective" were approximately three times higher than the teachers who responded with "SBA is not effective".

Table-3: Variables in the Equation: Constant

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 0	Constant	.944	.315	8.991	1	.003	2.571

The study involved an analysis of all predictors' variables which were the respondents' gender, age, years of teaching, race, marital status, highest qualification, area of specialization and the location of school to teachers' perception on the SBA effectiveness in increasing students' achievement in mathematics. The Wald statistic and the corresponding significance level test were analysed on each of the covariate and dummy independent variables in the model. If the Wald statistic is significant (i.e., less than 0.05) then the parameter is significant in the model. Out of the independent variables, years of teaching, highest qualification and the marital status of the teacher were insignificant, whereas the location of school, the teachers' gender, age, race, and area of specialization had significantly affected the teachers' perception on the SBA effectiveness in Mathematics.

Table-4: Logistic Regression Analysis on Gender

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Gender (female)	.956	.651	1.152	1	.014	2.600
	Constant	.357	.493	.524	1	.046	1.429

The first significant predictor was the variable 'gender'. Table 4 shows the result of logistic regression analysis on the respondents' gender. The probability of the Wald statistic for this variable was 0.014, less or equal to the significance level of 0.05. The odds ratio of the respondents' gender (female) was 2.600. In other words, the female teachers who responded with "SBA is effective" were approximately three times higher than the male teachers in terms of their perception of the SBA effectiveness in school.

Table-5: Logistic Regression Analysis on Age

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	age (20-29)			1.728	3	.006	
	age(30-39)	-.118	1.364	.007	1	.031	.889
	age(40-49)	-.474	.939	.255	1	.014	.622
	age(50-59)	-1.099	.943	1.358	1	.024	.333
	Constant	1.504	.782	3.702	1	.054	4.500

The second significant predictor was the variable 'age'. Table 5 shows the result of logistic regression analysis on the respondents' age. Since the value for age variable is continuous, a large range of age difference between respondents was compared with 10 years difference. One year difference in age was not helpful, but a 10 years difference will be more descriptive. The probability of the Wald statistic for this variable was 0.006, less or equal to the significance level of 0.05. The odds ratio of the respondents' age (20-29) was 4.500. In other words, the teachers with the age between 20-29 years old who responded "SBA is effective" were approximately five times higher than the teachers with other age groups; 30-39 years old (0.89), 40-49 years old (0.62) and 50-59 years old (0.33).

Table-6: Logistic Regression Analysis on Race

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	race(Malay)			1.446	2	.004	
	race(Chinese)	.050	1.420	.070	1	.045	1.501
	race(Indian)	1.624	1.170	1.926	1	.036	.853
	Constant	1.889	2.426	.606	1	.000	6.615

The third significant predictor was the variable 'race'. Table 6 shows the result of logistic regression analysis on the respondents' race. The probability of the Wald statistic for this variable was 0.004, less or equal to the significance level of 0.05. The odds ratio of the respondents' race (Malay) was 6.615. In other words, the Malay teachers who responded "SBA is effective" were approximately seven times higher than Chinese (1.50) and Indian (0.85) teachers.

Table-7: Logistic Regression Analysis on Area of Specialization

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	specialization (Mathematics)	2.639	1.174	5.052	1	.025	14.000
	Constant	-1.386	1.118	1.537	1	.015	.250

The next significant predictor was the variable 'area of specialization'. Table 7 shows the result of logistic regression analysis on the respondents' area of specialization. The probability of the Wald statistic for this variable was 0.025, less or equal to the significance level of 0.05. The odds ratio of the respondents' area of specialization (Mathematics) was 14.000. In other words, the teachers with Mathematics as their area of specialization who responded "SBA is effective" were fourteen times higher than the teachers with other specializations.

Table-8: Logistic Regression Analysis on Location of School

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	location(urban)	.399	.635	.395	1	.053	1.490
	Constant	.754	.429	3.091	1	.079	2.125

The last significant predictor was the variable 'schools' location'. Table 8 shows the result of logistic regression analysis on the schools' location. The probability of the Wald statistic for this variable was 0.053, less or equal to the significance level of 0.05. The odds ratio of the respondents who taught in schools located in urban area was 1.490. In other words, the teachers from schools located in urban area who responded "SBA is effective" were 1.5 times higher than teachers from schools in rural areas.

It attempted to examine whether the teachers' perception of the SBA effectiveness in increasing students' achievement in Mathematics.

Table-9: Logistic Regression Analysis on Students' Achievement in Mathematics

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 1[a]	average_ach	.050	.038	1.729	1	.048	1.051
	Constant	-2.392	2.533	.892	1	.034	.091

Table-9 shows the result of logistic regression analysis on students' achievement in Mathematics. The probability of the Wald statistic for this variable was 0.048, less or equal to the significance level of 0.05. The odds ratio of the teachers who agreed that SBA was effective in increasing students' achievement in Mathematics was observed to have a probability of 1.051. In other words, the teachers who responded "SBA is effective" in increasing students' achievement in Mathematics were 1.051 times higher than the teachers who responded with "SBA is not effective" in increasing students' achievement in Mathematics. It was merely about 5% improvement in students' achievement in Mathematics via SBA practice in school.

DISCUSSION

The teachers' opinion about the effectiveness of SBA practiced in school.

The result illustrated in the previous chapter indicated that the teachers' opinion whether the SBA practiced in school was effective in increasing students' achievement in Mathematics, depended on the teachers' background itself. The study found that gender, age, race, area of specialization and the schools' location were the five aspects of the teachers' background that significantly affected the teachers' perception on the SBA effectiveness in school. These indicate that female teachers had significantly higher than male teachers, teachers with age group of 20-29 had significantly higher than other age group, Malay teachers had significantly higher than Chinese and Indian teachers, Mathematics specialization had significantly higher than other area of specialization, and schools in urban area had significantly higher than schools in rural area.

Of the 50 respondents, 72% responded positively in terms of the SBA effectiveness in school. It can be concluded that majority of the respondents realized that SBA was effective in increasing the students' achievement in Mathematics. As the research showed before, the odds of female teachers who responded with "SBA is effective" were approximately three times higher than male teachers. The reason for this result was because of the nature of the samples, in which the frequency of the female respondents was greater than the male respondents. That is why the number of female respondents who responded that SBA was effective in school was higher than the male respondents. In addition, perceptions of males toward assessment in mathematics are different from those of females, which seem to be related to perceptions of gender roles [36].

The study found that the odds ratio decreased as the age difference increased. Therefore, respondents' age became less statistically significant as the age increased. This indicates that the teachers in the older group were not very satisfied in the changes of the new students' assessment as they had taught and used the previous assessment for a long time. Furthermore, the teachers in the older group category tend to believe that the SBA were not effective, therefore indicating that they preferred the traditional exam oriented. In terms of race, the odds of Malay respondents who responded that SBA was effective were approximately 7 times greater than Chinese and Indian respondents. This was because of the respondents' proportion itself. As we can see, the Malay respondents were the majority, constituting 85% of the population in this study.

As shown in table 7 and according to Wald criterion, the teachers who agreed that SBA was effective to be practiced in school were 14 times more likely to have Mathematics specialization. Having Mathematics in their area of

specialization was the reason for the teachers to recognize whether the SBA was effective as this study focused on Mathematics teachers. Based on the location of the school, the findings illustrated that the number of teachers from schools in urban area who responded that SBA was effective was about 1.5 higher than teachers from the schools in rural area. This was because the facilities and infrastructures adequacy at the schools in both areas observably affected the teachers' perception. The researcher concluded that schools in urban area provided the adequate facilities and infrastructures for students throughout the SBA assessment.

The results and findings led to the conclusion that the teachers who responded "SBA is effective" have a higher probability to have a positive perception on the students' achievement in Mathematics.

The teachers agree that students' achievement in Mathematics had improved via SBA

In this study, teachers believe that students' achievement in Mathematics had improved fairly through the practice of SBA. The results of the study showed that the odds ratio of the teachers who were of the opinion that the SBA effectiveness on students' achievement in Mathematics was positive. This implied that most of the teachers recognized the effectiveness of SBA on their students' achievement in Mathematics. The finding contrasted with the findings from Adediwura [37], which discovered that more than fifty percent of the teachers had a negative perception on the effectiveness of SBA in their teaching practices and students' learning. The claim that students might lose concentration in classrooms was not affected much. As can be seen, the results showed that students' achievement in Mathematics had improved although only about 5%.

CONCLUSION

Through logistics regression analysis, the study showed that gender, age, race, area of specialization and location of the school were significantly affect teacher's perception on the SBA effectiveness as practice in school. Secondly, students' achievement in mathematics had improved 5% through SBA practice. Moreover, study showed that the percentages of Chinese and Indian teachers among the respondents were lower than the Malay teachers. It was not a fair comparison between races when the racial composition was not balanced as the percentages of Chinese and Indian respondents were less than 15% of the whole number of respondents. Therefore, the researcher recommends a larger proportion of sample size for Chinese and Indian teachers for future researches so as to achieve more representative findings. Due to the limitations that existed in the questionnaire and quantitative research, future researches should also analyse the responses given in open-ended text box responses to gain a better understanding of the reasons behind the responses of the teachers in the questionnaire, and to explore teachers' experience through interviews as the complement to the data collected.

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