

School-Based and Standardised Assessments in Mathematics: A Correlational Study in Primary Schools

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ABSTRACT – Recently, School-Based Assessment (SBA) was introduced in the Malaysian primary schools. It offers a critical source of information for further actions to monitor and guide improvement in the school mathematics assessment. This study employed a correlational research design to evaluate the relationship between upper primary school students' performance in SBA and the standardised assessment in mathematics, and to compare parents' perceptions of the implementation of the assessments. This study used simple random sampling based on the Krejcie and Morgan (1970) table. There were a total of 90 Year Six students and 108 of their parents from three primary schools in a Malaysian state who volunteered to take part in the study. SBA records gathered from school, a standardised mathematics exam question and a structured parent questionnaire were used in this study. The analyses used in this study are descriptive statistics and Spearman correlation. This study has confirmed that the SBA was worth implementing among primary school students in learning mathematics, as it has a moderate relationship with the standardised assessment in mathematics performance. However, parents found the standardised assessment reasonable for implementation. It offered fairness, objectivity, and the ability to differentiate students' abilities. Overall, this study suggests a rational way of assessing mathematics performance via the combination of both approaches. This study guides stakeholders on gaining parents' trust and fostering students' abilities via mathematics assessments.

INTRODUCTION

Parents who provide significant support to their children's education are also focusing on the current changes of the educational system (Hill & Taylor, 2004). In primary school mathematics education, parents' support comes into play (Ahmad et al., 2017) when there is a transition from standard examination to school-based assessment (SBA). Recently, an announcement was made regarding the implementation of a mathematics standardised assessment for Primary Four pupils (Chan, 2026). More feedback is expected following the introduction of standardised assessment. Investigating parents' previous experiences and perceptions of mathematics education may serve as a valuable reference for the future practice of the new system. Hence, this study aims to investigate to what extent parents rated the implementation of the previous standard examination (UPSR) and school-based examination.

While implementing a new introduction of standardised assessment among Primary Four students, the current practice of SBA and the abolishment of the standardised assessment among Primary Six students are still getting public attention, particularly the critical subject – mathematics. In particular, the shift from standardised assessment to SBA represents a major transformation in the national education system. The abolishment of UPSR in 2021 marked a significant move towards holistic and continuous assessment practices (Bernama, 2021). This decision aims to balance student development as highlighted in the Malaysia Education Blueprint 2013–2025. In reducing over-reliance on high-stakes examinations and promoting (Ministry of Education Malaysia, 2013), SBA, also known as Pentaksiran Bilik Darjah (PBD), was introduced to assess students' learning continuously through classroom-based activities, teacher judgement, and formative feedback (Ministry of Education Malaysia, 2013). In contrast, SBA involves flexible implementation and relies on teacher judgement. There are possibilities that the concerns of fairness and transparency arise when there are variations in assessment practices (Sidhu et al., 2011; Bayzura & Salwana, 2023). These concerns are particularly being observed, as it is a subject that requires structured evaluation and is often used as an indicator of academic ability (Kementerian Pendidikan Malaysia, 2021).

Observing the change in the past few years, more investigation is becoming necessary to seek a balance between holistic assessment and standardised measurement. The introduction of new assessment initiatives at the primary level, including standardised testing elements for earlier years in Primary Four, reflects ongoing efforts to strengthen benchmarking in an early year compared to the previous implementation of Primary Six while maintaining formative assessment approaches (Scoop, 2026; The Star, 2026). This highlights the importance of understanding stakeholders' perceptions, particularly parents, who play a crucial role in supporting students' learning and interpreting assessment outcomes. Among the supports focuses on their preferences of assessment, for example, parents tend to favour standardised assessment due to their perceived objectivity, clarity, and comparability (Harris, 2015).

In investigating the observation, this study was designed based on a few theories. The CIPP Evaluation Model by Daniel Stufflebeam (Stufflebeam, 2003) provides a guide to investigate parents' perceptions as input to justify the students' current adaptation of the assessment in learning mathematics, which aligns with the second objective of identifying the extent to which parents perceive and compare SBA and standardised assessments. A structured approach to evaluate SBA and standardised assessment was designed through context, input, process, and product aims to present the impact of the current implementation. In particular, the product dimension of the model supports the first objective by providing a framework to examine the relationship between mathematics SBA and standardised assessment scores. The Planned Behaviour Model (Ajzen, 1991) was referred to as a guide to investigate parents' perceptions as a contribution of stakeholders' attitudes, social influences, and perceived control in shaping an overall support toward assessment practices, which further supports the second objective of understanding parents' perceptions and comparisons of the two assessment approaches. Grounded in the Information Quality Theory, this information serves as a critical source of information for educational decision-making (Wang & Strong, 1996). This theory is relevant to the first objective as both SBA and standardised assessment results provide information on students' mathematics achievement, allowing the relationship between the two forms of assessment to be examined.

Despite ongoing discussions, there is still a need to better understand how it compares with other assessment approaches used in schools, particularly in relation to mathematics performance. In response to this gap, the present study explores parents' views on both SBA and standardised assessments, while also examining the relationship between these two forms of assessment in students' mathematics performance at the upper primary level. The findings gained from study are intended to provide significant insights on the efficacy, acceptability and better future direction of Malaysian assessment practices. Specifically, the research objectives are (1) to investigate the relationship between mathematics school-based assessment (SBA) and standardised assessment scores, (2) to identify the extent to which parents perceive and compare SBA and the standardised assessments.

LITERATURE REVIEW

The Relationship Between School-Based Assessment (SBA) and Standardized Examination

Parents emphasised that their children placed a high value on the UPSR due to its recognition among Malaysians and the simplicity of understanding letter grades (A, B, C) in the result (Ding, 2021). Literature suggests that standardised assessment provide a "common indicator" for academic success, allowing comparability across students and schools. School-Based Assessments (SBA) are essential for assessing students' academic progress and are frequently used to predict how well they performed on standardized national exams. Exam results and SBA scores have been found to be correlated both directly and indirectly in several studies that have examined this relationship, especially in mathematics. Almost all studies that have been reviewed have consistently demonstrated a relationship between School-Based Assessment (SBA) and standardized examination including several academic factors like motivation. For example, it was evident that SBA scores significantly predicted students' performance in both English and mathematics on the Junior Secondary Certificate Examination (Opara et al., 2015). Similarly, the discovery by Nwakpa et al. (2023) informed that achievement in the continuous assessments was correlated to the performance on national tests such as the NECO Senior School Certificate Examination (SSSCE). Other than that, Performance in mathematics strongly associated with SBA scores in various educational settings. A study conducted in Ghana found a moderately positive relationship between SBA and standardized examination performance in mathematics (Ntow Godfried et al., 2022). Similarly, findings in Tanzania also reported a statistically significant correlation between continuous assessment and national examination scores in mathematics (Myombe & Mushi, 2022). Continuous assessment also functions as a motivational tool by providing regular feedback and encouraging consistent student effort (Myombe & Mushi, 2022; Aracena, 2024).

However, the relationship between school-based or formative assessment and examination performance may be influenced by additional factors (Morales et al., 2022; Nurul Nadiah Ahmad, 2025; Theobald et al., 2022). According to Astuti and Retnawati (2018), SBA shows a relationship with student motivation and national examination results, but a weaker relationship with readiness. This suggests that SBA alone may not directly determine examination performance without the influence of other factors. In addition, teacher-based assessments may provide a broader evaluation of students' abilities, but differences in grading standards and implementation may affect consistency (Pedro et al., 2022). The abolition of the Ujian Pencapaian Sekolah Rendah (UPSR) in 2021 has changed perception among parents and teachers. Some parents view the abolition of the UPSR as a precedent for their children's future competencies (Bayzura & Salwana, 2023), particularly in mathematics, which is a fundamental subject in STEM education. The abolishment of UPSR and replacement with school-based assessment (SBA) creates some challenges in education, such as the need for teachers to adapt their teaching methods and for parents to understand the new evaluation criteria. These issues remind everyone to ensure the new assessment methods effectively measure students' competencies in mathematics. The ultimate goal is to confirm it provides more opportunities, as supported by Harlen (2005), to enhance mathematical skills that are critical for STEM education. Parents may need to consider exploring alternative assessment methods and resources that can support their children's learning in mathematics, such as online tutoring, educational apps, and collaborative learning opportunities. Therefore, this group of parents plays an important part in determining the future of mathematics education.

Many parents may have different ideas about the inclusion of both formative and summative assessments in schools. SBA incorporates both formative and summative assessments, which are expected to provide a more holistic and continuous assessment of students' learning. This approach seeks to evaluate students' overall development and improve critical thinking and problem-solving skills and also provide individualized learning experiences rather than rote learning (Ministry of Education, 2013; Mohd Aziri & Che Ahmad, 2019). SBA encourages collaboration between teachers and pupils. Teachers become facilitators, helping pupils with their expertise by offering advice, helpful criticism, and remediation so that they have opportunities to explore ideas, develop skills, and produce work individually or in groups (Foo, 2023).

Parents' Perceptions towards SBA and Standard Examination

There are several discussions regarding parental views of standardized examinations and alternative assessment applied now which are SBA or PBD. According to a study from Osburn et al. (2004), parents did appreciate standardized examinations but they didn't fully comprehend the meaning of their children's result from the exam. Similarly, a survey by Malaysia Now (2021) revealed that 50% of parents opposed the UPSR's abolishment due to concerns about the absence of a standardized assessment to monitor their children's development, while 35% supported the change as it reduces test anxiety and promotes holistic learning. Another discussion is about the ignorance of parents about SBA and PBD systems. Regarding the assessments changing, it was found that parents don't understand how SBA and PBD works due to a gap between school assessment practices and parental knowledge (Malaysia Now, 2021). Based on an article from Malay Mail (2022), parents were concerned about how SBA can be used to determine academic competency following the abolishment of standardized examinations. Noor Azimah Abdul Rahim (2022) also emphasised the need for clearer communication between schools and parents to ensure confidence in the system. This aligns with Stakeholder Theory (Freeman et al., 2010), which highlights making transparent decision based on stakeholders' expectations. This alarming message was commonly supported as misunderstandings often arise due to limited communication between schools and parents regarding assessment processes and outcomes (Osburn et al., 2004).

Among the concerns from teachers and parents include the absence of standardised assessment may reduce students' motivation and focus, as clear academic benchmarks are no longer present (Che Md Ghazali, 2016; New Straits Times, 2024; Malay Mail, 2022). Their perception can always be a reference for the school to gauge parental support. More effort from school is required to get parents informed regarding any progress in the assessment so that they can continue support aligned with the school system since parents who are more informed about assessment systems are better able to support their children's learning (Cheng, 2011; Mustapha, 2024). Effective communication between schools and parents is therefore essential for successful implementation of SBA. Successful assessment implementation depends on parents and schools having effective communication. The study emphasised how crucial it is for schools to inform parents about SBA procedures. Children's involvement is directly impacted by parents' opinions on SBA, and parents who are knowledgeable about the programme are better able to assist their children (Cheng et al, 2010). Additionally, Osburn et al. (2004) found that parental perceptions of assessment are influenced by external factors, including school performance and communication practices.

Overall, literature suggests that taking parents' concerns and views on school assessment is the right approach for schools to gain support. While SBA is becoming the main practices in the assessment, it promotes holistic assessment, parents' confidence remains influenced by their familiarity with traditional examinations, clarity of reporting, and understanding of the assessment system. In reality, both standard examinations have their own benefits, but more doubts were coming in as the changes were happening during the current changes in the modern digital world. By identifying students' performance in both SBA and the standardised assessment, the relation between these two assessments and the current practices among Primary Six students is observed. The level of relation captures the extent to which SBA can replace standardised assessment based on the performance other than assigned values of SBA. Besides, by observing parents' views, more feedback is gained regarding the comparison of the aspects of knowledge, perceived benefits, and the challenges of each assessment system. Hence, the research aims to determine if current practices satisfy parents and how their preferences might guide future educational planning. Specifically, this study aims to (1) evaluate the relationship between school-based assessment (SBA) and standardised assessment in mathematics performance among upper primary school students, and (2) compare parents' perceptions of knowledge and the implementation (opportunities, benefits and challenges & concerns) of SBA and the standardised assessment (UPSR).

METHODOLOGY

Hypothesis

To examine the relationship between School-Based Assessment (SBA) scores and standardized mathematics examination performance among upper primary school students, the following hypotheses were decided:

H_0 : There is no significant relationship between School-Based Assessments (SBA) and standardized examination towards mathematics performance among upper primary students.

H_1 : There is a significant relationship between School-Based Assessments (SBA) and standardized examination towards mathematics performance among upper primary students.

Other than that, to compare parents' perceptions of School-Based Assessment (SBA) and standardized examinations in terms of knowledge, opportunities, benefits, and challenges, the following hypotheses were decided:

H_0 : There is no significant difference in perceptions (knowledge and implementation – opportunities, benefits and challenge & concerns) between SBA and Standardized exam as perceived by parents.

H_1 : There is a significant difference in perceptions (knowledge and implementation – opportunities, benefits and challenge & concerns) between SBA and Standardized exam as perceived by parents.

Research design, population and sample

This study aims to evaluate the current study, which employs a correlational research design to investigate both the relationship between SBA and standardised assessments and parents' perceptions of the two types of assessments. This study adopts a quantitative approach as it enables the collection of numerical data that can be statistically analysed for relationships and patterns (Mertler, 2016). Study employed inferential statistics, which rely on objective measurements to generalise findings for a larger population, ensuring that the sample was representative, answering the .

The target population of this study consisted of Year 6 students and their parents or guardians from three primary schools in Kulim, Kedah, Malaysia. The schools were selected purposively based on several criteria. First, all selected schools implemented the School-Based Assessment (SBA) system and had Year 6 students who had substantial experience with the assessment process. They are also directly involved in the SBA system and represent the cohort that would have sat for the Ujian Pencapaian Sekolah Rendah (UPSR) before its abolition. As the final year of primary schooling, this group is most appropriate for examining academic performance and assessment outcomes. Second, as required by the Malaysian education system, all schools maintained SBA records and students' academic performance data, which were necessary for this study. Third, approval was obtained from the school administrations, allowing direct access to the students, their own parents and the necessary data. In addition, the study was conducted in Kulim, Kedah due to accessibility and the availability of schools that met the study criteria. The selection of schools within the same district also helped minimise variations in educational policies, curriculum delivery, and assessment practices that could influence the study findings. Therefore, these schools provided an appropriate setting for examining the relationship between SBA performance and mathematics standardised assessment results, as well as parents' perceptions of the assessment systems.

The sampling technique employed for students and parents in this study was simple random sampling to ensure equal representation across the participating schools. School 1 consist of 20 students, school 2 consist of 31 students while school 3 consists of 53 students. The total population (N) consisted of 104 Year 6 students and 104 parents or guardians from the three selected primary schools in Kulim, Kedah. Since the Krejcie and Morgan (1970) sample size determination table does not provide an exact value for $N = 104$, the next higher available population value ($N = 110$) was used. Based on this value, the recommended minimum sample size is 86 respondents. Accordingly, this study aimed to meet or exceed the recommended sample size to ensure statistical reliability. A total of 90 students and 108 parents were obtained as the final sample. The slightly higher number of parent respondents further strengthens the representativeness and reliability of the data.

INSTRUMENT

The instruments used in this study are: a demographic form, a paper and pencil test and a structured questionnaire (refer Appendix A). A paper-and-pencil test consisting of 40 objective items and 15 subjective questions, totaling 100 marks, was given for Research Objective 1 (RO1) by utilising adapted 2019 UPSR mathematics past questions. Both the 2019 UPSR and the current KSSR mathematics used in the school-based assessment are relevant to each other, as they cover the same core domains of the mathematics content. This instrument was used to measure how well students performed on standardised assessment. Their School Based Assessment (SBA) scores were obtained from school records. In the Malaysian School-Based Assessment (SBA) system, student achievement is reported using six mastery levels (TP1–TP6). TP1 represents basic knowledge and skills, while TP6 indicates a high level of mastery, where students are able to apply mathematical knowledge and skills creatively and effectively in complex situations. Higher mastery levels reflect higher levels of mathematical competency. The SBA scores used in this study were based on these mastery levels assigned by teachers as part of the regular assessment process.

For Research Objective 2 (RO2), a questionnaire was employed to gather parents' perspectives on both of the assessment, SBA and standardised assessment (UPSR). The instrument was derived from prior research by Cheng et al. (2010) and Ghazanfer (2023) and tailored to suit the Malaysian mathematics context. There are 63 items, several were eliminated or rephrased to increase clarity and relevancy. The final questionnaire used a 6-point Likert scale and was divided into four major categories: Knowledge and Understanding, Opportunities, Benefits, and Challenges and Concerns. A demographic section was also incorporated to collect respondents' background information.

Cronbach's Alpha was used to test reliability; values greater than 0.70 suggest adequate internal consistency (Taber, 2017). A pilot study with 30 participants found Cronbach's Alpha values of 0.840 for SBA perception and 0.924 for standardised assessment, demonstrating strong reliability. In the end of the final analysis, all dimensions produced values more than 0.90, indicating high internal consistency. The paper-and-pencil test had high split-half reliability, with a Pearson correlation coefficient of $r = 0.907$ ($p < 0.001$), indicating that it consistently tested the desired construct. In terms of validity, Content validity was established through an extensive review of relevant literature and alignment with established theoretical frameworks to identify the appropriate constructs and measurement domains for the study. The initial instrument items were developed based on these identified domains, while face validity and content validity were established through two experts' review. The instruments were evaluated in terms of relevance, clarity, and alignment with the research objectives, and provided feedback for improvement. The instruments were subsequently revised and refined based on the feedback received prior to the final data collection. This is to ensure that all items were appropriate, clear, and understandable for the target respondents.

The instruments were also linked with relevant theoretical frameworks, such as Constructivist Learning Theory, the CIPP Evaluation Model, and the Theory of Planned Behaviour, to ensure that the constructs measured were relevant to the study's objectives. This study's data collection was conducted after getting the university's Research Ethics Committee (REC) approval. All of the participants were briefed about this study. Consent forms were collected from the parents, as the students were under the age of 18. Following data collection, all replies were screened and cleaned before going to analysis.

RESULT

General and Demographic Question

Demographic Profile of Students

Students' demographics were described using eight items: gender, year, ethnicity, school, type of schools, mathematics enjoyment status, tuition status, and grade. The profile of the respondents ($N = 90$) is summarised in Table 1 below. The majority of students were male (61.1%, $n = 55$), with 38.9% ($n = 35$) being female. The majority were from School 3 (57.8%, $n = 52$), followed by School 2 (28.9%, $n = 26$) and School 1 (13.3%, $n = 12$). The larger proportion of respondents from School 3 reflects its larger Year 6 student population compared to the other participating schools. Malay students made up

the majority of responders (97.8%, $n = 88$), with a minority of Chinese students (2.2%, $n = 2$). Of those surveyed, 67.8% ($n = 61$) said they like mathematics, whereas 32.2% ($n = 29$) said the opposite. 22.2% ($n = 20$) of the students attended tuition, whereas the majority (77.8%, $n = 70$) did not. Grade C was the most common (32.2%, $n = 29$), followed by B (21.1%, $n = 19$), D (20.0%, $n = 18$), A (16.7%, $n = 15$), and E (10.0%, $n = 9$).

Table 1. Students Demographic Background (N=90)

	Frequency	Percent
Gender		
Male	55	61.1
Female	35	38.9
Total	90	100
School Type		
School 1	12	13.3
School 2	26	28.9
School 3	52	57.8
Total	90	100
Ethnicity / Race Type		
Malay	88	97.8
Chinese	2	2.2
Total	90	100
Mathematic Enjoyment		
Yes	61	67.8
No	29	32.2
Total	90	100
Tuition		
Yes	20	22.2
No	70	77.8
Total	90	100
Mathematics Grade		
A	15	16.7
B	19	21.1
C	29	32.2
D	18	20
E	9	10
Total	90	100

Demographic Profile of Parents

The demographics of parents were described by six items: gender, age, relationship to student, agreement with UPSR abolishment, education level, and housing type. The responders ($N = 108$) are summarised in Table 2. Males (48.1%, $n = 52$) and females (51.9%, $n = 56$) made up a balanced gender distribution. Guardians formed the largest group (41.7%, $n = 45$), followed by mothers (39.8%, $n = 43$) and fathers (18.5%, $n = 20$). Most respondents disagreed with the abolishment of UPSR (82.4%, $n = 89$), while 17.6% ($n = 19$) agreed. The majority lived in private housing (87.0%, $n = 94$), compared to 13.0% ($n = 14$) in public housing. Most respondents were aged 41–50 (48.1%, $n = 52$), followed by 31–40 (28.7%, $n = 31$), 51 and above (18.5%, $n = 20$), and 20–30 (4.6%, $n = 5$). Most had secondary education (37.0%, $n = 40$), followed by degree (32.4%, $n = 35$), diploma (20.4%, $n = 22$), master's (6.5%, $n = 7$), and primary education (3.7%, $n = 4$).

Table 2. Parents Demographic Background (N=108)

	Frequency	Percent
Gender		
Male	52	48.1
Female	56	51.9
Total	108	100
Relationship with the student		
Mother	43	39.8
Father	20	18.5
Guardian (Other than mother and father)	45	41.7
Total	108	100
UPSR Abolishment Agreement		
Yes (Agree)	19	17.6
No (Disagree)	89	82.4
Total	108	100
Housing type		
Public Housing (Government - subsidized)	14	13.0
Private Housing (Privately owned / rented)	94	87.0
Total	108	100
Age		
20 - 30	5	4.6
31 - 40	31	28.7
41 - 50	52	48.1
50 and above	20	18.5
Total	108	100
Education Level		
Primary Education	4	3.7
Secondary Education	40	37.0
Diploma	22	20.4
Degree	35	32.4
Master's Degree	7	6.5
Total	108	100

FINDINGS

The relationship between Mathematics School-based assessment (SBA) and standardized examination Score

Table 3 presents descriptive statistics of students' mathematics performance (N = 90) measured via school-based assessment (SBA) and standardized examinations. SBA scores of the students, measured using the Malaysian mastery level scale (TP1 – TP6) and assigned by the teachers came out as ranged from 3 to 6, with a mean of 4.72 (SD = 0.75), indicating that most students were assessed within the upper mastery bands.

The relatively small standard deviation suggests limited variation in SBA scores among students. Although the full SBA scale ranges from TP1 to TP6, no students in this study were recorded at TP1 or TP2. The absence of lower mastery levels may indicate a ceiling effect, where scores are concentrated within the higher range of the scale. It may also reflect challenges commonly associated with teacher-based assessments, such as differences in scoring practices or potential leniency in assigning mastery levels across teachers. In contrast, standardized examination scores ranged from 1.00 to 87.50. An additional observation is the relatively low mean score obtained in the standardized examination 35.32 (SD = 18.18). The larger standard deviation indicates greater variability in student performance. Overall, students performed more consistently in SBA than in standardized examinations, reflecting differences between ongoing assessments and standard exams.

Table 3. Descriptive statistics of students' mathematics performance

	N	Minimum	Maximum	Mean	Std. Deviation
SBA Score	90	3	6	4.72	0.750
Standardized Exam Score	90	1.00	87.50	35.3222	18.1789

Table 4 shows a moderate positive correlation between SBA score, and the standardized examination score was observed ($r = 0.436$, $p < 0.001$). This indicates that students who performed better in SBA tended to perform better in standardized exams.

Table 4. Correlation between the two scores

		SBA Score	Standardized Exam Score
Spearman's rho	SBA Score	Correlation Coefficient	0.436**
		Sig. (2-tailed)	< 0.001
		N	90
	Standardized Exam Score	Correlation Coefficient	0.436 **
		Sig. (2-tailed)	< 0.001
		N	90

The null hypothesis is rejected by this moderate correlation :

H_1 : There is a significant relationship between School-Based Assessments (SBA) and standardized examination towards mathematics performance among upper primary school students.

While SBA performance came out as correlate to standardized exam performance, it only partially predicts standard exam outcomes. To put it another way, SBA can offer some insight into how well children perform in mathematics, but results from standardised assessment can still differ because of things like test conditions, exam content, or individual performance variations.

Parents' Perceptions Level towards SBA and Standard Examination

The following Table 5 presents a comparison of parents' perceptions of SBA and standardized examinations in terms of knowledge, opportunities, benefits, and challenges. The descriptive statistics are presented in the table below (N = 108). The overall perception of SBA was moderate (M = 3.61, SD = 1.33), indicating moderate agreement on its effectiveness. Standardised assessment, on the other hand, were perceived positively (M = 4.65, SD = 1.19), indicating a higher level of confidence in its effectiveness. Overall assessment perception was equally high (M = 4.13, SD = 0.95), indicating that the Malaysian educational system's currently used methods of assessment are generally regarded positively. However, this opinion should be considered moderate-to-high rather than strongly positive, with parents favouring standardized exams over SBA.

Table 5. Parents' perceptions of SBA and standardized examinations

	Mean	N	Std. Deviation	Std. Error Mean
SBA Knowledge	3.4931	108	1.48452	0.14285
Standard Exam Knowledge	4.7973	108	1.24702	0.11999
SBA Opportunities	3.8111	108	1.40149	0.13486
Standard Exam Opportunities	4.6000	108	1.23803	0.11913
SBA Benefit	3.5794	108	1.43454	0.13804
Standard Exam Benefit	4.6409	108	1.20157	0.11562
SBA Challenge	3.3750	108	1.45151	0.13967
Standard Exam Challenge	4.4929	108	1.26123	0.12136
SBA Perception Level	3.6085	108	1.32626	0.12762
Standard Exam Perception Level	4.6518	108	1.18858	0.11437
Overall Assessment Perception Level	4.1301	108	0.95269	0.09167

Parents' Comparison Preferences Between SBA and Standard Exam

A paired-samples t-test was conducted to compare parents' perceptions of SBA and standardized examinations across five dimensions: knowledge, opportunities, benefits, challenges, and overall perception. Table 6 shows that all differences were statistically significant ($p < 0.001$), rejecting the null hypotheses:

H_1 : There is a significant difference in perceptions (knowledge and implementation – opportunities, benefits and challenge & concerns) between SBA and Standard exam as perceived by parents,

Parents reported higher knowledge of standardized examinations than SBA ($MD = -1.30$, $t = -7.715$, $p < 0.001$, 95% CI = -1.64 to -0.97). Similarly, standardized examinations were rated higher in opportunities ($MD = -0.79$, $t = -4.768$, $p < 0.001$, 95% CI = -1.12 to -0.46) and benefits ($MD = -1.06$, $t = -6.266$, $p < 0.001$, 95% CI = -1.40 to -0.73). For challenges, the negative mean difference ($MD = -1.12$, $t = -6.473$, $p < 0.001$) indicates that standardized examinations were perceived as more demanding than SBA. Overall perception also favoured standardized examinations ($MD = -1.04$, $t = -6.583$, $p < 0.001$, 95% CI = -1.36 to -0.73). This implies that, even while SBA is still thought to be only moderately effective, parents seem to have more faith in standardized exams to forecast their children's performance in the subject. In other words, parents feel more informed and confident about their child's learning outcomes in the standardized exam.

Table 6. Paired-samples t-test: Perceptions of SBA and standardized examinations across five dimensions

Paired Differences									
Mean Difference (SBA – Standard Exam)		95% Confidence Interval of the Difference					Significance		
		Std. Deviation	Std. Error Mean	Lower	Upper	t	df	One-sided p	Two-Sided p
Knowledge	-1.30427	1.75691	0.16906	-1.63941	-0.96913	-7.715	107	<0.001	<0.001
Opportunities	-0.78889	1.71940	0.16545	-1.11687	-0.46091	-4.768	107	<0.001	<0.001
Benefits	-1.06158	1.76073	0.16943	-1.39745	-0.72571	-6.266	107	<0.001	<0.001
Challenges	-1.11790	1.79481	0.17271	-1.46027	-0.77553	-6.473	107	<0.001	<0.001
Perception Level	-1.04332	1.64710	0.15849	-1.35751	-0.72913	-6.583	107	<0.001	<0.001

DISCUSSION

The relationship between Mathematics School-based assessment (SBA) and standardized examination Score

An additional observation is the relatively low mean score obtained in the standardized examination ($M = 35.32$, $SD = 18.18$), contrasted with the relatively high SBA mastery levels (TP3–TP6). This may reflect both students' difficulties in applying mathematical knowledge to more challenging tasks and the greater cognitive demands of the examination itself. The standardized examination was adapted from the 2019 UPSR mathematics paper. The revised UPSR format mathematics test incorporated a greater emphasis on Higher-Order Thinking Skills (HOTS) and non-routine problem-solving tasks according to the guidelines (Examination Board, 2016). Such questions require students not only to recall knowledge but also to analyse, evaluate, and apply concepts in unfamiliar situations. In addition, standardized examinations were conducted under timed and formal testing conditions, which may increase test anxiety and affect students' performance (Von der Embse et al., 2012). Conversely, SBA is designed as an ongoing formative assessment conducted in a familiar classroom environment, providing students with multiple opportunities to demonstrate their understanding over time (Hernández, 2012). These differences may explain why students achieved relatively high SBA mastery levels yet obtained lower scores in the standardised assessment.

The analysis showed a moderate positive correlation between SBA and standardised assessment scores ($r = 0.436$, $p < .001$). This suggests that students who excel in SBA tend to score better on standardised assessment. However, the associations came out as moderate rather than strong. This shows that SBA cannot fully predict achievement in high-stakes and standardised assessment like UPSR. While SBA provides useful insights into student learning, it does not fully represent exam outcomes considering other factors. This result is consistent with previous research conducted by other researchers. Based on previous study, it discussed how continuous or formative evaluations like SBA are frequently associated with improved summative test performance, however this association is not always significant and strong (Okechukwu et al., 2025). A previous study also informed the importance of structured assessment in leading to performing in thinking (Bayzura & Salwana, 2023). Similar to this, local research conducted in Malaysia found a strong correlation between student achievement and classroom-based evaluation, however the strength varied depending on the contexts (Husaina, 2020). However, predictive power limits are highlighted by other research as reviewed in the literature review. Although ongoing evaluation may have an impact on learning processes, it is still not always reliable in predicting final exam results (Morales et al., 2022).

Other than that, according to Nurul Nadiah Ahmad (2025), students in Malaysian higher education who excel in their coursework do not always achieve comparable outcomes in their final exams. The difference in assessment conditions could be one of the reasons why it happened. While performance also may be impacted by the time limitations and severe requirements of high-stakes exams. Even with prior preparation, test anxiety has been demonstrated to have a negative effect on exam results (Theobald et al., 2022). In Malaysian assessment context, both standardised assessment like UPSR and SBA have various functions. SBA is an ongoing, formative procedure that monitor students' development over time (Fadhlina Sidek, 2024). Standardised assessment, on the other hand, are intended to evaluate students under same conditions (Shalonda & Shaundra, 2019). Because of these variations, standardised assessment evaluate final mastery, whereas SBA represents continuous learning. That explains for the observed moderate correlation. This idea is further supported by international practices. For example, to enhance assessment validity, the Hong Kong Diploma of Secondary Education (HKDSE), incorporates SBA into final grades (HKEAA, 2023). Overall, after considering everything, the research indicate that SBA and standardised assessment are complementary. Standardised assessment offer an indicator of final achievement, while SBA encourages lifelong learning. A thorough assessment of students' performance in mathematics requires both types of assessments.

Parents' Perceptions and Comparison of SBA and Standardised Assessment

According to the results, parents gave SBA a lower rating compared to standardised assessment in every category. Standardised assessment perception was high ($M = 4.65$, $SD = 1.19$), whereas SBA perception was moderate ($M = 3.61$, $SD = 1.33$). Additionally, overall perception was also high ($M =$

4.13, $SD = 0.95$). The paired t-test analysis showed there are significant differences across all dimensions ($p < 0.001$). This demonstrates that parents are more knowledgeable as well as confident about standardised assessment compared to SBA. These results are consistent with previous research. Parents typically prefer them due to the reason that standardised assessment are seen as more objective and enable student comparison (Harris, 2015). This desire grew more during the COVID-19 pandemic because there were no official tests, which raised concerns about students' performance (Daniela et al., 2021). Other than that, perceptions are also influenced by subjectivity. Assessments conducted by teachers are frequently seen to be biased, including the "halo effect" (Christodoulou, 2017). Due to its lack of standardisation, parents may doubt SBA's reliability no matter how well it is at providing a more comprehensive picture of students' learning (Harlen, 2005). In Malaysia, parents may similarly fail to understand mastery levels. These levels are less familiar than standard grades and are frequently viewed as unreliable or subjective (World Bank, 2024).

As a result, parents may have difficulty monitoring their child's progress. The greater difference in SBA perception shows that parents have different levels of knowledge. Limited exposure and unclear reporting could weaken trust in SBA. Research's suggested parents' trust in systems of assessment is influenced by familiarity and reporting clarity (Harris, 2015; Osburn et al., 2004). In fact, parents actually prefer detailed progress reports over traditional grades, but only if the reporting is highly detailed and explicitly highlights their child's specific strengths and weaknesses (Swan et al., 2014). Brookhart (2015) further emphasises that ambiguous or inconsistent grading practices may hinder parents' ability to accurately interpret student performance, thereby reducing their trust in the assessment system. Similarly, Guskey (2015) highlights that overly complex or vague report card designs can limit parents' capacity to effectively monitor their children's academic progress. Policy changes may help to explain these findings. According to the news, SBA has become Malaysia's primary assessment method after the abolishment of UPSR (Ministry of Education Malaysia, 2021). However, the lack of a national benchmark may limit parents' capacity to compare their child's performance outside the classroom (Harlen, 2005). Overall, parents are more confident in standardised assessment than SBA. While SBA is recognised by parents as a useful tool for monitoring learning, it is not regarded as a complete replacement for high-stakes exams as important as UPSR. standardised assessment are still considered more reliable for evaluating and validating students' academic performance.

CONCLUSIONS

This study revealed two major findings. There was a moderately positive relationship between SBA and the standardised assessment scores. It indicates that both forms of assessment are related even though they capture distinct dimensions of student learning. Second, parents showed higher levels of support for standardized examinations compared to SBA across all measured dimensions. At moderate levels of supportive perception, respondents tend to express greater confidence in standardised assessment than in the SBA. Although parents recognised the role of SBA in supporting continuous and ongoing assessment of student learning, they demonstrated greater confidence in standardized examinations for evaluating mathematic performance.

The limitations of this study are acknowledged as follows. First, the study was conducted within a single district in Kedah, Malaysia, which may limit the generalisability of the findings to other states or educational contexts. Second, the student sample was largely homogeneous in terms of ethnicity, with the majority being Malay (97.8%), which may limit the diversity of perspectives represented. Third, SBA scores used in the study were based on teacher assessments, which may be subject to potential subjective bias despite standardised guidelines. In addition, the standardized examination instrument was adapted from 2019 UPSR past papers, which may not fully reflect current assessment trends. Next, the cross-sectional research design only captures data at one point in time and does not allow for examination of changes in students' performance or parents' perceptions over time. Therefore, future studies are recommended to adopt larger, more diverse samples and longitudinal designs to strengthen the robustness of the findings. Other than that, the unequal distribution of respondents across the participating schools. As School 3 contributed a larger proportion of the sample, the findings may reflect the characteristics of that school more strongly than those of the other schools. Future studies may consider stratified sampling or involving a larger number of schools to achieve a more balanced representation. Currently, a new standardised test has been implemented among Year Four students, suggesting more research with a bigger sample size for further investigation.

Implications from this found that high-stakes decisions may require more than just SBA as a year 6 assessment. Policymakers should either integrate hybrid models that combine both classroom evidence and standardised benchmarking or tighten moderation protocols that are standard all around the country in order to ensure national consistency and credibility. There is a need for professional development in assessment literacy especially in the areas of moderation, task design and scoring consistency. The implementation of standardised rubrics and reporting templates will also enhance instructional planning. Community involvement show that schools need to do a better job of communicating SBA aims. It is necessary to increase transparency through transparent grading and frequent feedback through two-way interaction platforms between teachers and parents.

Future research should include systematic classroom observation of SBA implementation. It can provide better concrete proof and deeper insights into student involvement in actual classroom settings. There is also a need to compare the implementation of mathematics SBA between government and private schools in order to learn more about contextual variable influences such as resources and class size on the consistency and the accuracy of both of the assessments. Other than that, it is also necessary to address and demonstrate the inter-rater reliability and potential marking bias factor. Future research could look further into the issues that parents are concerned about, such as the SBA marking rubrics' inconsistencies and the variables related to teachers' scoring methods. For example, it could be necessary to have several teachers assess the students' identical work in order to find interpretive variations in order to address the subjective concerns. Issues like big classrooms and heavy workloads frequently hinder teachers from providing timely and personalised feedback. In this case, schools should consider using digital tools, standardised rubrics and skill checklists to boost student monitoring. Teachers can more effectively maintain high-quality, fair evaluations by combining these with professional development and strategic scheduling.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHORS CONTRIBUTION

All listed authors have made a significant scientific contribution to the research in the manuscript, approved its claims, and agreed to be an author.

Author 1: Conceptualization, Methodology, Formal Analysis, Software, Literature Review, Data curation, Writing- Original draft preparation, Visualization, Investigation.

Author 2: Validation, Supervision, Writing – Abstract, Introduction, Literature Review & Editing.

AVAILABILITY OF DATA AND MATERIALS

Data available within the article or its supplementary materials. Data are not publicly available due to strict privacy and ethical restrictions involving underage participants and school records. Access is restricted and may be granted only upon justified request and with prior ethical approval.

DECLARATION OF GENERATIVE AI

During the preparation of this work, the author(s) used Google Gemini to assist with language refinement, improving clarity of the manuscript, and identifying relevant literature for citation purposes. The author(s) independently verified all suggested sources and references. After using this tool, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the published paper.

ETHIC STATEMENTS

This study involved human participants. Ethical approval was obtained from the relevant institutional ethics committee prior to data collection. The study was conducted in accordance with institutional research ethics guidelines, relevant policies, and the principles of ethical research involving human subjects. Informed consent was obtained from all participants involved in the study. For participants below the age of 18, written informed consent was obtained from their parents or legal guardians prior to participation. Participant confidentiality and anonymity were strictly maintained throughout the study.

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APPENDIX

Strongly Agree (6); Agree (5); Somewhat Agree (4) ; Somewhat Disagree (3); Disagree (2); Strongly Disagree (1)			
SBA		STANDARD EXAM	
(1) KNOWLEDGE & UNDERSTANDING ABOUT SBA		(1) KNOWLEDGE & UNDERSTANDING ABOUT STANDARDIZED EXAM	
1	I understand why SBA is being implemented instead of the UPSR in learning Mathematics	1	I believe standardized tests accurately measure my child's understanding of mathematical concepts.
2	I have a good understanding of the requirements of SBA in Mathematics.	2	Standardized tests reflect my child's true understanding of the Mathematics curriculum.
3	I have a good understanding of the procedures of SBA for Mathematics tasks.	3	Standardized tests adequately assess my child's problem-solving skills in Mathematics.
4	I have a good understanding of the marking criteria used in Mathematics SBA.	4	I think my child's performance on standardized tests predicts his/her Mathematics success.
5	I have a good understanding of the moderation system for Mathematics SBA.	5	I am confident that standardized Mathematics tests in the Malaysian context provide consistent results for students with similar knowledge and skills.
6	I know the weighting of the SBA component in assessing Mathematics in Malaysia.	6	I believe that standardized Mathematics tests accurately measure what they are intended to measure in the Malaysian education system.
(2) OPPORTUNITIES TO KNOW SBA / PELUANG MENGENALI SBA		7	I think standardized Mathematics tests align with the curriculum and learning objectives in the Malaysian education system.
1	I have had sufficient opportunities to discuss Mathematics SBA with my child.	8	I find the questions and scoring of Mathematics standardized tests in the Malaysian context to be consistent and unbiased.
2	I have had sufficient opportunities to discuss SBA with my child's Mathematics teacher.	9	Standardized Mathematics tests accurately assess my child's knowledge and skills.
3	I have had sufficient opportunities to discuss Mathematics SBA with other parents.	(2) OPPORTUNITIES TO KNOW STANDARDIZED EXAM	
4	I talk to my child about SBA Mathematics topics he/she is learning.	1	Mathematics Standardized tests accommodate students with different learning styles or abilities.
5	I talk to my child about the SBA Mathematics exercises or assignments he/she has completed.	2	Standardized Mathematics tests help identify areas where my child needs improvement.
6	I encourage my child to practice SBA Mathematics exercises at home.	3	Standardized Mathematics tests provide useful data for identifying educational strengths and weaknesses.
7	I buy extra SBA Mathematics workbooks or materials for my child in addition to those required by the school.	4	Standardized Mathematics tests shape educational policies based on students' performance.

8	I help my child to prepare for Mathematics SBA tasks (eg : reviewing his/her work or solving problems together)	5	Standardized Mathematics tests encourage teachers into using creative teaching methods.
9	I encourage my child to seek additional help for Mathematics (eg: tuition or online resources).	(3) BENEFITS OF STANDARDIZED EXAM	
10	I work with my child on activities that strengthen his/her understanding of Mathematics concepts. In addition to those required by the school.	1	I think Mathematics standardized tests foster a competitive learning environment among students in Malaysia..
(3) BENEFITS OF SBA / MANFAAT SBA		2	Standardized Mathematics tests help my child manage stress effectively during assessments.
1	I think SBA results in fair judgement of each students' level of Mathematics skills.	3	Standardized Mathematics tests encourage creativity and critical thinking in my child's classroom.
2	I think SBA can help shy or nervous children to demonstrate their abilities better.	4	Standardized Mathematics tests adequately measure my child's overall academic performance.
3	I think SBA advantages students with lower Mathematic skills.	5	Standardized tests accurately reflect my child's understanding of Mathematics.
4	I think SBA provides a fairer evaluation of students' mathematical abilities compared to standardized examinations like UPSR	6	Standardized Mathematic tests motivate my child to study and work harder in Mathematics.
5	SBA helps improve my child's problem solving skills.	7	Standardized Mathematic tests create a competitive learning environment among students.
6	SBA helps improve my child's reasoning skills (logical thinking and making justifications).	8	Standardized Mathematics tests encourage schools to not prioritize tested subjects over others.
7	SBA helps improve my child's communication skills in explaining mathematical ideas.	9	Standardized Mathematics tests have a positive impact on educational policies and reforms.
8	SBA helps improve my child's representation skills (using visual, symbols, or graphs to solve problems).	(4) CHALLENGES & CONCERNS OF STANDARDIZED EXAM	
9	SBA helps improve my child's connection skills (linking Mathematics concepts to real-world applications).	1	Standardized Mathematics tests do not put excessive pressure on teachers to "teach to the test".
10	My child practices Mathematics exercises more frequently than before.	2	Standardized tests influence the teaching methods used by teachers in Mathematics.
11	My child uses more Mathematics-related resources (eg: apps, websites or videos) than before.	3	Standardized Mathematics tests promote meaningful learning rather than a narrow, rote memorization-based approach to learning.
12	My child is becoming more interested in Mathematics than before.	4	Standardized Mathematics tests encourage innovative teaching approaches.
13	I find my child motivated to participate in Mathematics SBA activities.	5	Standardized Mathematics tests promote a one-size-fits-all approach to education.
14	I think SBA helps my child to know better about his/her strengths and weaknesses in Mathematics.	6	Standardized Mathematics tests encourage innovative teaching approaches.
(4) CHALLENGES & CONCERNS OF SBA / CABARAN & KEBIMBANGAN TERHADAP SBA			
1	I think SBA has a positive effect on my child's attitudes toward studying Mathematics.		
2	I think SBA increases my child's study workload in a beneficial way.		
3	I think SBA makes my child confident.		
4	I think SBA makes me confident as a parent.		