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Needs Analysis for the Development of a Classroom-Based Assessment (CBA) Recording and Sharing System - MyTracking

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Abstract: *This study examines the needs of urban primary school Mathematics teachers as the basis for designing the MyTracking system for consistent, data-informed recording and sharing of Classroom-Based Assessment (CBA). A qualitative approach was employed through semi-structured interviews with three upper primary teachers. Transcripts were thematically analyzed to identify challenges, needs and critical functions. The findings indicate the burden of manual recording, large class sizes, misaligned records, limited parental access and time constraints that delay feedback. Key needs include a user-friendly system with easy access, record structures organized by topic and mastery level, progress visualizations, automated reporting and ongoing training. CBA operates through a cycle of feedback, intervention and reflection that enables targeted interventions, continuous monitoring and pupil self-reflection. Based on the findings, MyTracking is proposed to integrate evidence management, analytics, progress displays, action notifications and channels for sharing with parents and the school. The implication is that this user-centered design is expected to enhance teacher efficiency, communication transparency and the effectiveness of evidence-based follow-up actions.*

Keywords: Classroom-Based Assessment (CBA), MyTracking digital system, teacher needs analysis, feedback, intervention

1. Introduction

In the era of global educational transformation, the use of digital technology in assessment is becoming increasingly widespread and plays an important role in improving the effectiveness of teaching and learning. The study by Mouti and Al Chalabi (2024) shows that the intelligent Student Performance Assessment (SPA) system was developed specifically to support teachers in assessing student performance based on course learning outcomes (CLO) in an online learning environment. The system not only provides diagnostic reports that identify students' weaknesses, but it also suggests appropriate corrective interventions. This indicates the potential of technologies such as SPA to support formative assessment and the ongoing, systematic improvement of instruction grounded in data. Palomo-Duart et al. (2020) likewise show that evidence-based assessment systems in virtual environments can generate immediate feedback and support teacher interventions more effectively.

In the context of Mathematics learning, the use of digital technologies such as computer algebra systems and adaptive learning platforms has been shown to support deeper and more interactive conceptual understanding, while empowering students to build knowledge in more meaningful

and organised ways (Engelbrecht & Borba, 2023). In addition, findings by Faber et al. (2023) indicate that the use of digital monitoring tools improves student achievement when teachers can adapt their teaching approaches based on current performance data. A study by Faber (2020) shows that the use of digital assessment tools in Mathematics teaching not only has a positive impact on student achievement but also improves the quality of teaching through more structured formative feedback.

The literature also highlights the need for digital systems to reduce teachers' workload in recording and analysing assessment data. Primary school teachers in Singapore likewise require a clear implementation model and the skills to use a range of digital tools to support the effectiveness of student self-assessment in blended learning contexts (Kwong, 2021). Avdiu-Kryeziu and Neziri (2025) emphasise that teachers face documentation challenges for summative assessment in primary schools which underscores the need for systems that can streamline this process without reducing data accuracy. Bharti (2024) argues that holistic assessment can only be implemented effectively when teachers are equipped with comprehensive and intuitive tools. Collectively, these studies substantiate the justification for developing digital systems that support teachers in multiple aspects of implementing Classroom-Based Assessment (CBA).

The implementation of CBA is one of the core approaches in the Standard Curriculum Primary Schools (SCPS), which emphasises continuous formative assessment. However, manual implementation of CBA continues to pose multiple challenges for teachers, including time constraints, routine workload, limited knowledge and skills and difficulties in managing information and tracking pupils' progress systematically (Manap & Mohd Sheikh, 2020). Previous studies likewise show that many teachers are not yet ready to implement CBA effectively without appropriate technological support, particularly in online teaching and the new normal (Ahmad et al., 2022). Accordingly, the use of digital technology in assessment has gained attention in line with the aspirations of the Ministry of Education Malaysia, which emphasises authentic, holistic and evidence-based assessment.

Several studies have demonstrated the potential of technology to enhance the effectiveness of CBA implementation. Nasir et al. (2024) found that the use of digital assessment documents can help teachers identify pupils' needs more accurately and systematically. In the study by Ghazali and Saad (2022), the effectiveness of digital systems such as the Online Student Performance System (OSPS) in implementing CBA could only be achieved when the system is designed based on the real needs of classroom teachers, including ease of use, interactive supports such as chatbots and comprehensive data visualisation. To ensure the effectiveness of such a digital system, teachers' needs as the primary users must first be identified.

Although CBA is implemented as a holistic assessment mechanism to support continuous learning, Malaysian pupils' performance in international assessments such as TIMSS and PISA remains a concern. Based on the TIMSS 2023 report, 48 per cent of pupils' achievement in Mathematics falls below 400 points, placing them in the category of not meeting the international benchmark (Educational Planning and Policy Research Division, 2024). This situation underscores an urgent need to re-examine the actual implementation of CBA in classrooms, as studies indicate that teachers continue to face constraints in understanding and practising continuous assessment (Wan Oya & Nordin, 2024). This raises the question of how effective CBA has been in helping teachers improve pupils' understanding of fundamental Mathematical concepts and their ability to apply knowledge at more complex levels.

In classroom realities, teachers often struggle to implement immediate interventions because pupils' performance information cannot be obtained quickly and systematically. Studies indicate that teachers face time, knowledge and skills constraints, as well as routine workload that hinders effective CBA implementation (Manap & Sheikh, 2020). While in principle CBA enables teachers to identify pupils' strengths and weaknesses for prompt follow-up, in practice the implementation is frequently delayed due to weaknesses in monitoring and reporting (Curriculum Development Division, Ministry of Education Malaysia [MOE], 2021). In addition, confusion about assessment criteria, limited teacher skills and negative attitudes that view CBA as an additional burden also impede its effectiveness (Ruslan, 2024). This situation ultimately makes it difficult to detect pupils' learning gaps early, particularly in Mathematics and these gaps persist into higher levels of learning.

Another factor that complicates CBA implementation is the absence of an efficient digital system to record and track pupils' progress. Teachers still rely on manual records such as transit forms and handwritten notes, which are time-consuming and require high levels of meticulousness and therefore impractical in large classes with more than 35 pupils (Hadi & Effendi, 2024). Nasir et al. (2024) also emphasise that the lack of clear digital documentation prevents teachers from assessing pupils' mastery levels consistently, undermines the principles of formative assessment and delays the provision of feedback. These constraints not only reduce teachers' capacity to detect performance patterns, but they also allow foundational weaknesses in Mathematics to persist without timely intervention.

Furthermore, ineffective data communication among teachers, parents and administrators undermines shared understanding of pupils' learning needs. Many schools still lack a uniform platform for real-time sharing of pupils' performance which prevents data-informed monitoring from being carried out collaboratively (Curriculum Development Division, MOE, 2021). Therefore, an urgent need to develop a user-friendly, well-structured CBA recording and sharing system that can generate automated reports and analyses based on authentic pupil data (Nasir et al., 2024). Developing such a system is crucial to meet the real needs of classroom teachers, support more effective intervention planning and help improve the Mathematics achievement of upper primary pupils in urban primary schools.

Therefore, this study was conducted to identify the actual needs of Mathematics teachers in implementing CBA and to form the basis for developing the MyTracking digital system. Through this analysis, the study is expected to provide a comprehensive picture of teachers' challenges and the system features required so that MyTracking is genuinely practical, user-friendly and supports a more systematic implementation of CBA. Specifically, the objectives of this study are to:

1. Identify the challenges faced by teachers in implementing CBA for the subject of Mathematics.
2. Analyse teachers' needs for a CBA recording and sharing system for the subject of Mathematics.
3. Analyse the digital system features required by teachers as the basis for developing the MyTracking system.

2. Literature Review

Classroom-Based Assessment (CBA) is a formative assessment approach introduced in the Malaysian education system in 2016 (Curriculum Development Division, MOE, 2021),

replacing School-Based Assessment (SBA), which began in 2011. CBA spans all subjects with the objective of assessing pupils' learning continuously, holistically and based on evidence. Through various methods such as observation, questioning, tasks and pupils' work, teachers determine pupils' levels of mastery with reference to the Standard Performance Document (SPD). CBA emphasises the teacher's role in providing constructive feedback to support learning rather than merely recording pupils' achievement summatively. However, implementation realities show that many teachers face challenges related to conceptual understanding, workload and time constraints (Ruslan, 2024). In addition, there is a gap in the availability of suitable digital support systems to enable efficient CBA implementation (Ahmad et al., 2022).

In Mathematics, implementing CBA requires a comprehensive assessment across multiple skill domains, including computation, reasoning, communication and problem-solving. Teachers must monitor pupils' progress continuously across topics that build sequentially which makes assessment in this subject more challenging than in others. According to Basri and Maat (2021), Mathematics teachers experience ongoing job pressure and emotional exhaustion that contribute to burnout. This pressure stems from increasing workload and challenges in pupils' mastery of Mathematics. Findings by Hadi and Effendi (2024) further show that many teachers are compelled to rely on subjective professional judgement due to limited time and the absence of appropriate support systems. This makes assessment in Mathematics difficult to implement systematically as outlined by the Ministry of Education Malaysia.

Moreover, implementing CBA in large classes, particularly those with more than 35 pupils, further increases complexity for teachers. In such situations, teachers struggle to conduct high-quality observations and provide individualised feedback as required by the CBA approach. Ruslan (2024) found that teachers do not have sufficient time to assess all pupils carefully within limited teaching periods. Jamil (2023) likewise emphasises that CBA becomes difficult to implement when class size exceeds the optimal capacity for teachers to monitor and record diligently. In addition, the report by Curriculum Development Division, MOE (2021) shows that teachers' ability to track individual pupils' progress declines as classroom density increases.

Manual methods for recording pupils' achievement in primary schools remain common practice despite nearly a decade of CBA implementation. The use of record books, Excel sheets and handwritten notes is time-consuming and demands meticulous attention that often does not align with teachers' real constraints in schools. Manap and Sheikh (2020) report that manual recording exposes teachers to errors and loss of critical data when assessing pupils' progress. Roslan (2024) shows that CBA among primary teachers commonly uses observation, writing and oral tasks to determine pupils' Mastery Levels (ML). However, such an assessment is highly subjective because there are no clear standards or criteria used consistently by teachers. Manual and unsystematic recording makes CBA data collection inconsistent and burdensome for teachers.

To support more efficient CBA implementation, digital system proposals have been advanced, yet most remain misaligned with teachers' needs, particularly for primary Mathematics. Nasir et al. (2024) show that the use of digital CBA documents helps teachers identify pupils' needs more accurately and responsively. However, that study involved only Form 1 lower secondary pupils. Meanwhile, Ghazali and Saad (2022) developed a digital CBA system that integrates multidimensional data visualisation and a chatbot. Their findings show that data visualisation helps teachers view pupils' performance graphically and analytically, thereby facilitating more

accurate instructional decisions. Even so, the system developed by Ghazali and Saad (2022) addresses general academic performance among primary pupils without focusing on a specific subject such as Mathematics.

Sharing pupils' achievement among subject teachers, next year's teachers and school administrators is important to ensure continuity of instruction. Without a digital system that enables access to systematic data, this process becomes cumbersome and time-consuming. The absence of a central reference system causes teachers to lose track of pupils' progress from year to year. Several local studies report that the lack of a uniform, systematic reference system undermines teachers' capacity to track progress continuously (Manap & Sheikh, 2020; Ungat & Nasri, 2022; Ruslan, 2024). This is supported by Nasir et al. (2024), who found that teachers face difficulties planning interventions when they do not have access to pupils' achievement histories in a systematic form. Consequently, the need for a digital system that can support not only recording but also sharing and reporting of data has become increasingly urgent.

In summary, a research gap remains concerning major challenges related to class size, recording burden and the absence of a suitable digital system for recording CBA in primary school Mathematics. Effective implementation requires a system designed specifically around actual classroom realities and teachers' needs. Accordingly, this study is guided by the following research questions:

1. What challenges do upper primary Mathematics teachers face in implementing Classroom-Based Assessment (CBA)?
2. What are the specific needs of teachers for a CBA recording and sharing system that supports effective assessment practices in Mathematics?
3. What essential digital features and design characteristics should be included in the MyTracking system to meet teachers' practical needs and improve CBA implementation?

Through these research questions, the study aims to analyse teachers' needs as the foundation for designing the MyTracking system. The insights obtained are expected to contribute meaningfully to strengthening CBA implementation in primary school Mathematics through a practical, user-friendly technological solution that supports data-informed and continuous assessment. In line with national education aspirations, this digital system is expected to empower teachers to conduct formative assessment that genuinely supports pupils' learning holistically. Therefore, the development of such a system is no longer optional but a strategic necessity in contemporary education.

3. Methodology

This study adopted a single case study research design (Yin, 2018) with a qualitative approach to explore teachers' experiences in depth. The participants comprised three upper primary Mathematics teachers from urban primary schools, selected as the main respondents through purposive sampling (Cresswell, 2023; Palinkas et al., 2015). Each teacher had more than 15 years of teaching experience and was responsible for teaching pupils in Years 4, 5 and 6. Semi-structured interviews were used to obtain data on their experiences, challenges and suggestions related to CBA.

The interviews were conducted face to face, recorded and transcribed for analysis and the data analysis process followed the thematic analysis method proposed by Braun and Clarke (2019). Interview data were coded, grouped into categories and subsequently developed into main

themes. Three themes were identified, encompassing issues of manual recording, large class challenges, the absence of a digital system, the need for a user-friendly system and the benefits of interventions for pupils who are struggling. Qualitative excerpts from teachers were included to support the validity of the findings.

To enhance data accuracy and trustworthiness, triangulation was conducted by comparing interview findings with official documents such as the CBA Management Guide. In addition, member checking was implemented by giving teachers the opportunity to review their interview transcripts (Birt et al., 2016). Through this approach, the study connects theory with actual classroom practice. The data obtained provide a clear picture of teachers' needs and offer a robust basis for proposing a more relevant and user-friendly CBA recording and sharing system for Mathematics (McKim 2023).

4. Findings

Table 1 presents the interview results grouped into three overarching themes that address manual assessment, workload, large class sizes, the absence of a comprehensive system, teacher readiness for digitalization, the need for a user-friendly system, system features, feedback, intervention and pupils' self-reflection. These elements are important for designing a system that meets teachers' needs to implement CBA more efficiently and effectively.

Table 1: Theme Groups

No	Theme	Sub-themes
1	Operational Challenges of Manual Assessment	Manual assessment/workload
		Absence of a comprehensive system
		High pupil load per class
2	Transition to Digital CBA	Readiness for digitalization
		Need for a user-friendly system
		System features
3	The Role of CBA in Pupil Development	Feedback
		Intervention

The findings show that CBA implementation still relies heavily on manual recording and the absence of a comprehensive system to track pupils' progress consistently at the topical level. Teachers described current routines centered on transit forms and handwritten notes, which can cause evidence to be misplaced, processed slowly and difficult to retrieve when needed. Respondent 1 (R1) stated, "I have to mark manually on the form first. Sometimes, the form might be misplaced". This was reinforced by Respondent 2 (R2), "I need to prepare the records manually, it takes quite a long time." and Respondent 3 (R3) noted, "We use transit forms to record pupils' mastery levels".

More importantly, teachers stressed that there is no truly comprehensive system to unify records, analytics and real-time data access. This gap forces them to rely on manual references whenever they wish to view topical performance or pupils' mastery histories. R1 summarized the current situation, "Right now we use transit forms manually". R2 emphasized the challenge, "The current system is not geared towards topics, we have to check our manual records". R3 added, "The current system is still manual, there are constraints in terms of access". Collectively, these excerpts affirm that the absence of a comprehensive system is not merely a

matter of tool choice, it is a structural weakness that undermines information accessibility and evidence-based follow-up.

These constraints are exacerbated by large class sizes, which make evidence collection, checking and record updating highly time-consuming. As stated by R1, "I teach three classes, each with around 40 pupils, the time taken is far too long". This is supported by R2, "Forty to forty-five pupils per class, it takes quite a long time to check and record", and R3 stated, "The number of pupils is quite large, time is quite limited for recording". In this context, the absence of a comprehensive system means teachers do not have a sustainable mechanism to monitor progress, identify topical gaps and trigger interventions quickly. In short, the combination of manual recording, the absence of a comprehensive system and large pupil numbers creates a clear delay between teachers' observations and follow-up actions for pupils.

Despite these challenges, teachers expressed openness to transitioning to a digital system on the condition that it is genuinely user-friendly, easily accessible and accompanied by training. R1 affirmatively agreed, "I am open, as long as it does not make things difficult and training is provided". R2 pointed out, "We need to accept change, if it makes things easier, why not?". R3 agreed on exploring a new system, "God willing, if training is provided, we will try". Regarding accessibility, R1 stated, "I think there is no problem to fill in CBA online, using a phone or other devices". R2 emphasized, "I need a system that is easy to access, perhaps through apps", and this is supported by R3, "If it is digital, what matters is easy access and that it is teacher-friendly".

Respondents also suggested necessary system features. They wanted meaningful data displays that can show topical scores (summative and formative), levels of achievement (TP) over time, and visualisations in the form of graphs and charts to support interpretation. R1 emphasized the necessity of, "Topical scores and comparison of scores in graph form", and this also supported by R2, "Pupils' performance, week by week or month by month improvement, topics that need attention". R3 summarized the need of, "Performance reports in the form of graphs, charts and easy access". These findings underscore that digital adoption is not merely a matter of attitude, it also depends on a user experience that is simple, fast and directly supportive of instructional decision-making.

In addition, CBA functions as a cycle of feedback, intervention, reflection and a digital system is viewed as an accelerator of this cycle. In terms of feedback, teachers emphasised transparency and speed. "If there is a system, I can immediately tell them what they need to improve" (R1). Teachers also observed motivational effects on pupils. "Pupils see 'I need to improve more,' they have the motivation to improve themselves" (R2), and R3 summarized the effectiveness of immediate feedback, "Immediate feedback helps pupils improve their performance".

Next, interventions become more precise when data are well collected and visualised. R1 stated, "If information is gathered, we can plan interventions by topic and by pupil group". This is also echoed by R2, who emphasized the ability to identify struggling students and weak topics, "We can identify struggling pupils and the topics they struggle with, so we can focus". R3 also added, "CBA provides opportunities for struggling pupils through repeated emphasis". This narrative illustrates how data-driven CBA can progressively close mastery gaps, provided that information is accessible in a timely manner and in formats that facilitate teachers' actions.

5. Discussion

Based on the findings, teachers face significant difficulty in recording pupils' achievement manually, especially when teaching large classes. This indicates that large pupil numbers and time constraints prevent teachers from implementing CBA optimally. This situation aligns with earlier studies that found workload, time constraints and class size to be major issues in CBA implementation (Ruslan, 2024; Manap & Sheikh, 2020).

Teachers also emphasised the need for a user-friendly system that does not add to their workload. This finding indicates teachers' willingness to adopt innovation when it is practical and brings direct benefits to their practice. Faber et al. (2023) reported that teachers use digital monitoring tools more effectively when provided with training and support and that frequent, detailed assessment feedback helps them link data to instructional decisions more quickly.

Consistent with the emphasis on user-friendly systems, CBA functions through a cycle of feedback, intervention and reflection that helps pupils identify mastery gaps and accelerates learning improvement. Teachers noted that pupils are more interested when they can see their own progress clearly. In line with this, immediate feedback supported by digital systems has the potential to strengthen positive attitudes towards learning (Faber et al., 2023) and Faber (2020) found that teachers who receive current performance data can adapt teaching methods according to pupils' needs, which provides a more supportive and responsive learning experience for individual pupils.

In addition, Nasir et al. (2024) show that the absence of systematic assessment documentation makes it difficult for teachers to assess pupils' mastery levels consistently which in turn undermines communication about pupils' progress with parents and administrators. According to Fadzil (2024), the absence of systematic progress recording and reporting features, including the ability to share or export data and to provide personalised feedback, makes it difficult for teachers to track interventions and pupils' development continuously which delays the provision of feedback. These findings confirm a substantial gap between policy and practice, especially when teachers are required to conduct continuous assessment without appropriate system support and they further substantiate the need to develop a comprehensive, user-friendly digital system that aligns with the realities and demands faced by teachers in the classroom.

6. Conclusion

This study identifies the key challenges faced by upper primary Mathematics teachers in urban primary schools when implementing CBA, namely the burden of manual recording, large class sizes, the absence of a comprehensive digital system and limited information sharing with parents and the school. These issues make it difficult for teachers to provide immediate feedback that is crucial for supporting pupils' progress. According to Siti Nur Fatihah et al. (2024), teachers and parents need to meet to discuss children's performance in addressing the challenges of a syllabus that is becoming increasingly advanced and difficult. However, time constraints limit such meetings between teachers and parents. So, a digital system solution is therefore urgently needed.

Through a qualitative approach, this study successfully identified teachers' actual needs for a CBA recording and sharing system. Teachers emphasized user-friendly design, easy input, automated reports and ease of access as priorities. These recommendations not only reduce teachers' workload, but they also support early intervention for pupils who are struggling in

Mathematics. A study by Faber (2020) found that Digital Formative Assessment Tools (DFAT) have the potential to positively influence pupils' achievement, where teachers use information from DFAT as feedback to evaluate the impact of their instruction and as feedback to plan subsequent adaptive teaching.

The findings also show that teachers are ready to transition to a digital system if training is provided and if the system genuinely reduces workload and accelerates feedback. This is reinforced by Faber et al. (2023), who report that teachers are more likely to use technology when the system is supported by training and brings a direct impact to their teaching practice. Nasir et al. (2024) demonstrate that the Digital Classroom Assessment Document (Ca-Do**)**, used as an assessment document, can guide the recording and evaluation of pupils' mastery levels. The study also recommends that all teachers require a structured classroom assessment to implement assessment more systematically and effectively.

In conclusion, developing a digital system that meets teachers' needs will contribute to more effective CBA implementation. This is also aligned with the aspirations of the Malaysia Education Blueprint 2013-2025 in producing excellent pupils through continuous assessment (Lee et al., 2024). The capacity of technology-based CBA tools to track and report progress, to share or export data and to generate reports for feedback are core features teachers require. The absence of these features makes it difficult to track interventions and prevents sustained transparency in feedback (Fadzil, 2024). It is hoped that this study will serve as a reference for stakeholders in developing a practical system that brings direct impact to Mathematics teaching in primary school.

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Conflict of Interest Statement
The authors declare that there is no conflict of interest regarding the publication of this study.

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