

Formative Classroom Assessment in Malaysia: Primary vs Secondary School Comparisons

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Abstract

Classroom Assessment is a systematic approach to formative assessment, used by teachers to evaluate and understand students' learning. When applied appropriately, hold significant potential to enrich educational experiences, improve communication, and foster social engagement, while also potentially reducing learning obstacles for certain student groups. The current study aimed to investigate how digital technology, particularly smartphones is integrated into formative assessment practices in Malaysian primary and secondary education, examining issues such as internet access, smartphones usage, and teachers' formative assessment implementations. 251 volunteer qualified teacher (Primary = 114; Secondary = 137) completed an online survey to explore schools' internet connectivity, smartphone culture, and formative assessment practices. Results showed similarities in connectivity and engagement with formative assessment across educational levels, but differences in smartphone culture, with less tolerance of usage at Primary levels and greater tolerance at Secondary levels. Discussion focuses on the importance of digital literacy and encouraging responsible device usage at early stages, as well as opportunities and challenges around device usage in-class. It is clear that formative assessment is a vital element of effective education, and educational technology based around clear standards and practices can enhance the experience of learners and educators.

Keywords: Digital Technology, Formative Assessment, Internet, Primary Education, Secondary Education, Smartphones

Introduction

Classroom assessment, particularly formative assessment has emerged as a pivotal mechanism for enhancing the quality of teaching and learning in schools. It is a systematic approach to formative assessment, used by teachers to evaluate and understand students' learning. It operates as a continuous, systematic process through which teachers monitor students' progress, provide timely feedback, and adapt instructional strategies to meet learners' needs. Van Orman et al. (2024) emphasize that a primary objective of classroom assessment is "assessment for learning" (AfL), which aligns with the concept of formative assessment and emphasizes a collaborative approach between educators and students to

strengthen academic achievement and promote self-regulated learning. This refers to a deliberately structured process embedded within teaching activities, where educators and learners engage collaboratively, monitor academic progress, exchange feedback, and adjust learning strategies based on gathered evidence. According to Abd Halim et al. (2024), formative assessment is an ongoing evaluative process aimed at continuously enhancing student learning. Although its central purpose is student-oriented, Cañadas (2023) notes that, when performed using well-defined criteria shared with learners and informed by collected evidence, it also serves as a mechanism for professional growth among educators. Contemporary discourse in educational research, policy, and practice has increasingly focused on the quality of learning especially how classroom assessments are conducted. Parents express concern about their children's preparedness for future challenges, while educators grapple with student engagement under limited resources (Paperballad, 2025).

The urgency of studying classroom assessment practices in Malaysia stems from both local and international concerns about declining student performance, as evidenced by the Programme for International Student Assessment (PISA) 2022 results. Malaysian students' average scores in mathematics, reading, and science have fallen below both OECD and ASEAN-6 averages (Azahar & Cheng, 2024), signalling a pressing need to re-evaluate the methods used to track and improve learning. Ly et al. (2024) stated that Malaysia will reach the top third of countries in PISA for the period 2013-2025. Ly et al. (2024) found that the awareness of teachers and students about PISA is still limited because PISA has not been disseminated broadly in schools and Malaysian students tend to focus and put more efforts to PT3 (Form Three Assessment - national assessment). Although structural reforms, such as the abolition of UPSR and PT3, aim to shift the focus away from exam-oriented learning towards classroom-based assessment (Pentaksiran Bilik Darjah, PBD), there remains limited empirical evidence comparing how formative assessment is implemented across different school levels.

One increasingly relevant dimension is the integration of digital technologies—particularly smartphones—into classroom assessment. Global trends show that when appropriately managed, smartphones can support learning through interactive activities, real-time feedback, and collaborative engagement (Onodipe & Ayadi, 2020; OECD, 2023). Yet, Malaysia's current policies largely restrict smartphone use in schools (Kementerian Pendidikan Malaysia, 2025), potentially limiting opportunities for technology-enhanced formative assessment. This raises critical questions about the equity of access to digital tools, readiness of educators, and the development of effective policies that balance technological benefits with potential distractions.

This area warrants deeper investigation for several reasons. First, there is a clear research gap in comparative analyses of primary and secondary school contexts in Malaysia, particularly regarding smartphone integration in formative assessment. Second, understanding these differences is essential for evidence-based policy development, enabling education authorities to design interventions that are responsive to distinct school environments. Third, examining the role of digital devices in assessment contributes to the broader goal of digital inclusion, ensuring all students regardless of school level or background can benefit from equitable access to learning technologies.

The significance of this study lies in its potential to guide multiple stakeholder groups such as policymakers who can use the findings to refine national policies on digital tool usage, balancing innovation with effective governance. For school leaders, they can adopt evidence-based practices to enhance teacher readiness and resource allocation for technology-driven assessments. Teachers can leverage insights to improve formative assessment strategies, integrating technology in ways that are pedagogically sound and inclusive, whereas parents and students can benefit from more engaging, transparent, and effective assessment practices that better prepare learners for future academic and professional demands.

By systematically comparing formative assessment practices and technology integration in Malaysia's primary and secondary schools, this study aims to contribute to the development of equitable, future-ready assessment strategies that address both the pedagogical and digital needs of the 21st-century classroom.

Classroom Assessment in Malaysia's Primary and Secondary Schools

Malaysia's education system follows a 6+3+2+2 model, comprising six years of primary education (Standard 1–6) for ages 7–12, three years of lower secondary (Form 1–3) for ages 13–15, two years of upper secondary (Form 4–5) for ages 16–17, and two years of pre-university education. According to the Malaysian Ministry of Education (2025), the Guidelines for the Implementation of Compulsory Education at the Lower-Level state that the period of compulsory education is for six years, which is the period of primary education. Previously, students in Malaysia had to sit for national school examinations in primary and secondary schools: Primary School Achievement Test (UPSR, Primary Year 6), Form Three Assessment (PT3, Secondary Form 3); Malaysian Certificate Examination (SPM, Secondary Form 5), and Malaysian High Certificate Examination (STPM, Secondary Upper Form 6). UPSR and PT3 were abolished in 2021 and 2022, respectively (Muhammad & Alias, 2023).

Muhammad and Alias (2023), highlight a divide in public opinion regarding the abolition of national assessments such as UPSR and PT3. While some welcome the move, others argue that its absence could compromise education quality. Advocates for reintroducing these assessments cite parental demands, overloaded curricula, overcrowded classrooms, and schools' readiness to implement classroom-based assessments (Pentaksiran Bilik Darjah, or PBD). Said and Wan Mohamad's (2023) findings showed that teachers in primary school are knowledgeable and ready to implement classroom assessment after the abolition of UPSR.

The Kementerian Pendidikan Malaysia (2019) introduced the PBD starting from the end of 2016, which is an assessment tool to assess the overall level of student mastery as an improvement over the School-Based Assessment (PBS) that was implemented previously. But, PBD maintains all the concepts of PBS (which contains a holistic assessment consisting of two categories, namely academic and non-academic) and involves determining the level of mastery of students in each subject. PBD is a classroom assessment model introduced by the Malaysian Ministry of Education to replace exam-oriented learning (Hajmi & Jamaludin, 2022). At the start of a T&L activity, the teacher must state the content standards and learning objectives to be achieved at the end of the T&L activity so that students know their respective responsibilities. Teachers not only need to be fully prepared to teach, but they also need to be prepared to assess students throughout the T&L session (Hajmi & Jamaludin, 2022).

School Level in Classroom Assessment

Early assessment of essential academic competencies particularly literacy and numeracy at pre-primary and early primary/secondary levels is instrumental in identifying learners at risk (Azahar & Cheng, 2024). The authors also argue that education policymakers must prioritize expanding access to early childhood education for diverse communities. Measures may include increasing the number of public preschool facilities in high-demand areas and offering greater financial assistance to low-income families. Broader access to pre-primary education could help mitigate disparities in educational outcomes between students in public versus private schooling streams (Azahar & Cheng, 2024).

Internet Access in Classroom Assessment

Digital technology creates a pathway for new methodologies and characteristics of assessment. This assessment can take various forms such as audio or audio-visual recording, digitised multiple-choice questionnaire, online text composition, film production, online forum participation, digitised concept map creation, or e-portfolio, and many other forms (Zaibout et al., 2024). For the schools which lack of electricity and internet, Ofosu-Asare (2024) proposes several practical interventions to enhance educational equity, including the use of affordable mobile technologies, strengthening teacher training, developing localized digital content, and encouraging community engagement.

Mehboob et al. (2024) report that multimedia tools significantly enhance student engagement and understanding, thereby improving learning outcomes. Nonetheless, obstacles such as insufficient technology access, lack of teacher training, and potential distractions remain significant barriers. Both students and educators stress the importance of better digital infrastructure and ongoing professional development. As digital literacy becomes a core competency for academic and economic success, achieving universal access to digital learning tools is essential for improving student performance in Malaysia (Azahar & Cheng, 2024). Digital tools such as interactive whiteboards, online learning platforms, and virtual classrooms have contributed to more dynamic learning environments that cater to diverse learner needs (Rafiq et al, 2024).

Smartphones Usage by Students in Classroom as Part of T&L Activities

Many educational institutions have introduced protocols to address the potential for distraction associated with in-class use of digital devices (OECD, 2023). While smartphone bans may seem effective on the surface, OECD (2023) data reveals that 30% of students in schools with such bans still report using smartphones multiple times daily, and 21% report using them almost every day, highlighting enforcement challenges.

At the same time, OECD (2023) findings show that students who used digital devices for up to one hour per day either for academic or recreational purposes achieved higher scores in mathematics compared to those who did not use devices at all. Wang et al. (2023) identified smartphone use as a mediating factor in academic achievement, noting that high-use students outperformed their low-use peers. These findings suggest that limiting smartphone access may not always produce improved academic results. Moderate, purposeful use of digital devices is associated with better performance, though this relationship depends heavily on how the devices are used (OECD, 2023). Overuse or

inappropriate use, by contrast, tends to correlate with lower academic outcomes. The PISA 2022 findings underscore the need for clearer policies to guide digital device usage in schools.

Formative Classroom Assessments Conduct by Teacher

Bui and Nguyen (2024) assert that the effectiveness of assessments in enhancing student motivation depends more on their design than on their frequency. Their research supports the incorporation of varied assessment methods to boost student engagement. In Malaysia, Hajmi and Jamaludin (2022) found that the level of teacher readiness was high for the implementation of classroom assessment. However, to optimize digital assessment practices, there remains a pressing need to strengthen digital competencies among students and educators and to establish clear, responsible-use guidelines for digital tools (Azahar & Cheng, 2024).

Research Objectives

The current study aimed to investigate how digital technology, particularly smartphones is integrated into formative assessment practices in primary and secondary schools in Malaysia, examining issues such as internet access, smartphones usage, and teachers' formative assessment implementations.

Research Questions

Primary research questions included:

Are there systematic differences in internet access across primary and secondary schools in Malaysia?

Are there systematic differences in smartphone usage as part of in-class T&L across primary and secondary schools in Malaysia?

Are there significant differences in formative assessment implementation across primary and secondary schools in Malaysia?

Methods

Research Design

This paper is a comparative study of school formative classroom assessment systems between primary and secondary schools in Malaysia. This study adopted a quantitative research design. It involved an online survey of primary and secondary school teachers to gain insights into the implementation of smartphones in formative assessment.

Participants

The target population was primary and secondary school teachers in Malaysia who are involved in formative classroom assessment. Opportunity sampling techniques were used, with the goal of securing representation of teachers from different schools and regions. Respondents were volunteers and they received no monetary incentives. All participants were from Malaysia.

Malaysia has 235,232 primary and 181,134 secondary school teachers (Department of Statistics Malaysia, 2025). An a priori power analysis in G*Power 3.1, based on a difference between two independent means (two groups), (primary and secondary school) and an effect size of $f = 0.5$, $\alpha = 0.05$, $\beta = 0.95$, and two-tails, suggested a total sample size of 210 with sample size for each group is 105 respondents.

The sample was obtained from public school teachers (primary and secondary) in Malaysia. A total of 434 participants commenced the survey from 9 February 2025 until 18 March 2025. However, after triaging incomplete responses, a final sample of 251 volunteers was retained. Both sample size estimates were exceeded (primary = 114; secondary = 137). Table 1 summarises participant sex by school level.

Table 1

Participant sex by level of school

Gender	Primary	Secondary	Total
Male	34	42	76
Female	79	94	173
Prefer not to answer	1	1	2
Total	114	137	251

Source: Authors' own work

Procedure and Materials

The study was designed in line with the principles of the British Educational Research Association. Full Ethical Review and Approval was achieved through the Research Committee of the College of Social Sciences at the University of Glasgow. Data collection and storage was aligned with EU General Data Protection Regulation (GDPR). The survey was designed in Qualtrics web-based survey software, which is GDPR compliant (Loeffen et al, 2025). The survey was conducted online in the English language.

Prior to the data collection process, potential participants were invited via a survey link, which included a detailed explanation of the study's objectives, rationale for participant selection, and instructions on opting out if desired. An informed consent sheet was integrated into the online survey form, and full consent was obtained from all participants prior to data collection.

Participation was completely voluntary, completely anonymized, and respondents were informed about their right to withdraw during participation. Respondents could stop completing the survey at any point. If the respondents decided to take part and completed the survey, they were still free to withdraw up until the point of data analysis by sending an email to the researchers, without giving a reason. No sensitive data were collected or stored and conducted to standard and established protocols.

The instrument scoring system evaluates three factors in an educational setting: Internet Access, Smartphone Usage, and Formative Assessment Conducting. Each factor is assigned a scoring range with specific indicators. Table 2 summarises the data collection instrument.

Table 2

Research Instrument

Item	Scoring & Indicators	Purpose
Internet Access	4. Provided – Unlimited 3. Provided – Limited 2. Use a private hotspot 1. Not provided / No internet	To assess internet access to online learning resources and formative classroom assessment.
Smartphones Usage	3. Yes, in every class session 2. Yes, but not in every class session 1. Never in a class session	To determine the smartphones usage and integration in T&L.
Formative Assessment Conducting	3. Yes, every class session 2. Yes, but not in every class session 1. Never in a class session	To measure how regularly teachers implement formative assessment in the classroom.

Source: Authors' own work

Data Analysis

The data were screened and cleaned; any incomplete responses were dropped resulting in 251 valid, full responses. Data were analysed using SPSS v26 to generate descriptive statistics and an independent measures t-test. To determine significant differences between the experiences and practices of primary and secondary school teachers, the following statistical tests were used:

Results*Internet Access*

Table 3 summarises Internet Connectivity across Primary and Secondary Schools sampled.

Table 3

Teachers' internet accessibility at school

Internet Access (at School)	Primary	Secondary	Total
Provided - Unlimited	53 (47%)	69 (50%)	122 (49%)
Provided - Limited	43 (38%)	47 (34%)	90 (36%)
Use a private hotspot	14 (12%)	17 (12%)	31 (12%)
Not provided / No internet	4 (4%)	4 (3%)	8 (3%)
Total	114 (100%)	137 (100%)	251 (100%)

Source: Authors' own work

A Pearson's chi-square test of association revealed no association between School Level (Primary, Secondary) and Internet Connectivity [$\chi^2 (3) = 0.46, p = .927$]. Almost half of both Primary and Secondary schools sampled had Provided and Unlimited internet access. Approximately 38% of Primary and 34% of Secondary schools had Provided but Limited connectivity. Approximately 12% at each level relied upon Private Hotspots. Fewer than 5% at each level reported No Connectivity.

Smartphones Usage by Students in Classroom T&L Activities

Table 4 summarises classroom Smartphone Usage across Primary and Secondary Schools sampled.

Table 4

Smartphones usage by students across levels

Smartphones Usage by Students	Primary	Secondary	Total
Yes, in every class session	9 (8%)	8 (6%)	17 (7%)
Yes, but not in every class session	14 (12%)	45 (33%)	59 (24%)
Never in a class session	89 (78%)	77 (56%)	166 (66%)
No answer	2 (2%)	7 (5%)	9 (4%)
Total	114 (100%)	137 (100%)	251 (100%)

Source: Authors' own work

Statistical analysis using Pearson's chi-square test indicated a significant association between school level (primary versus secondary) and smartphone usage in classrooms [$\chi^2 (3) = 18.04$, $p < .001$], with a medium-to-large effect size [Cramer's $V = 0.27$, $p < .001$].

At Primary level, a larger number of schools sampled (89) reported "*never in a class session*" than expected (75.4), with a smaller number of schools sampled reporting "*yes, but not in every class session*" (14) than expected (26.8). At Secondary level, a mirror-opposite pattern was observed: a *smaller* number of schools sampled (77) reported "*never in a class session*" than expected (90.6), with a *larger* number of schools sampled reporting "*yes, but not in every class session*" (45) than expected (32.2). Observed and expected frequencies for "*yes, in every class session*" were approximately equal at both Primary and Secondary levels (9 vs. 7.7 and 8 vs. 9.3, respectively).

Formative Classroom Assessments Implementation by Teachers

Table 4 summarises classroom Formative Classroom Assessment uptake across Primary and Secondary Schools sampled.

Table 5

Formative classroom assessments

Formative Classroom Assessments	Primary	Secondary	Total
Yes, in every class session	45 (39%)	48 (35%)	93 (37%)
Yes, but not in every class session	67 (59%)	84 (61%)	151 (60%)
Never in a class session	2 (2%)	5 (4%)	7 (3%)
Total	114 (100%)	137 (100%)	251 (100%)

Source: Authors' own work

A Pearson's chi-square test of association revealed no association between School Level (Primary, Secondary) and uptake of Formative Classroom Assessments [$\chi^2 (2) = 1.20$, $p = .549$]. Overall, approximately 37% of schools engaged with formative assessment in every class session, approximately 60% engaged but not in every classroom session, and only 3% reported not engaging with formative classroom assessment.

Correlational analyses (Spearman's rho) are summarised in Table 6.

Table 6

Correlations between co-variables (N = 251)

	Internet Access	Smartphone Culture	Formative Assessment
Internet Access	--	rho = .086 <i>p</i> = .087	rho = .095 <i>p</i> = .067
Smartphone Culture		--	rho = .120 <i>p</i> = .029
Formative Assessment			--

Source: Authors' own work

There is a weak but significant correlation between Smartphone Culture and Formative Assessment, that is the more likely that schools were to 'tolerate' smartphone usage in class, the more likely they were also likely to be engaging with digital formative assessment (and vice versa). There are non-significant, but descriptively trending, relationships between Internet Connectivity and both Smartphone Culture and digital Formative Assessment engagement.

Discussion

Zaibout et al. (2024) stress that digital technology enables diverse assessment methods, such as quizzes and forum participation. This aligns with Rafiq et al. (2024), who highlight the benefits of multimedia learning platforms and virtual classrooms in enhancing interactivity and supporting different learning styles. The current research found that a high percentage of schools (approx. 85%) already provide some level of internet access; however, only approximately 50% provide unlimited access, and a concerning 12% rely on private hotspots. In an increasingly digitised and cloud-based society, this suggests possible barriers to effective, modernised education. The statistical analysis suggests no systematic internet access differences across Primary and Secondary schools; this contrasts with the finding from Ofosu-Asare (2024). Mehboob et al. (2024) identify barriers to effective technology integration, including limited access to digital tools, lack of teacher training, and potential distractions. The internet access data confirms that a small proportion of teachers (approx. 3%) still lack internet access. This – coupled with the 12% reliant on private hotspots – indicates that while the infrastructure is generally good, some gaps remain, particularly in ensuring consistent access for all educators. Azahar & Cheng (2024) emphasize the importance of digital inclusion for student performance. While many schools in Malaysia are equipped with internet access, effective use requires proper teacher training and curricular adaptation, as suggested by Mehboob et al. (2024). This suggests that Malaysia and other nations should focus not only on infrastructure but also on ensuring equitable access to digital tools, professional development, and pedagogical strategies. Not only in T&L, the integration of digital technology in assessment must also be supported by policies ensuring universal digital inclusion.

Statistical analysis revealed a difference in Smartphone Culture between Primary and Secondary schools. At Primary level, a larger number of schools sampled reported "*never in a class session*" than expected, with a smaller number of schools sampled reporting "*yes, but not in every class session*" than expected. At Secondary level, a mirror-opposite pattern was observed: a *smaller* number of schools sampled reported "*never in a class session*" than

expected, with a *larger* number of schools sampled reporting “yes, but not in every class session” than expected. Observed and expected frequencies for “yes, in every class session” were approximately equal at both Primary and Secondary levels. This, although nested in cognitive and physical competencies for device usage, suggests that there is a need for learners at primary to be socialised towards appropriate device usage and to set clear expectancies about pro-social and appropriate smartphone behaviours prior to transitioning to secondary school.

Outright bans although eye-catching and potentially ‘popular’ may not be the most effective approach to facilitating a positive educational environment. Instead, establishing clear guidelines on appropriate smartphone use for learning could be more beneficial. Research shows that moderate smartphone use can be beneficial. OECD (2023) found that students who engage with digital devices for learning activities up to one hour per day tend to perform better in mathematics compared to those who do not use such devices at all. Echoing earlier findings, Wang et al. (2023) reported that students categorized under high smartphone usage achieved higher academic results than those in the low-use group, challenging conventional assumptions that reduced smartphone access inherently improves educational performance. Instead, it suggests that limited smartphone access could hinder learning effectiveness. At the same time, research on smartphone use in classrooms indicates that usage levels remain low. Moderate use of digital devices appears to enhance academic performance, while excessive use or complete restriction could be detrimental. Ultimately, the PISA 2022 results highlight the importance of developing nuanced school policies that regulate smartphone use balancing their educational benefits with the need to minimize potential distractions (OECD, 2023). Therefore, while concerns over distractions have led to restrictions on smartphone use in schools, evidence suggests that moderate and purposeful use can support learning and academic achievement. Schools should focus on structured policies that encourage educational use while preventing misuse, ensuring students benefit from technology without it becoming a hindrance to their learning experience.

The findings indicate that while formative assessments are widely conducted by teachers, their frequency varies. A substantial proportion (37%) of teachers integrate formative assessments in every class, while 60% do so occasionally. A small percentage (3%) of teachers never implement them. These findings align with existing literature emphasizing the importance of formative assessment not just in frequency but in effectiveness. Bui and Nguyen (2024) highlight that the characteristics of assessment, rather than its frequency, are key to enhancing students' learning motivation. This suggests that merely conducting formative assessments frequently may not necessarily translate into better learning outcomes unless appropriate assessment techniques are employed. Additionally, the study by Hajmi and Jamaludin (2022) in Malaysia found a high level of teacher readiness for implementing classroom assessment. However, challenges remain, particularly in the digital aspect of assessments. Azahar and Cheng (2024) emphasize the need to improve digital literacy among students and teachers and establish guidelines for responsible technology use in assessments. When contextualizing these studies with the present findings, it becomes clear that while formative assessments are widely adopted, their effectiveness depends on both pedagogical approach and technological readiness. The absence of a significant difference between primary and secondary schools in formative assessment implementation suggests that similar strategies could be applied across different education levels. However,

enhancing assessment techniques and integrating digital tools effectively could further optimize their impact on student learning motivation and outcomes.

Potential Impact of the Current Study

This study is highly relevant to educators, policymakers, and researchers as it explores the implementation of classroom assessment, particularly in primary and secondary schools in Malaysia, with an emphasis on understanding technological integration. Classroom assessment serves as a fundamental pillar of formative evaluation, equipping teachers with the necessary tools to systematically monitor student progress and enhance learning outcomes (Abd Halim et al., 2024).

By examining the incorporation of digital technologies, especially mobile devices such as smartphones, this study generates valuable insights into their potential to optimize formative assessment practices. Existing research highlights the advantages of mobile devices in supporting student learning when employed responsibly (Onodipe & Ayadi, 2020). Structured guidelines, like those established in Scotland (The Scottish Government, 2024) provide a framework for effectively integrating such technologies into education. However, despite the increasing emphasis on digital learning tools, policies in Malaysia currently impose restrictions on the use of smartphones in schools, presenting a significant barrier to leveraging technology for assessment purposes (Kementerian Pendidikan Malaysia, 2025).

By comparing classroom assessment practices and digital technology usage across different educational levels, this study offers crucial insights into best practices and challenges in integrating digital tools into formative assessment. Findings contribute to the broader discourse on improving educational outcomes by addressing key considerations such as equity and accessibility in the implementation of technology-driven assessment strategies (Rafiq et al., 2024). Findings can not only inform future policy decisions but also support practical recommendations for enhancing the effectiveness of formative assessment through technological advancements.

Policymakers are suggested to address digital inclusion by ensuring that all students and educators have equitable access to internet infrastructure and digital tools to support not only effective learning, but formative assessment as well. Instead of outright bans, schools should develop structured policies that encourage the educational use of smartphones while minimizing distractions, recognizing that moderate smartphone usage can enhance academic performance. Digital tools, including smartphones, can facilitate paperless formative assessments with recorded evidence, but their effectiveness depends on quality implementation rather than frequency. The similarity in assessment practices across primary and secondary schools suggests that effective strategies can be applied universally, with adjustments for digital literacy levels and pedagogical needs.

Limitations and Recommendations for Future Research

This study acknowledges that assessment effectiveness depends on quality rather than frequency but does not explore the specific factors contributing to high-quality formative assessments which needs an in-depth interview, document analysis, and observation. This study also does not examine long-term effects of digital assessments and smartphone usage on student learning outcomes. Therefore, it is suggested that the future research to identify

and test specific strategies that improve the quality and effectiveness of formative assessments in digital learning environments, potentially through randomised control trials.

Conclusion

The current research highlights the significant role of digital technology in assessments and learning, emphasizing that strong internet infrastructure in schools facilitates diverse and interactive assessment methods. Despite high internet access levels in both primary and secondary schools, gaps remain in ensuring equitable access for all educators and students. Effective technology integration requires not only infrastructure but also teacher training and curriculum adaptation. Policymakers must prioritize digital inclusion to enhance student performance and support technology-based assessments.

Regarding smartphone usage, findings suggest that moderate and structured use can improve academic performance, contrary to the belief that restrictions enhance learning. Limited smartphone access may hinder learning effectiveness, and outright bans are unlikely to be the best approach. Instead, schools should implement well-defined policies that encourage educational smartphone use while mitigating potential distractions. Moreover, formative assessment using smartphones can be made by paperless with recorded evidences.

While formative assessments are widely used across both primary and secondary schools, their effectiveness depends on quality rather than frequency. The lack of a significant difference in assessment practices between school levels suggests that similar strategies can be applied universally. However, optimizing formative assessments requires improving digital literacy among teachers and students, integrating technology effectively, and employing appropriate pedagogical techniques.

Overall, the findings emphasize the need for a balanced approach in term of leveraging technology in assessments while ensuring digital equity, appropriate smartphone usage policies, and pedagogical effectiveness. Moving forward, schools should focus on holistic strategies that integrate digital tools, enhance teacher readiness, and support student learning outcomes.

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