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Challenges to Digital Transformation of Monitoring and Evaluation in Pakistani Secondary Schools

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Abstract: This study investigates the potential of digital technologies to enhance Monitoring and Evaluation (M&E) practices in Pakistani secondary schools. The study has focussed to identify the key challenges hindering the digital transformation of M&E system in Federal Government Secondary Schools, to explore the perceived impact of these challenges on the effectiveness of M&E practices. Concurrent triangulation research design of mixed methods was used to take the qualitative and quantitative data for analysis. Census sampling method was used, and all members of population, 12 Regional Directors, 186 MEAs and 186 principals of FGEIs (C/G) were taken as a sample and analysed. Self-structured questionnaire was developed for MEAs and principals and semi-structured interviews of Regional Directors were conducted for qualitative data. Validity of the research tools was carried out through experts' opinions while the reliability was checked by using Cronbach Alpha. The data was collected and analysed by using SPSS, (version 2022). Descriptive statistics (M, Median & SD) were used for data analysis while thematic analysis was used for qualitative data. Major findings of the current study were that in most of the schools M&E is conducted manually without using digital technologies and there are also internet connectivity issues in schools. The study recommended that there is a need to develop adequate virtual infrastructure with internet connectivity to integrate digital technologies in the M&E practices. The proposed transformation will improve the M&E mechanism resulting improvement in academics, management, curricular, co-curricular activities of school.

Keywords: Transformation, Monitoring and Evaluation, Digital Technology Integration, Secondary Schools

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Introduction

Monitoring and evaluation mechanism is an important aspect in education to regulate the operational activities and make the educational program accountable, efficient, and effective to achieve preset goals. According to Liu (2022), M&E system provides real-time insight which are essential for decision-making and implementation of corrective measures. But the manual and traditional M&E practices hold lengthy procedure reaching to report generation and its implementation therefore the M&E mechanism should be equipped with the latest education technologies to allocate and use of resources effectively, regulate all the operational activities and ensure decision-making. In most of the institutions of Pakistan, the M&E practices are commonly carried out manually in traditional way which resulting inefficiency, subjectivity, lack of timeliness in data collection, report generation and its implementation (Datahan, 2020). Traditional M&E practices mostly depend on physical classroom observation of the evaluator, paper-based survey, and manual data collection, that lead to delay, inaccuracy, and partial information. The phenomena limit the potential in effective decision-making, particularly in Pakistan the educational landscape is frequently changing, where significant gaps remain to achieve the desired objectives and learning outcomes (UNESCO, 2019).

Problem Statement

The current monitoring and evaluation (M&E) practices in Federal Government secondary schools across Pakistan are predominantly traditional, manual, subjective, and outdated, which impedes the accurate and data-driven insights necessary for informed decision-making and quality improvement in secondary education. This is further exacerbated by challenges such as low budget allocation, insufficient virtual infrastructure, unskilled administrators and evaluators, unavailability of IT gadgets, and negative attitudes towards technology among school staff. Further, the 18th constitutional amendment has decentralized educational management and necessitated an equipped M&E mechanism with the latest digital technology to assess whether the program is on track and objectives are met or not. The integration of digital technologies into M&E practices offers a potential solution to enhance objectivity, efficiency, and effectiveness, leading to better resource utilization, increased accountability, and improved educational outcomes. This research aims to explore the challenges that hinder the digital transformation of M&E system in Federal Government Secondary Schools and explore the impact of these challenges on the effectiveness of M&E practices. Further, to devise a strategy facilitating digital transformation of existing M&E to enhance the M&E process and ultimately improve the quality of school education.

Objectives of the Study

The study revolved around the following objectives:

1. To identify the key challenges hindering the digital transformation of M&E system in Federal Government Secondary Schools.
2. To explore the perceived impact of these challenges on the effectiveness of M&E practices within Pakistani secondary schools.
3. To develop recommendations for policymakers and evaluators on effectively integrating digital technologies to improve M&E in Pakistani secondary schools.

Challenges in Integrating Digital Technologies in M&E

Digital technology integration is essential to address the challenges posed by manual M&E practices at school level. But inadequate virtual infrastructure, negative attitudes of evaluators and principals towards using emerging technologies, insufficient financial resources and untrained monitoring assistants are some of the main challenges that prevent integration of digital technologies into the traditional M&E practices. In addition, the data collected through traditional manual ways lack real-time data, objectivity and evidence-based insights, resulting the outcome of such M&E process is always open to question. Consequently, these issues hinder the implementation of M&E at secondary schools in Pakistan.

Technological Infrastructure: In most of the educational institutions in remote areas in Pakistan, there is no adequate virtual infrastructure or poor internet connectivity, unskilled evaluators, principals and other professionals which often lack required technical skills for using IT gadgets. While in other areas, adequate technological and virtual infrastructure are available but the skilled staff deficiencies impede the integration of digital technologies in existing M&E system (Hashmi & Khan, 2025). According to Tehseen et al. (2023) digital literacy can effectively engage the evaluators and other stakeholders with digital technology while assessing various aspects of the educational institutions. Lack of access to digital technology and other IT gadgets and poor internet connectivity are the main challenges that restrain the integration of digital technology in M&E practices. Khwaja (2017) also highlighted that schools functioning in urban areas have necessary IT and virtual infrastructure but even there is no trend of conducting M&E with the help of latest emerging educational technologies (Hashmi & Khan, 2025).

Digital Literacy: Insufficient digital literacy of evaluators and principals is one of the main issues that hinders the integration of digital technology into the existing manual and traditional M&E system in Pakistan. The work of Constantine (2018) also identified that successful integration of digital technologies depends on the attitudes, digital literacy and skills of stakeholders and professionals. According to Tehseen et al. (2023)) digital literacy can effectively

engage the evaluators and other stakeholders with digital technology while assessing various aspects of the educational institutions. Lack of access to digital technology and other IT gadgets and poor internet connectivity are the main challenges that restrain the integration of digital technology in M&E practices. Khwaja (2017) also highlighted that schools functioning in urban areas have necessary IT and virtual infrastructure but even there is no trend of conducting M&E with the help of latest emerging educational technologies due to absence of requisite skills of principals and evaluators.

Financial Constraints: The role of financial resources in integrating technology in manual M&E system is significant and important. According to UNESCO (2019) report, the insufficient financial resources in the educational public sector restrain the integration of latest education technology in Pakistan. In addition, the implementation and maintenance of these technologies require substantial budget, which is not available with majority of educational institutions. Hashmi and Khan, (2025) also highlighted that without substantial budgets an effective implementation of digital technology in M&E system is not possible. Thus, adequate financial resources are significantly required for systematic monitoring, timely evaluation, tangible reports, workable recommendations and practical execution of corrective measures.

Policy Framework: The policy framework is significant and equally important for all operational activities of the institution. Zhao (2020), focused on the framework of clear policies and guidelines for the adoption of digital technologies in M&E. While after 18th Constitutional Amendment in Pakistan, the decentralization of education has disturbed the consistency in policies and their execution at all levels (Hashmi & Khan, 2025). Each province has different priority and capacity for implementing digital M&E gadgets, that lead to disparities in accountability and quality of education. Although, the need of policy reform pertaining to technology integration is instantly growing up, but the policy related to digital technology use is still vague and inconsistent. Due to unclear policy framework, there is a lack of coordination to successfully integrate the digital technology in M&E system (Liu, 2022).

Impact of the Challenges on the Effectiveness of M&E practices

The following challenges adversely affect the digital integration of M&E practices at secondary schools in Pakistan:

Real-time Data Collection and Analysis

Digital technologies provide the ability to collect and analyse data in real time. As highlighted by Constantine (2018), using digital tools such as Learning Management Systems (LMS) and Student Information Systems (SIS), educators and administrators can track student attendance, performance, and learning outcomes on a continuous basis. The challenges of technology infrastructure, digital literacy, financial constraints restrain the real-time data collection and informed decision making.

Subjectivity and lack of Transparency

Traditional M&E methods and insufficient technology infrastructure, digital literacy, financial resources often result in inaccurate or inconsistent evaluations. By contrast, digital technologies enable data-driven, objective assessments that reduce the influence of subjectivity. According to a study by Zhao (2020), digital M&E systems help ensure transparency by providing verifiable data on school performance, making it easier to track improvements or identify areas needing attention. These challenges bring subjectivity and disturb transparency in M&E process across schools.

Enhanced Collaboration

Digital technologies facilitate better communication and collaboration among teachers, administrators, and other stakeholders involved in the M&E process. A study by Tehseen et al. (2023) found that platforms such as Learning Management Systems allow for the sharing of real-time updates, data, and feedback, fostering a collaborative approach to problem-solving and decision-making. Due to challenges active collaboration and communication are not possible. Further, the stakeholders will not be on the same page regarding student progress and institutional performance.

Delimitation of the Study. The study was delimited to:

1. Federal government secondary schools Cantonments and Garrisons (C/G) Pakistan.
2. Regional Directors (RDs) of FGEIs (C/G) Pakistan.
3. Monitoring and Evaluation Assistants (MEAs) of FGEIs (C/G) Pakistan.
4. Principals of FGEIs (C/G) secondary schools of Pakistan.

Findings of this study may easily be generalized because Federal Govt secondary schools are spread across the country. In addition, all the population were taken as sample of the study.

Research Methodology.

Mixed methods approach was adopted to carry out the study. Concurrent triangulation research design of mixed methods was used to take the qualitative and quantitative data for analysis to reach the conclusion.

Population.

Population comprised of all Regional Directors of Federal Government Educational Institutions (FGEI), all Monitoring and Evaluation Assistants (MEAs) and all secondary school principals from twelve regions of FGEI (Cantonment/ Garrisons). The study comprised of the following population:

1. All the 12 Regional Directors of 12 Regions of FGEI (C/G)
2. All 186 MEAs from all 12 Regions of FGEI (C/G)
3. All 186 secondary schools from 12 Regions of FGEI (C/G) set up
4. All 186 Principals of FG secondary schools

Details of the population are as under:

Table *1*

Population of the Study

No	Title	KP	Punjab	Sindh	Baluchistan	Total
1	Regional Directors	2	8	1	1	12
2	MEAs	26	143	10	7	186
3	Principals	26	143	10	7	186

Source: EMIS of FGEIs (Cantonments / Garrisons) Directorate -2021

Sample of the Study

Census sampling method was used as it is a statistical enumeration in which all members of the population were included and analysed. All population of 12 Regional Directors (RDs), 186 Monitoring and Evaluation Assistants (MEAs) and 186 principals of Federal Government Educational Institutions (Cantonment/ Garrisons) Pakistan were taken as samples of the study. The sample for the current study comprised of following three groups:

a. Regional Directors = 12
b. Monitoring and Evaluation Assistants (MEAs) = 186
c. Principals of Secondary Schools = 186

Tools of the Study

Self-structured questionnaire was developed for MEAs and principals. Semi-structured interviews of Regional Directors were included to understand the monitoring and evaluation practice objectively at secondary school level in Pakistan. Validity of the research tools was carried out through experts' opinions while the reliability was checked by using Cronbach Alpha. The data was collected through Google Form and by personal visits. Data was analysed by using SPSS, (version 2022). Descriptive (M, Madian & SD) were used for data analysis. While for in-depth understanding, 12 RDs were interviewed to get qualitative data. The data obtained through interviews was analysed through thematic analysis, which was presented and explained theme-wise.

Data Analysis and Results

The analysis comprised of quantitative data analysis and qualitative data analysis:

Quantitative Data Analysis

The opinions of the respondents are analyzed below.

Table 2

Challenges Pertaining to Technological Infrastructure

Group	Mean Score	Median	Standard Deviation
MEAs	2.56	3.00	1.021
Principals	2.71	3.00	1.149

Table 1 shows the M (2.56) score of MEAs responses, which indicates the technological infrastructure availability in schools between "Disagree" and "Neutral," leaning towards low availability of technology infrastructure. The Mdn (3.00) shows the availability of technology infrastructure is moderate to lower while SD (1.021) of MEAs responses is relatively low-to-moderate regarding availability of technological infrastructure.

Table 1 also shows the M (2.71) score indicates a slightly higher availability of technological infrastructure compared to MEAs, but still their average perceptions fall between "Disagree" and "Neutral," leaning towards low availability of technological infrastructure. Like MEAs, the Mdn (3.00) indicates moderate to lower-level of availability of technological infrastructure. The SD (1.149) of principals' responses is a slightly higher as compared to MEAs (1.021) that shows greater variability in the opinions of principals regarding the availability of technological infrastructure.

Table 2

Challenges Pertaining to Digital Literacy

Group	Mean Score	Median	Standard Deviation
MEAs	2.98	2.88	1.001
Principals	2.88	2.61	1.101

Table 2 shows the M (2.98) score of MEAs responses, which indicates the digital literacy of MEAs and principals for M&E around "Moderate" or average level of digital skills. The Mdn (2.88) indicates the digital literacy as being at or below a "Moderate" level.

Table 2 also shows the M (2.88) score of principals indicate digital literacy slightly below "Moderate," leaning towards "Low Digital Literacy". The median (2.61) is noticeably lower than the mean (2.88) for Principals which indicates the digital literacy as lower or below moderate.

Table 3

Challenges Pertaining to Policies & Guidelines

Group	Mean Score	Median	Standard Deviation
MEAs	2.20	2.86	1.509
Principals	2.40	2.74	1.416

Table 3 shows the M (2.20) score of MEAs responses, which indicates that, MEAs tend to lean towards the "Disagree" or "Poorly Implemented" The results indicate that the policies and guidelines are either insufficient in scope or deficient in implementation. The Mdn (2.86) indicates that a substantial portion of respondents are not entirely negative, but still below the neutral point. The SD (1.509) of MEAs is relatively high which indicates that the policies and guidelines are very low.

Table 3 also shows the M (2.40) score of principals which also falls lower, indicating a tendency towards "Disagree" or "Poorly Implemented. The M (2.40) indicates that policies and guidelines is less poorly implemented as compared to MEAs. The Mdn (2.74) score of principals' responses is slightly lower than their mean which indicates that half of

the principals provided responses at or below 2.74, and half above it. The SD (1.416) is also relatively high which shows considerable dispersion which shows a lack of strong consensus among the principals.

Table 4

Challenges Pertaining to Financial Resources

Group	Mean Score	Median	Standard Deviation
MEAs	3.72	3.00	1.419
Principals	3.69	3.00	1.427

Table 4 shows the M (3.72) score of MEAs falls between "Neutral" and "Agree", leaning closer to "Agree. The SD (1.419) is relatively large indicating considerable dispersion in the responses of MEAs which reveals that some MEAs strongly agree that financial resources are sufficient, while others strongly disagree.

Table 4 also shows that the M (3.69) of principals also falls between "Neutral" and "Agree", like that of MEAs, leaning closer to "Agree" which indicates that, responses tend to agree that the financial resources are available for digital technology and IT gadgets at moderate level. The SD of (1.427) of principals is relatively higher as well, like that of MEAs, indicating significant spread in the responses of principals. This high spread indicates that the resources availability for IT gadgets is not uniform across FG Secondary schools.

Table 5

Enhanced Capacity of Digital M&E System

Group	Mean Score	Median	Standard Deviation
MEAs	4.21	3.60	0.701
Principals	3.94	3.53	0.927

Table 5 shows the M (4.21) score of MEAs responses which indicates that MEAs lean strongly towards "Agree" or "Strongly Agree" regarding the construct. It reflects positive perception of MEAs that integrating digital technology will indeed enhance the capacity of M&E system. The low SD (0.701) indicates that the responses of MEAs are clustered closely around their mean. There is a good degree of consistency in their views.

Table 5 shows the M (3.94) of principals' responses which also indicates positive sentiment, and the M score falls between "Neutral" and "Agree". They also tend to agree that integrating digital technology will enhance the capacity of the M&E system, The SD (0.927) is higher compared to the MEAs which indicates dispersion in the responses of principals.

Table 6

Construct-wise Mean Score by Stakeholders

Construct	MEAs	Principals
Technological Infrastructure	2.56	2.71
Digital Literacy	2.98	2.88
Policies & Guidelines	2.20	2.40
Financial Resources	3.72	3.69
Enhanced Capacity of Digital M&E System	421	3.94

Table 6 shows the M score of MEAs reveals that they feel severely unsupported by FG secondary schools. Further, due to absence of clear policies & guidelines both MEAs and principals highlight a significant gap in governing frameworks for digital M&E. Both stakeholders perceived that infrastructure is main barrier. The neutral position of responses reveals a need for improvement. The low scores for "Technological Infrastructure," "Digital Literacy," "Policies & Guidelines," and "financial resources" reflect that M&E processes rely heavily on traditional, manual methods. Where digital tools might be used on an individual basis, lacking systematic integration. The challenges in

infrastructure and support suggest difficulties in collecting, processing, and analysing data efficiently using digital means. Despite having a positive view of the "Enhanced Capacity of Digital M&E System," are severely hampered by the lack of infrastructure, and clear guidelines, likely leading to frustration in their efforts to implement digital M&E.

Thematic Analysis

Following is theme-wise thematic analyses:

Theme 1: Challenges Pertaining to Technological Infrastructure and Digital Literacy

Respondents consistently noted gaps in IT infrastructure across schools. R3 and R10 explained that some schools had only one outdated computer, while others had non-functional CCTV systems. R6 highlighted how "even when internet is available, it is too slow to support real-time reporting." In terms of digital literacy, MEAs were rated as the most proficient by several RDs (R2, R7), while Principals vary widely, with some still preferring manual formats. R4 suggested that "basic digital skills should be mandatory for new Principal appointments."

Theme 2: Challenges Pertaining to Policy Awareness and Implementation

Several RDs (R1, R5, R9) revealed that they were only verbally briefed about digital policies, with no formal documentation shared. While R3 was aware of general guidelines, he stated that "they lack clarity on practical implementation steps." Others (R8, R12) pointed out that existing policies are not localized or contextualized for specific regional needs, leading to uneven compliance.

Theme 3: Challenges in Integrating Digital Technologies

Commonly reported challenges include limited funding, technophobia among senior staff, and unreliable technical support. R7 shared that "Principals who are about to retire are not interested in learning new systems." R10 noted that "even when hardware is available, we lack trained personnel to operate and maintain it." Some RDs (R6, R11) also mentioned challenges in synchronizing multiple platforms like EMIS, LMS, and third-party apps.

Theme 4: Impact of Challenges on Effectiveness of M&E

Due to challenges, all RDs expressed strong support the digital transformation of monitoring and evaluation processes at school level. They highlighted that challenges have adversely the technology integration resulting absence of real-time data collection, streamlined reporting, subjectivity, and lack of transparency, and data-driven decision-making. All respondents recognized that without digital M&E efficiency, transparency, and accountability are not possible.

Conclusions

Following are the quantitative data conclusions:

Quantitative data conclusions

Technological Infrastructure: The availability of technology infrastructure in FG secondary schools for M&E processes is viewed as low to moderate. Therefore, the schools face issue due to insufficient technology infrastructure. Digital Literacy: The study also concluded lack of digital literacy of principals and MEAs for conducting M&E processes in FG secondary schools which is one of the main challenges for digital integration in existing manual M& system of the schools.

Policies & Guidelines: There is also a challenge regarding "Policies & Guidelines" related to digital technology integration which are either inadequate or poorly implemented in FG secondary schools. The significant variability in the responses of stakeholders show fundamental lack of clarity or inconsistent application of available policies at the grassroots level.

Financial Resources: The availability of "Financial Resources" for digital technology and IT gadgets in FG secondary schools is "moderate to good" but their "neutral" stance of respondents, suggests that existing resources only address the basic needs.

Impact of Challenges on M&E System: The respondents strongly agreed that technology integration can significantly enhance the capacity of M&E mechanism in FG secondary schools, which lead to improved processes,

data analysis, and informed decision-making. The challenges have adverse impact on the effective digital transformation of existing M&E system of FG secondary schools in Pakistan. In addition, it also affects the transparency, objectivity and reliability of M&E process.

Qualitative Data Conclusions

The qualitative findings from interviews with 12 Regional Directors revealed a clear recognition that the challenges can disturb the transparency, efficiency, and data-informed decision-making in educational monitoring and evaluation process. RDs highlighted that actual implementation is constrained by insufficient infrastructure, inconsistent policy communication, limited training, and cultural resistance. Conclusions of qualitative data are discussed as follow:

Challenges to Digital Transformation of M&E: The RDs highlighted that existing M&E processes are carried out conventionally without using emerging digital technologies. Some FG secondary schools have adequate digital infrastructure but their staff including principals have limited digital literacy and technical expertise to use the available digital gadgets during M&E process which are main challenge to digital transformation of M&E. In addition, Insufficient financial resources are another main issue digital transformation into existing M&E system. Responded concluded that some schools situated in far-flung remote areas which have limited internet connectivity to establish digital M&E. They also identified that some principals do not support digital technology integration into existing manual M&E system. They conduct all the operational activities including M&E process in conventional way manually. There is also no policy framework and guidelines to support the digital transformation of manual M&E system. Additional challenges included the lack of centralized data management, absence of cybersecurity protocols, and inconsistent synchronization between various platforms (e.g., EMIS, LMS, third-party apps). These challenges collectively contribute to the slow and fragmented digital transformation into existing M&E system.

Impact of Challenges on Digital Transformation of M&E System: Though the digital transformation of M&E in the existing secondary schools have potential benefits but the existing challenges including inadequate digital infrastructure, insufficient digital skills of evaluators, limited financial resources, non-cooperative attitude of principals and absence of polices framework have adverse impact on digital transformation of M&E. Therefore, it becomes impossible to ensure real-time data collection, streamlined reporting, objectivity, transparency, preparation of corrective measures, data-driven decision-making and timely implementation of decisions.

Recommendations

- Based on the comprehensive analysis of responses from Regional Directors (R1–R12) and the quantitative data collected from MEAs and Principals, the following recommendations are proposed for digital transformation of M&E in Federal Government Educational Institutions (FGEIs) of Pakistan:
- It is imperative that the existing technological infrastructure be standardized across all regions and FG secondary schools as presently the schools possess basic IT equipment therefore, Directorate should specify separate budget for IT equipment and digital technologies. Further, each regional office and institution may prioritize investment in high-quality IT gadgets including updated computers, projectors, and surveillance systems. A centrally coordinated infrastructure development plan, supported by regular audits and inventory updates, would help ensure equitable access and reduce technological disparities among schools. Additionally, maintenance support units at the regional level should be institutionalized to handle technical issues promptly.
- The digital competence and literacy are responsible for successful digital transformation and implementation. The study highlighted that most of the principals and some Regional Directors lack the proficiency required to fully utilize digital systems therefore, structured and continuous digital literacy programs may be introduced and organized periodically to extend the capacity of RDs, MEAs and principal for conducting M&E processes more effectively. These programs should go beyond basic computer use to include training in platforms such as EMIS, LMS, cloud-based tools, and data visualization applications. Offering certified courses with built-in incentives can promote engagement and ensure sustained improvement in digital capacity across all institutional levels.

- A reliable internet connectivity should be established in schools where internet connectivity is inconsistent and weak, particularly in rural and under-resourced regions. Addressing this issue, the Directorate should collaborate with telecom authorities and service providers to ensure the provision of high-speed, stable internet in all FG secondary schools.
- Though general directives exist, but the stakeholders operate M&E without formal guidance, leading to inconsistency in M&E practice. It is therefore recommended that the Directorate develop a comprehensive policy framework and disseminate a concrete digital M&E guideline and outlining roles, responsibilities, ethical considerations, and data security protocols. This policy should be user-friendly, translated into operational manuals, and adapted to regional contexts. Orientation sessions should be organized regarding IT policy and guidelines to ensure clarity and adherence among all relevant personnel, including Principals, MEAs, and Regional Directors.
- Although Regional Directors indicated the availability of moderate funds, but sustainable financial investment is essential to overcome issues of digital infrastructure, training gaps in IT gadgets and inconsistency of internet connectivity. A dedicated digital M&E budget needs to be created within Directorate in separate head in annual budget to cover technology procurement, internet subscriptions, training programs, and emergency technical support. Furthermore, resource allocation must be transparent and responsive to the specific needs of each region, with performance-based disbursement mechanisms to ensure effective utilization.
- Respondents strongly support the notion digital transformation of current manual M&E system to improve data-driven decision-making, yet there were constraints and challenges to restrain the digital transformation of existing M&E system. To address the issues, the Directorate should develop a phased digital M&E enhancement strategy. This strategy should prioritize technological upgrades, policy alignment, training of staff, and facilitate evaluation, while simultaneously piloting innovations such as artificial intelligence, dashboard analytics, and remote evaluation tools. Strengthening this capacity not only improve M&E outcomes but can also promote a culture of accountability, transparency and evidence-based school management.

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