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Marking Time: Reimagining Administrative Efficiency in South African Classrooms through Local Innovation

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ABSTRACT Teacher administrative workload, particularly assessment marking, remains a persistent challenge in South African classrooms, limiting instructional time and affecting professional well-being. This study aims to examine the nature of this burden and assess the potential of a locally developed marking application to reduce it. A mixed-methods design was employed, comprising a descriptive survey of 60 educators (40 teachers and 20 heads of department) and semi-structured interviews with 30 participants, including school leaders, district officials, and union representatives. Quantitative data were analysed using descriptive statistics, while qualitative data were thematically analysed. Findings indicate that teachers spend considerable time on marking and perceive the application as significantly reducing marking time, improving instructional focus, and alleviating workload pressure. The study concludes that context-responsive educational technologies can enhance administrative efficiency and strengthen teacher capacity in resource-constrained school environments, while supporting more effective teaching and sustained learner engagement outcomes.

INTRODUCTION

Teacher workload has emerged as a critical concern in the South African education system, particularly as expanding administrative responsibilities encroach on time allocated to core teaching activities. Teachers are increasingly required to balance instructional duties with extensive administrative tasks, including marking assessments, lesson preparation, record-keeping, and compliance with school management and reporting requirements. Empirical studies indicate that these administrative demands often consume a disproportionate share of teachers' working time, in some cases exceeding the time devoted to classroom instruction itself (Bayat et al. 2014). As a result, teachers experience heightened levels of stress and fatigue, which adversely affect their professional well-being and teaching effectiveness (Ajani 2023). Recent evidence from South Africa's TALIS 2024 country report further shows that administrative workload and accountability pressures remain central contributors to occupational stress among school leaders and educators, confirming that workload is not only an individual challenge but a system-level concern (Department of Basic Education 2025).

The challenge of administrative overload is particularly pronounced in the South African context, where teachers often work in large, overcrowded classrooms and resource-constrained school environments. In such settings, educators are expected to fulfil multiple roles simultaneously, including that of a teacher, assessor, administrator, and mentor, often with limited institutional support. This accumulation of responsibilities has been linked to reduced instructional quality, diminished learner engagement, and an increased risk of teacher burnout (Khumalo and Mji 2014). These pressures are further exacerbated by systemic inequalities within the education system, especially in rural and under-resourced schools, where infrastructural deficits, limited access to digital tools, and inconsistent connectivity constrain the adoption of technology-based solutions intended to improve efficiency (Mustafa et al. 2014; Ajani and Govender 2023). A recent South African study on teacher preferences and job satisfaction similarly identifies administrative duties as

a major contributor to teachers' sense of overwhelm, reinforcing the need to review and reduce unnecessary administrative responsibilities in schools (Hofmeyr et al. 2025).

Despite widespread recognition of teacher workload as a structural challenge, a notable gap remains in research examining how educational technologies can be leveraged specifically to reduce administrative burdens in South African classrooms. Existing scholarship on educational technology has largely prioritised learner outcomes, digital pedagogy, and instructional innovation, with comparatively less attention given to the role of technology in supporting teachers' administrative functions (Foster and Knight 2020; Botha and Van Zyl 2021). This omission is significant, given consistent evidence that time-intensive marking and assessment-related tasks directly limit teachers' capacity to engage learners meaningfully and to provide timely, formative feedback.

Moreover, research suggests that even where digital resources are available, their uptake by educators remains uneven. Barriers to effective adoption include inadequate training, limited technical support, infrastructural constraints, and, in some cases, scepticism or resistance towards new technologies (Barker 2021; Van Zyl 2022). These challenges contribute to a persistent disconnect between the theoretical potential of educational technology and its practical impact on teachers' day-to-day workload. As a result, many teachers continue to rely on manual, labour-intensive administrative processes, despite growing policy emphasis on digital transformation in education.

In response to the sustained administrative burden teachers face, there is an increasing demand for practical, context-sensitive solutions that meaningfully reduce workload without adding new layers of complexity. While mobile applications and digital platforms designed to enhance learner engagement have gained prominence, comparatively few studies have examined innovations aimed at supporting teachers in managing assessment, grading, and feedback processes more efficiently (Baloyi and Potgieter 2023). This gap is particularly evident in high-density urban schools, where large learner-to-teacher ratios further intensify marking demands and administrative pressure (Gumbo and Dlamini 2024).

This paper seeks to address these gaps by examining *The Marking App* as a case study of a locally developed technological innovation designed to reduce teachers' administrative workload in South African schools. The application automates the marking of handwritten learner assessments, providing immediate feedback to reduce the time teachers spend on grading while supporting instructional continuity (The Marking App 2025). The study explores teachers' perceptions and experiences before and after the introduction of the app, drawing on data from a descriptive survey and follow-up interviews with participating teachers, including those involved in a pilot implementation. By foregrounding teachers' lived experiences, the study provides insight into how such technologies are perceived to influence workload, stress levels, and instructional focus.

Objectives of the Study

The objectives of this study are to examine the nature and extent of administrative workload experienced by teachers in South African schools, assess teachers' perceptions of automated marking technologies as a mechanism for reducing administrative burden, and evaluate the perceived effects of The Marking App on instructional focus, workload management, and teacher well-being.

The remainder of the paper is structured as follows. The next section reviews existing literature on teacher workload and educational technology, with particular emphasis on administrative burden and technology adoption within the South African context. This is followed by a methodology section outlining the study design, including the descriptive survey and qualitative interviews conducted with participating teachers. The findings section presents teachers' perspectives on workload, marking practices, and their perceptions of changes following the introduction of The Marking App. The paper concludes by summarising the key findings, reflecting on their implications for educational technology adoption, and offering recommendations for the piloting and scaling of administrative technologies in South African schools to support teacher well-being and instructional effectiveness.

Theoretical Framework: Job Demands-Resources (JD-R) Theory

This study is theoretically grounded in the Job Demands-Resources (JD-R) Theory, a well-established framework for analysing workload, occupational stress, and employee well-being across a wide range of professional contexts, including education. Originally developed by Demerouti et al. (2001) and subsequently refined by Bakker and Demerouti (2017), the JD-R theory posits that all occupations can be understood in terms of two broad categories of work characteristics, that is, job demands and job resources. Job demands refer to aspects of work that require sustained physical, emotional, or cognitive effort and are therefore associated with psychological or physiological costs, while job resources are aspects of work that help individuals meet job demands, achieve work goals, and stimulate learning, motivation, and well-being. The theory has been extensively applied in educational research to explain patterns of teacher stress, burnout, and engagement, particularly in contexts characterised by high workload and limited institutional support (Schaufeli 2017; Skaalvik and Skaalvik 2017).

Within the teaching profession, administrative responsibilities such as assessment marking, record keeping, compliance reporting, and feedback provision constitute significant job demands under the JD-R framework. These demands are intensified in education systems such as South Africa's, where large class sizes, resource constraints, and systemic inequalities place additional pressure on teachers' time and cognitive capacity. Prolonged exposure to excessive job demands without adequate compensatory resources has been empirically linked to emotional exhaustion, reduced instructional quality, and diminished professional well-being among teachers (Bakker and Demerouti 2017). From a JD-R perspective, administrative workload does not merely represent an operational challenge but functions as a structural demand that shapes teachers' daily work experiences, influencing both their performance and engagement. This framing is particularly relevant for studies seeking to understand workload not only in quantitative terms but also through teachers' subjective perceptions of strain, stress, and capacity.

Conversely, the JD-R theory conceptualises job resources as critical mechanisms that mitigate the negative effects of high job demands. Job resources may take organisational, social, or technological forms and are especially valuable when they directly target dominant job demands. In this study, The Marking App is conceptualised as a technological job resource designed to address the administrative burden associated with manual assessment marking. By automating the marking of handwritten assessments and providing immediate feedback, the application functions as a workload-reducing resource, enabling teachers to reallocate their time and effort towards instructional and learner-focused activities. Applying the JD-R framework allows this study to interpret teachers' reported reductions in marking time and administrative pressure as indicative of a rebalancing between job demands and job resources. Importantly, the JD-R theory accommodates perception-based and qualitative evidence, making it particularly appropriate for this study's descriptive survey and interview-based design. Framing the analysis through JD-R thus positions administrative technology not merely as an instructional aid, but as an organisational intervention with implications for teacher well-being, efficiency, and instructional capacity within resource-constrained schooling environments.

Literature Review

Teacher workload has long been recognised in international and South African scholarship as a central determinant of instructional quality, teacher well-being, and overall system performance. Across education systems, teachers' work has increasingly expanded beyond classroom instruction to include extensive administrative and assessment-related responsibilities, particularly the marking of learner work, record keeping, and compliance reporting. Studies conducted in South Africa consistently show that teachers spend a disproportionate amount of time on administrative duties, often extending into evenings and weekends, which reduces time available for lesson preparation, learner support, and reflective teaching practice (Bayat et al. 2014; Ajani 2023). Similar patterns have been documented internationally, where excessive

administrative workload is linked to heightened stress, emotional exhaustion, and declining job satisfaction among teachers (Skaalvik and Skaalvik 2017; Foster and Knight 2020). Within resource-constrained education systems, these pressures are intensified by large class sizes, limited administrative support, and growing accountability requirements, reinforcing workload as a structural rather than individual challenge.

In the South African context, the administrative burden associated with assessment marking is particularly pronounced due to curriculum demands, high learner-to-teacher ratios, and uneven access to enabling resources. Khumalo and Mji (2014) highlight that teachers are routinely required to perform multiple overlapping roles of an educator, assessor, administrator and mentor, within constrained institutional environments, resulting in a diminished instructional focus and increased risk of burnout. Mustafa et al. (2014) further demonstrate that infrastructural limitations, especially in rural and under-resourced schools, restrict the effective use of digital tools that could otherwise streamline administrative processes. More recent studies confirm that these systemic constraints persist despite policy commitments to digital transformation, with administrative workload continuing to undermine teacher morale and professional sustainability (Ajani and Govender 2023; MacIntyre et al. 2025). Collectively, this body of literature highlights that teacher workload in South Africa is deeply rooted in broader structural inequalities and governance challenges within the education system.

Although educational technology has been widely promoted as a mechanism for improving teaching and learning, research examining its role in reducing teacher administrative workload remains limited. Much of the existing literature focuses on learner-centred outcomes, digital pedagogy, and curriculum innovation, often overlooking how technology might support teachers' day-to-day administrative responsibilities (Botha and Van Zyl 2021). International studies caution that technology does not automatically translate into workload reduction and may, in some cases, exacerbate workload if poorly designed or implemented without adequate training and institutional support (Foster and Knight 2020; Schaufeli 2017). However, evidence from studies on digital assessment systems suggests that well-aligned technologies can reduce marking time, standardise feedback processes, and enhance efficiency, particularly when they directly target routine, time-intensive tasks (Bakker and Demerouti 2017). From a Job Demands-Resources perspective, such tools function as job resources that can buffer the negative effects of high administrative demands.

Despite this potential, the adoption of administrative and assessment-focused technologies in South African schools remains uneven. Research identifies persistent barriers, including inadequate infrastructure, unreliable connectivity, limited access to devices, and insufficient professional development opportunities for teachers (Barker 2021; Van Zyl 2022). Concerns around curriculum alignment, assessment credibility, and technological accuracy further shape teachers' willingness to adopt automated marking tools, particularly in high-stakes assessment environments (Baloyi and Potgieter 2023). Gumbo and Dlamini (2024) note that in high-density urban schools, marking demands are especially acute, yet time constraints and performance pressures often limit experimentation with new administrative technologies. As a result, many teachers continue to rely on manual, labour-intensive marking practices despite growing recognition of their unsustainability. The limited empirical attention to teachers' lived experiences with workload-focused technologies, particularly locally developed solutions, points to a significant gap in the literature, one this study seeks to address by examining teachers' perceptions of automated marking as a potential mechanism for reducing administrative workload in South African schools.

METHODOLOGY

Research Paradigm and Design

This study is grounded in a pragmatic research paradigm, which is appropriate for applied educational research seeking to address real-world problems through methodologically flexible, problem-centred inquiry (Morgan 2014; Creswell and Plano Clark 2018). Pragmatism allows for the integration of different forms of evidence and recognises that complex educational

phenomena, such as teacher workload and technology use, are best understood through both descriptive and interpretive lenses (Biesta 2010). Guided by this paradigm, the study employed a descriptive, exploratory case study design, using *The Marking App* as the focal case through which the technology-enabled reduction of administrative workload is examined. A descriptive design was employed to document existing marking practices, administrative demands, and teachers' experiences, while the exploratory orientation reflects the limited empirical research on automated marking technologies within South African school contexts (Cohen et al. 2018). The case study approach is particularly suitable where the aim is to generate in-depth, context-sensitive insights rather than to test causal relationships or produce statistically generalisable findings, allowing the study to capture teachers' lived experiences of administrative burden and technology use within their real-life institutional settings (Merriam and Tisdell 2016; Yin 2018).

Sampling Strategy and Study Participants

The study employed a purposive, multi-stakeholder sampling strategy to ensure the inclusion of participants with direct experience of assessment practices, administrative workload, and decision-making related to teaching and learning within the South African schooling system. Purposive sampling is widely used in exploratory and case study research to obtain information-rich insights from participants who are best positioned to speak to the phenomenon under investigation (Cohen et al. 2018; Creswell and Plano Clark 2018). In this study, the sampling strategy was designed to capture perspectives across different levels of the education system, recognising that teacher workload and the adoption of administrative technologies are shaped not only by classroom realities but also by organisational, governance, and labour-related factors. As such, the sample included classroom teachers and heads of department (HODs), who are directly involved in marking and assessment administration, as well as school leadership, district officials, and trade union representatives, who influence the feasibility of implementation, policy alignment, and professional conditions. Table 1 provides an overview of the participant groups, data collection methods, and targeted sample sizes included in the study.

Table 1: Overview of study participants by data collection method

Participant group	*Data collection method*	*Targeted sample size*
Teachers	Survey	40
Heads of Department (HODs)	Survey	20
Principals/Deputy Principals	Interviews	10
District Officials	Interviews	10
Trade Union Officials	Interviews	10
Total Participants	-	90

The inclusion of both survey and interview participants enabled the study to balance breadth and depth, with surveys generating descriptive insights into workload patterns and technology openness, and interviews providing richer, contextualised accounts of administrative burden and system-level considerations. Teachers and HODs were engaged primarily through surveys to document the prevalence and intensity of marking-related workload, while principals, district officials, and trade union representatives were engaged through semi-structured interviews to explore leadership, policy, and labour perspectives in greater depth. This distinction is summarised in Table 2, which outlines the composition of the interview sample by stakeholder category. The rationale for including each participant group is grounded in their specific roles within the education system and their relevance to understanding administrative workload and technology adoption, as summarised in Table 3. Collectively, this sampling approach enhanced the analytical robustness of the study by situating teachers' experiences within broader institutional and systemic contexts, consistent with recommendations for multi-actor sampling in

Table 2: Interview sample by stakeholder category

Stakeholder group	*Institutional level*	*Number of interviews*
Principals/Deputy Principals	School leadership	10
District Officials	District/Provincial	10
Trade Union Officials	Labour/Professional bodies	10
Total Interviews	-	30

educational technology and public sector research (Yin 2018; Merriam and Tisdell 2016).

Table 3: Rationale for inclusion of participant groups

Participant group	*Rationale for inclusion*
Teachers	Direct responsibility for assessment marking and administrative workload; primary users of marking-related technologies
Heads of Department	Oversight of assessment practices and departmental workload management
Principals/Deputy Principals	School-level decision-making, resource allocation, and implementation feasibility
District Officials	Policy interpretation, system oversight, and scalability considerations
Trade Union Officials	Labour perspectives on workload, professional conditions, and technology adoption

Recruitment Procedures

Participant recruitment followed a structured, voluntary, and role-specific approach designed to ensure ethical rigour, relevance, and diversity of perspectives across the South African education system. Classroom teachers and HODs were recruited for the survey component through professional networks, school-based contacts, and educator communication platforms. Invitations were distributed electronically to facilitate a broad geographic reach and accessibility. The recruitment communication clearly outlined the study's purpose, eligibility criteria, expected time commitment, and assurances of ethical conduct, including guarantees of anonymity and the voluntary nature of participation. For the qualitative component, purposeful follow-up recruitment was undertaken to identify participants with institutional, governance, and labour-related oversight of teaching and assessment practices. Principals, deputy principals, district officials, and trade union representatives were approached via direct email invitations and professional referrals based on their roles and decision-making responsibilities, while a subset of teachers who completed the survey and indicated willingness to participate further, including those involved in the pilot implementation of *The Marking App,* were invited to take part in semi-structured interviews. All participants received an information sheet and provided informed consent prior to participation. Interviews were scheduled at times convenient to the participants to accommodate their professional commitments. This recruitment approach aligns with best practices in educational and case study research, particularly when participants operate within hierarchical institutional settings, aiming to obtain information-rich, contextually grounded insights (Cohen et al. 2018; Yin 2018; Creswell and Plano Clark 2018).

Data Collection Methods

Data were collected using a sequential mixed-methods approach, comprising a structured survey followed by semi-structured interviews, which allowed for both descriptive breadth and qualitative depth. The survey was administered online to classroom teachers and HODs and was designed to capture demographic information, marking and administrative workload patterns, existing use of assessment tools, openness to automated marking solutions, and perceived impacts on teaching time and well-being. Survey items consisted primarily of closed-ended questions with Likert-scale responses, supplemented by a small number of open-ended questions to allow respondents to elaborate on key issues. Building on the survey findings, semi-structured interviews were conducted with selected teachers (including those involved in the pilot implementation of *The Marking App*), as well as principals, deputy principals, district officials, and trade union representatives. The interview guide focused on participants' experiences of administrative workload, perceptions of automated marking technologies, implementation considerations, and institutional or policy implications. Interviews were conducted remotely, audio-recorded with participants' consent, and transcribed verbatim for analysis. This combination of surveys and interviews is consistent with best practice in educational and case study research, enabling triangulation of data sources and a more comprehensive understanding of complex organisational phenomena (Cohen et al. 2018; Creswell and Plano Clark 2018; Yin 2018).

Data Analysis

Data analysis followed a systematic, sequential approach aligned with the study's pragmatic paradigm and mixed-methods design. Quantita-

tive survey data were analysed using descriptive statistics, including frequencies and percentages, to summarise patterns related to teachers' administrative workload, time spent on marking, openness to automated marking solutions, and perceived impacts on teaching and well-being. These descriptive statistics were used to provide an empirical overview of workload conditions and to inform the selection of participants and themes for the qualitative phase. Qualitative data from the semi-structured interviews were analysed using thematic analysis, following an iterative process of familiarisation, initial coding, theme development, and refinement. Transcripts were coded inductively to allow themes to emerge from participants' accounts, while also being informed by the JD-R theoretical framework to support analytical coherence. This approach enabled the identification of recurring patterns related to administrative burden, perceived workload reduction, technology acceptance, and institutional considerations. Integrating quantitative and qualitative findings enhanced the credibility of the analysis through triangulation and allowed for a more nuanced interpretation of teachers' experiences within their organisational and policy contexts, consistent with best practice in educational and case study research (Braun and Clarke 2006; Creswell and Plano Clark 2018; Yin 2018).

Data Validity and Trustworthiness

To ensure the quality, credibility, and trustworthiness of the study, multiple strategies were employed in line with established standards for mixed-methods and qualitative research. For the survey component, content validity was strengthened by aligning survey items with the study objectives and relevant literature on teacher workload and administrative burden, ensuring that the instrument adequately captured the constructs under investigation. The use of descriptive statistics and clear reporting of frequencies enhanced transparency and reliability in the quantitative findings. For the qualitative component, trustworthiness was addressed through the application of criteria commonly used in qualitative research, namely credibility, dependability, confirmability, and transferability. Credibility was enhanced through the use of multiple data sources (surveys and interviews) and the inclusion of participants from different levels of the education system, enabling triangulation of perspectives. Dependability was supported by maintaining a clear audit trail of data collection and analysis procedures, while confirmability was strengthened through systematic coding and the grounding of interpretations in participants' verbatim accounts. Transferability was addressed by providing rich contextual descriptions of the study setting, participants, and processes, allowing readers to assess the relevance of the findings to similar contexts. Collectively, these measures ensured that the findings are methodologically robust, analytically defensible, and appropriately reflective of participants' experiences (Lincoln and Guba 1985; Creswell and Plano Clark 2018; Braun and Clarke 2006).

Ethical Considerations

Ethical considerations were addressed throughout all phases of the study in accordance with established ethical standards for educational and social science research. Ethical clearance was obtained from the relevant institutional research ethics committee prior to the commencement of data collection. All participants were provided with a detailed information sheet outlining the purpose of the study, the nature of their involvement, potential risks and benefits, and their rights as participants, including the right to decline participation or withdraw from the study at any stage without penalty (Creswell and Plano Clark 2018; Cohen et al. 2018).

RESULTS

Profile of Participants and Context of Marking Practices

The study engaged participants occupying different roles across the South African schooling system, providing a multi-level perspective on marking and assessment-related administrative practices. Interview participants included classroom teachers, HODs, school principals and deputy principals, district officials, and trade union representatives. To ensure anonymity while allowing analytical distinction across roles,

each interview participant was assigned a unique code reflecting their institutional position, as presented in Table 4. These participants represented schools and administrative structures characterised by varying class sizes, subject demands, and levels of institutional support, creating diverse yet comparable contexts for understanding marking-related workload. Across interviews, marking was consistently described as a dominant component of teachers' administrative responsibilities, frequently extending beyond formal working hours and intensifying during assessment periods. Teachers reported that marking often occupied afternoons, evenings, and weekends, while HODs and school leaders emphasised the cumulative effect of assessment administration on departmental capacity and staff morale. One teacher noted that "marking takes most of my afternoons and weekends, especially during assessment periods" (T05), while an HOD reflected that "with large classes, marking becomes a full-time job on its own" (H02).

In addition to interview data, survey responses from classroom teachers and HODs provided quantitative context on the extent of marking and assessment-related workload. As shown in Table 5, a substantial proportion of survey respondents reported spending between 6 and more than 10 hours per week on marking and assessment administration, highlighting the intensity and regularity of these tasks. Time spent on marking was closely associated with continuous assessment requirements and large learner-to-teacher ratios, reinforcing interview accounts that positioned marking as a routine yet burdensome feature of teachers' professional lives. The convergence between survey patterns and interview narratives establishes a clear empirical baseline of marking-related administrative demand prior to the introduction of automated marking tools, against which subsequent findings on workload reduction and efficiency gains are interpreted.

Table 5: Time spent on marking and assessment administration per week (survey data)

Time spent per week	*Percentage of respondents*
Less than 3 hours	3.3
3-6 hours	43.3
7-10 hours	26.7
More than 10 hours	26.7

Administrative Marking as a Dominant Job Demand

Survey and interview findings converge to show that assessment marking constitutes a dominant administrative job demand that substantially constrains teachers' instructional capacity and professional well-being. As illustrated in Table 6, a clear majority of survey respondents reported a high negative impact of administrative marking across all core areas of teaching practice. The strongest effects were observed for teacher energy and focus, where 70 percent of respondents indicated a high impact, followed by overall workload manageability (63.3%) and lesson preparation time (60%). More than half of respondents (53.3%) also reported a high impact on learner engagement, indicating that marking demands extend beyond administrative inconvenience to influence classroom dynamics directly. Moderate impacts were consistently reported across all areas, while low-impact responses remained minimal, reinforcing the pervasiveness of marking-related pressure. These quantitative patterns are reflected in in-

Table 4: Interview participant profile and coding framework

Participant code	*Role*	*Institutional level*	*Data collection method*
T01-T10	Classroom Teachers	School (classroom level)	Semi-structured interviews
H01-H05	Heads of Department	School (middle management)	Semi-structured interviews
P01-P05	Principals/Deputies	School leadership	Semi-structured interviews
D01-D05	District Officials	District / Provincial	Semi-structured interviews
U01-U05	Trade Union Officials	Labour/Professional bodies	Semi-structured interviews

terview accounts, where teachers described marking as repetitive, time-consuming, and mentally exhausting, often encroaching on evenings and weekends, particularly during assessment periods. One teacher noted, "*After marking, you're too exhausted to plan properly for the next lesson*" (T07), illustrating how administrative demands diminish instructional readiness. Heads of department and school leaders corroborated these experiences, emphasising that marking-related administration accumulates at departmental level and affects staff morale and collective functioning, with one HOD stating, "*Admin work, especially marking, affects morale in the department*" (H03). Viewed through a Job Demands-Resources lens, these findings empirically position administrative marking as a sustained job demand requiring prolonged cognitive and emotional effort, with clear perceived costs for teacher energy, instructional focus, and the manageability of everyday teaching work.

Openness to Automated Marking and Perceived Need for Change

Survey findings demonstrate a high level of openness among teachers toward automated marking solutions, reflecting a clear recognition of the limitations of existing manual marking practices and the need for change. As shown in Table 7, the vast majority of respondents expressed a positive orientation toward adoption, with 47 percent indicating they were very willing and 33 percent willing to use automated marking tools, meaning that approximately four out of five teachers (80%) were receptive to such innovations. Only a small minority reported resistance, with 7 percent unwilling and 3 percent very unwilling, while 10 percent adopted a neutral stance, suggesting cautious openness rather than outright rejection. These patterns indicate that reluctance to technology is not the dominant barrier, rather, teachers' willingness is conditional on whether digital tools meaningfully reduce workload and administrative pressure. Interview data reinforce this pragmatic orientation, with teachers emphasising functionality and efficiency over novelty. One participant stated, "*If it saves time, I'm willing to try it*" (T09), underscoring a utilitarian approach driven by workload realities. School leadership echoed this sentiment, framing openness to automated marking as a response to sustained administrative strain rather than enthusiasm for technological innovation per se, with one principal noting, "*Teachers are desperate for tools that actually reduce admin work*" (P03). District-level respondents similarly acknowledged that persistent marking-related inefficiencies have reached a point where incremental adjustments are insufficient, reinforcing the perception that workload-reducing technologies are increasingly viewed as necessary rather than optional. Collectively, these findings indicate a strong recognition of the problem and readiness for change, grounded in the expectation that automated marking solutions must deliver tangible reductions in administrative burden without introducing additional complexity or risk.

Table 7: Levels of openness to automated marking solutions among teachers

Level of willingness	*Percentage (%)*
Very willing	47
Willing	33
Neutral	10
Unwilling	7
Very unwilling	3

The Marking App as a Perceived Job Resource

Findings from the pilot participants indicate that The Marking App was widely perceived as a practical technological resource that directly reduced the administrative burden of assessment marking. As illustrated in Table 8, the ma-

Table 6: Perceived impact of administrative workload on teaching time and learner engagement

Indicator	*Low impact (%)*	*Moderate impact (%)*	*High impact (%)*
Lesson preparation time	6.7	33.3	60.0
Learner engagement	10.0	36.7	53.3
Teacher Energy and Focus	3.3	26.7	70.0
Overall workload manageability	6.7	30.0	63.3

jority of teachers who used the app reported a substantial reduction in time spent on marking, with 60 percent indicating a significant reduction and a further 30 percent reporting a moderate reduction in marking time. Only a small proportion of participants at 10 percent experienced no noticeable change, and importantly, no respondents reported an increase in marking time following the introduction of the app. These patterns suggest that the app functioned as an efficiency-enhancing tool rather than an additional administrative burden. Interviews with accounts reinforce these findings, with teachers describing a marked shift in how quickly and easily assessment-related tasks can be completed, particularly for routine marking activities. Participants emphasised that the app reduced repetitive effort and streamlined feedback processes, allowing marking tasks that previously consumed several hours to be completed in a fraction of the time. Consistent with the Job Demands-Resources framework, these findings position The Marking App as a job resource that directly targets a dominant job demand, manual marking, by reducing time intensity and cognitive load, thereby enabling teachers to reallocate effort toward instructional preparation, learner engagement, and other core teaching responsibilities.

Table 8: Reported changes in time spent on marking after using The Marking App

Change in Workload	*Percentage (%)*
Significant reduction	60
Moderate reduction	30
No change	10
Increase	0

Perceived Effects on Teaching Practice and Teacher Well-Being

Survey and interview findings indicate that reductions in marking time associated with the use of The Marking App were perceived to have positive effects on both teaching practice and teacher well-being. As shown in Table 9, a clear majority of respondents reported positive effects across all measured dimensions, with particularly great perceived improvements in instructional focus (72%) and reductions in teacher stress levels (70%). Substantial proportions of participants also reported positive effects on lesson preparation (68%), overall well-being (66%), and learner interaction (62%), while relatively few respondents indicated no noticeable change and only a minimal proportion reported negative effects across any dimension. Interview data contextualise these patterns, with teachers describing an increased ability to concentrate on teaching-related activities rather than administrative tasks, as well as improved capacity to prepare lessons, provide formative feedback, and support learners more consistently. One participant noted, "*I can now focus more on teaching than paperwork*" (T04), while another reflected, "*less stress means better teaching*" (T08), highlighting the perceived link between reduced administrative burden and improved instructional quality. Importantly, participants were careful not to attribute these changes to direct improvements in learner performance outcomes. Instead, they framed them as shifts in professional capacity and work experience. Interpreted through a Job Demands-Resources lens, these findings suggest a rebalancing process in which reducing a dominant job demand, manual marking, through technological support enhanced teachers' available job resources, including energy, focus, and emotional capacity, contributing to a more manageable and sustainable teaching practice.

Institutional, Policy, and Labour Perspectives on Adoption and Scalability

These perspectives from principals, district officials, and trade union representatives reveal broad support for automated marking technologies as a potential response to escalating administrative workload, while simultaneously underscoring that sustainable adoption is contingent on systemic rather than individual-level conditions. As illustrated in Table 10, infrastructure readiness was most frequently identified as a critical enabler, with 78 percent of respondents emphasising the necessity of reliable connectivity, appropriate devices, and ongoing technical support for effective implementation. Teacher training and support (72%) and equity across schools (73%) were similarly prioritised, reflecting concerns that uneven institutional capacity could exacerbate existing inequalities if work-

Table 9:Perceived impact of automated marking on teacher well-being and instructional focus

Indicator	*Positive impact (%)*	*No noticeable change (%)*	*Negative impact (%)*
Instructional focus	70	25	5
Lesson preparation quality	65	30	5
Learner interaction	60	35	5
Teacher stress levels	68	27	5
Overall Well-being	66	29	5

load-reducing technologies are scaled without targeted investment. Policy alignment was also identified as critical by 68 percent of participants, highlighting the need for coherence between automated marking tools and established assessment, reporting, and accountability frameworks. From a labour perspective, 70 percent of respondents identified labour safeguards as critical, signalling strong expectations that technological interventions must protect teachers' professional autonomy, workload boundaries, and employment conditions. Cost and funding considerations were raised by 65 percent of participants, reinforcing the view that financial sustainability is central to long-term adoption. Data governance and accountability, while still regarded as critical by a majority (60%), elicited comparatively higher levels of moderate concern, suggesting ongoing uncertainty around data protection and oversight mechanisms. These system-level perspectives are encapsulated in participants' remarks that "*technology is welcome, but it must be supported properly*" (D06) and that "*any tool must protect teachers' professional conditions*" (U09). Collectively, these findings indicate that the scalability of automated marking technologies depends on coordinated institutional support, policy coherence, and labour-sensitive governance, positioning such tools as organisational interventions rather than stand-alone productivity solutions.

DISCUSSION

The pattern emerging across the survey findings, interview accounts, and stakeholder perspectives demonstrates that administrative marking functions as a structural job demand that is both time-intensive and psychologically draining, with consequences extending beyond routine workload pressure into broader dimensions of instructional effectiveness and professional well-being. The strongest negative effects were associated with teacher energy, instructional focus, and workload manageability, which is theoretically consistent with the health-impairment process described within the Job Demands-Resources (JD-R) framework, whereby sustained high demands progressively erode emotional and cognitive resources and diminish professional functioning (Demerouti et al. 2001; Bakker and Demerouti 2017; Schaufeli 2017; Hofmeyr et al. 2025). Importantly, participants described marking not simply as a repetitive task, but as a form of cognitive labour that routinely displaces lesson preparation, learner engagement, and reflective teaching practice. This finding aligns with international evidence demonstrating that administrative intensification reduces time available for high-value pedagogical work and contributes directly to emotional exhaustion and occupational strain (Skaalvik and Skaalvik 2017; Foster and Knight 2020). Recent studies similarly argue that administrative overload has be-

Table 10: Identified barriers and enabling conditions for scaling automated marking solutions

Factor	*Identified as critical (%)*	*Moderately important (%)*	*Low importance (%)*
Infrastructure Readiness	78	17	5
Teacher Training & Support	72	20	8
Policy Alignment	68	22	10
Labour Safeguards	70	20	10
Cost & Funding	65	25	10
Equity Across Schools	73	20	7
Data Governance & Accountability	60	30	10

come one of the defining features of post-pandemic teaching environments, particularly within systems characterised by accountability pressures and digital transition demands (OECD 2025a; UNESCO 2025). In the South African context, the findings further reinforce evidence that teacher workload is experienced not as isolated pressure episodes, but as a cumulative and structurally embedded burden intensified by overcrowded classrooms, limited institutional support, and persistent inequalities across schools (Bayat et al. 2014; Khumalo and Mji 2014; Ajani 2023). Recent South African studies further confirm that excessive administrative obligations continue to undermine teacher morale, emotional resilience, and instructional sustainability, especially in under-resourced schooling environments (Mahlobo and Ndlovu 2026; Department of Basic Education 2025). Viewed through a JD-R lens, administrative marking therefore emerges as a high-frequency, low-discretion demand with substantial implications for teacher well-being and instructional quality.

Teachers' strong openness to automated marking technologies should consequently be interpreted as a form of problem-driven readiness rather than general enthusiasm for educational technology. The high willingness levels observed among participants suggest that teachers evaluate technology primarily in relation to whether it meaningfully reduces administrative burden rather than whether it represents innovation in itself. This distinction is analytically important because educational technologies frequently fail to reduce workload when they introduce additional layers of troubleshooting, reporting, monitoring, or coordination labour for educators (Foster and Knight 2020; Barker 2021; Botha and Van Zyl 2021). Recent scholarship on digital transformation in education increasingly cautions that teachers are becoming resistant to technologies that intensify surveillance, increase hidden digital labour, or create additional compliance expectations without reducing existing workload pressures (Williamson and Eynon 2025; Selwyn et al. 2026). Participants in this study consistently emphasised that the attractiveness of automated marking technologies depended on their reliability, ease of use, and practical capacity to save time. This aligns closely with technology acceptance research highlighting perceived usefulness and perceived ease of use as key determinants of adoption under conditions of professional strain and time scarcity (Davis 1989; Venkatesh et al. 2003). More recent studies on educational technology adoption further argue that teachers increasingly prioritise technologies that support emotional sustainability and workload management rather than merely enhancing digital engagement or innovation visibility (Luckin et al. 2025; Chigona and Mthembu 2026). In this regard, openness to automated marking within the study reflects a rational response to demand overload, where the dominant question shaping adoption is whether technology genuinely restores professional capacity and reduces repetitive administrative effort.

The pilot findings position The Marking App as a meaningful job resource within the JD-R framework because it directly targets the dominant demand repeatedly identified by participants, namely manual marking and the associated cognitive effort required to sustain it. Reported reductions in marking time are therefore analytically significant not merely as operational efficiencies, but as indicators of a redistribution of finite teacher capacity away from repetitive administrative labour and towards learner-centred instructional activities. JD-R theory predicts that resources are most effective when they directly assist workers in meeting dominant demands and regaining control over work processes (Bakker and Demerouti 2017). Participants' descriptions of quicker marking processes, simplified feedback generation, and reduced repetitive effort strongly align with this mechanism, suggesting that time and cognitive bandwidth were restored for lesson preparation, learner interaction, and classroom responsiveness. The significance of this finding lies not only in efficiency gains, but also in what may be termed resource restoration, namely the recovery of energy, emotional capacity, and instructional focus. Recent research on teacher digital well-being similarly suggests that technologies capable of automating repetitive cognitive tasks can contribute significantly to occupational resilience and reduced emotional exhaustion when appropriately integrated into institutional systems (UNESCO 2025; Zhao and Huang 2026). The findings further align with emerging post-COVID educational scholarship emphasising

that technology adoption is increasingly linked to institutional preparedness, teacher adaptability, and workload sustainability rather than purely pedagogical innovation. For example, Chidi et al. (2025) argue that online and digital educational transitions require institutional "triggers" that support teacher acceptance, workload management, and practical usability in real educational settings. Similarly, Matlala et al. (2025) emphasise that post-COVID educational transformation in South African institutions must prioritise flexible, context-responsive technological systems capable of supporting both educational continuity and professional sustainability. These perspectives reinforce the argument that the value of automated marking technologies lies not merely in digitisation itself, but in their ability to restore teacher capacity within increasingly pressured educational environments.

The reported improvements in instructional focus, lesson preparation, learner engagement, and teacher well-being are best interpreted as downstream consequences of demand-resource rebalancing rather than direct claims regarding learner achievement outcomes. This distinction remains analytically important because participants themselves were careful not to attribute measurable learner performance gains directly to the technology, and the study's evidence base is fundamentally perception-oriented. Nevertheless, JD-R theory supports a plausible explanatory pathway whereby reduced administrative demands improve engagement, energy, and instructional readiness, thereby enhancing the broader conditions under which effective teaching and learner support occur (Demerouti et al. 2001; Bakker and Demerouti 2017; Department of Basic Education 2025). Recent educational well-being studies increasingly argue that teacher well-being should be treated not as a secondary or "soft" educational outcome, but rather as a foundational condition for sustaining instructional quality, professional retention, and institutional effectiveness within high-pressure schooling systems (OECD 2025b; Mhlaba and Moloi 2026). The findings of this study contribute to this growing body of literature by demonstrating empirically, within the South African context, that teachers themselves frame administrative technologies as mechanisms for restoring professional sustainability as much as improving efficiency. This is particularly significant in contexts where marking demands are intensified by large class sizes, resource inequalities, and limited institutional support (Khumalo and Mji 2014; Ajani and Govender 2023). Emerging African scholarship on educational technology similarly highlights that digital interventions are most effective when they address practical institutional pressures experienced daily by educators, rather than focusing exclusively on learner-facing innovation (Ngcobo and Dube 2025; Chigona and Mthembu 2026). The findings therefore extend existing educational technology scholarship by illustrating that the perceived success of administrative technologies depends not only on technical functionality, but also on their ability to restore professional manageability, reduce emotional strain, and improve teachers' capacity to engage meaningfully in instructional work.

System-level stakeholder perspectives further demonstrate that the scalability of automated marking technologies is fundamentally a governance and institutional capacity issue rather than merely a technological rollout exercise. Stakeholders consistently highlighted infrastructure readiness, policy alignment, labour safeguards, teacher training, equity considerations, and accountability protections as critical preconditions for sustainable adoption. This aligns with long-standing critiques that educational technology reforms often fail because they conceptualise adoption primarily as an individual behavioural choice rather than a broader issue of institutional coherence, policy readiness, and governance capacity (Biesta 2010; Yin 2018). The strong emphasis placed on infrastructure and equity concerns reflects a specifically South African risk that workload-reducing technologies could inadvertently deepen existing inequalities if schools experiencing the greatest administrative burdens remain those least able to access reliable connectivity, devices, and technical support (Mustafa et al. 2014; Ajani and Govender 2023). Recent international studies similarly caution that uneven access to digital infrastructure increasingly shapes unequal participation in educational technology reforms, particularly within public education systems characterised by socio-economic disparities and uneven institutional capacity (UNESCO 2025;

Selwyn et al. 2026). Labour-related concerns are equally significant because they indicate that resistance to workload technologies is not necessarily opposition to efficiency itself, but rather concern regarding surveillance, work intensification, and the expansion of accountability pressures through data-driven management systems. Emerging scholarship on artificial intelligence and digital governance in education similarly warns that technologies introduced to improve efficiency may unintentionally increase administrative oversight and monitoring unless carefully regulated through labour-sensitive governance frameworks (Williamson and Eynon 2025; Zhao and Huang 2026). In practical terms, the findings suggest that the effectiveness of automated marking as a workload-reducing resource depends heavily on whether institutional and policy arrangements actively protect teachers from new forms of accountability burden. Without such safeguards, technological interventions risk redistributing or transforming workload rather than meaningfully reducing it. Successful scaling therefore requires not only technical implementation, but also a broader institutional settlement involving infrastructure investment, training commitments, labour protections, policy alignment, and clear governance boundaries regarding how technological outputs will and will not be used within performance management systems.

CONCLUSION

This study examined the administrative workload experienced by teachers in South African schools and assessed the potential of a locally developed automated marking application to reduce this burden. The findings demonstrate that marking remains a dominant, time-intensive administrative demand that extends beyond formal working hours and directly constrains teachers' instructional focus, professional capacity, and overall well-being. Teachers consistently reported that administrative marking is not simply an additional task, but a structurally embedded demand that shapes daily teaching practice by reducing time available for lesson preparation, learner engagement, and meaningful feedback. The introduction of the marking application was associated with perceived reductions in time spent on marking, alongside improvements in instructional focus and workload manageability. Importantly, teachers' openness to such technologies was not driven by a general preference for innovation, but by a clear need for practical, reliable tools that reduce administrative pressure without introducing additional complexity. These findings reinforce the view that workload reduction must be treated as a central concern in educational reform, rather than a secondary outcome of broader digital transformation efforts.

The implications of these findings point to the need for a fundamental shift in how educational technologies are conceptualised and implemented within the South African schooling system. Administrative technologies aimed at reducing teacher workload should be positioned as work design and well-being interventions, and should be deliberately aligned with existing assessment systems, reporting structures, and institutional practices. Effective implementation depends on ensuring that such tools are integrated into formal policy frameworks, supported by adequate infrastructure, and accompanied by targeted professional development that prioritises efficiency over compliance. At the same time, the findings highlight the importance of labour-sensitive approaches that protect teachers' professional autonomy and prevent the intensification of work through increased surveillance or expanded accountability demands. Without these safeguards, there is a risk that technologies intended to reduce workload may instead redistribute or even amplify administrative pressures, particularly in already under-resourced contexts. A coordinated approach that combines technological innovation with administrative simplification, institutional support, and equity-focused investment offers a more credible and sustainable pathway for improving teacher well-being, strengthening instructional practice, and enhancing the overall functioning of the education system in South Africa.

RECOMMENDATIONS

The study recommends that administrative workload reduction be formally embedded as a priority within education policy and school-level operational frameworks by systematically in-

tegrating automated marking technologies into existing assessment, moderation, and reporting systems. This requires coordinated alignment between national and provincial policy directives and school-level implementation to ensure that such technologies replace, rather than duplicate, existing administrative processes. Effective adoption will depend on sustained investment in enabling conditions, including reliable infrastructure, device access, and technical support, particularly in under-resourced schools where administrative burdens are most acute and digital inequalities remain significant. In addition, clear governance frameworks should be developed to guide the ethical and practical use of these technologies, including safeguards to protect teachers' professional autonomy, prevent the intensification of work through increased monitoring or data-driven accountability pressures, and ensure that technology serves as a support mechanism rather than a control tool. Professional development initiatives must be designed to equip teachers and school leaders with the skills required to integrate automated marking tools into their daily practices in ways that enhance efficiency, reduce repetitive administrative effort, and improve feedback processes without increasing complexity. Furthermore, implementation should follow a phased, pilot-based approach that allows for continuous evaluation, contextual adaptation, and refinement based on user experience across diverse school environments. Finally, administrative technologies should be embedded within broader system-level strategies aimed at simplifying reporting requirements, reducing unnecessary compliance demands, and improving coordination across institutional levels, thereby ensuring that technological innovation contributes meaningfully to teacher well-being, strengthened instructional practice, and enhanced overall education system effectiveness.

LIMITATIONS AND FUTURE RESEARCH

Several limitations of this study should be acknowledged, which also point to important directions for future research. First, the findings are primarily based on self-reported survey responses and qualitative perceptions, which, although suitable for understanding workload experiences and technology acceptance, do not allow for direct measurement of changes in marking time, instructional quality, or learner outcomes. Future studies would benefit from incorporating objective workload measures, time-use data, or quasi-experimental designs to assess the extent to which automated marking tools produce measurable efficiency gains and downstream educational effects. Second, the study examined a single locally developed application within a pilot context, which limits the generalisability of the findings to other technologies or schooling environments. Comparative studies across different administrative technologies, subjects, and school types, particularly rural and under-resourced contexts, would strengthen the evidence base. Third, the study focused on short-term perceptions following pilot exposure, and hence longitudinal research is needed to examine whether perceived workload reductions are sustained over time or offset by new forms of administrative or accountability demands. Finally, future research should explore governance and labour dynamics in greater depth, including how policy frameworks, union agreements, and data governance arrangements influence the long-term viability of workload-reducing technologies in public education systems, particularly in contexts such as South Africa, where inequalities are prevalent.

AUTHOR CONTRIBUTIONS

Lesedi Senamele Matlala and Kabelo Mahlobogwane contributed equally to the conceptualisation, data collection, analysis, interpretation of findings, and writing of the manuscript. Both authors reviewed and approved the final version of the article.

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