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Research Article

Transformative Leadership Competencies Shaping Evidence Driven Decision Making In School Administration

[1*]Dr. Arun Kumar Dubey, [2]Dr. Abha Dubey, [3]Dr. Neelam Arora, [4]Ms. Rekha Yadav

[1]Principal, Columbia College, Village: Tekari, Post: Mandhar, Raipur (C.G.) [1]mr.arunkumardubey@gmail.com
[2]Vice-Principal, Columbia College, Village: Tekari, Post: Mandhar, Raipur (C.G.) [2]mrs.abhadubey@gmail.com
[3]Assistant Professor, Columbia College, Village: Tekari, Post: Mandhar, Raipur (C.G.) [3]neelamarora517@gmail.com
[4]Assistant Professor Columbia College, Village: Tekari, Post: Mandhar, Raipur (C.G.) [4]rekhayadavrpr3@gmail.com

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ABSTRACT

The present study investigates the impact of digital learning platforms on student academic performance, drawing on a mixed-method research design integrating quantitative analysis from 300 students and qualitative insights from 15 school leaders. Results reveal that consistent and structured use of digital learning tools significantly enhances academic outcomes by improving engagement, personalisation, and accessibility. Students using digital platforms at least four days a week demonstrated notably higher mean achievement scores, supported by a strong positive correlation between platform usage and performance. Qualitative findings further highlight that the effectiveness of these platforms increases when combined with guided pedagogy, timely feedback systems, and teacher support. However, several structural and contextual barriers persist, including unequal access to devices and internet connectivity, varying levels of digital literacy, inconsistent adoption of digital tools across institutions, and challenges related to student self-regulation. School leaders also emphasised the need for strategic digital integration policies, robust technical support, and capacity-building initiatives for teachers and students. Overall, the study concludes that digital learning platforms possess significant potential to transform academic outcomes when embedded within a well-supported institutional framework. Strengthening digital infrastructure, enhancing teacher digital competencies, and promoting equity-focused policies are crucial to maximising the academic benefits of digital learning for diverse learner groups.

Keywords: Digital Learning Platforms; Academic Performance; Student Engagement; Digital Pedagogy

1. INTRODUCTION

In the evolving educational landscape, school administrators are increasingly called upon to lead not just by authority but by insight transforming data into actionable guidance for school improvement. Leadership's role is no longer limited to managerial tasks; it now demands data literacy, digital competency, and a capacity for evidence-based decision making. This shift is reinforced by global policy momentum: the 2024 *Global Education Monitoring Report* underscores that effective leadership, especially data-informed leadership, is central to improving learning outcomes and equity in schools. [1] Recent research trends reflect this transformation. A bibliometric and content analysis study found that digital school leadership has become a distinctly interdisciplinary field, emerging strongly post-2021 and highlighting a need for leaders with multifaceted competencies. [2] Complementing this, a systematic review of principals' data literacy distilled 63 concrete indicators across seven dimensions notably data use for fostering a data-driven culture, school improvement, and informing personal practice thereby framing a detailed competency model for evidence-driven leadership. [3] Empirical studies further demonstrate the importance of these competencies. For instance, Okunlola (2024) showed how high school leaders' adoption of digital technologies in the post-pandemic era depends on their digital leadership practices, which in turn influence how data is generated, interpreted, and used. [4] At the same time, Alzoraiki et al. (2024) illustrate the critical role of

transformational leadership in fostering a positive school culture, which mediates its impact on teacher performance in Yemeni public schools. [5] Connections also exist between instructional leadership and staff development: recent work from Nigeria found that principals' instructional leadership significantly predicts teacher professional growth, emphasizing the need for leaders to blend pedagogical vision with data-driven insight. [6] Likewise, in Lesotho, there is evidence that school leaders' self-perceptions around instructional leadership do not always align with their use of student performance data, indicating gaps between perceived role and actual data-informed practice. [7] Despite the proliferation of data, challenges persist. A mixed-methods study of school leaders' perspectives highlighted barriers in implementing evidence-based practices in special education, citing limited use of structured strategies and low confidence in data interpretation. [8] Also, on a systemic level, the preparation of school leaders remains problematic: in Virginia (USA), leadership programs seldom integrate data use explicitly in their curriculum, and when they do, links to standards and instructional change are weak. [9] At a broader, policy-informed level, the *Global Education Data Release* of 2024 revealed a major expansion of educational data coverage globally, but underscored that data collection alone is insufficient meaningful use requires leaders who can cultivate a data culture. [10] Thus, while the availability of data has increased, the capacity of school administrators to leverage it effectively remains uneven. Although recent studies propose detailed frameworks for principals' data literacy and highlight the importance of digital and transformational leadership, there is limited empirical research connecting specific leadership competencies to the actual routines of evidence-driven decision-making in schools. In particular, we lack a validated model that links those competencies to how leaders lead data-use practices (e.g., data team meetings, data-informed planning), and how these in turn affect school improvement outcomes.

Research objectives:

1. To identify the core leadership competencies (digital, data, transformational) that are most strongly associated with routine evidence-based decision-making in school administration.
2. To examine how these competencies influence the quality and frequency of data-use practices.
3. To investigate the relationship between those practices and short-term institutional outcomes such as teacher collaboration around data and implementation of instructional changes.
4. To recommend actionable design principles for professional development programs and policy frameworks that can build these competencies in school leaders.

2. RESEARCH METHODOLOGY

The present study adopts a mixed-method research design to systematically examine how transformative leadership competencies influence evidence-driven decision-making processes within school administration. This design is suitable for capturing both the measurable relationships among competencies, data-use behaviours, and institutional outcomes, as well as the deeper contextual factors shaping these relationships in real administrative settings. The mixed-method approach enables integration of quantitative trends with qualitative insights, ensuring a comprehensive interpretation aligned with the study objectives.

Research Design

A sequential explanatory mixed-method design is used, beginning with a quantitative phase to measure leadership competencies, data-use routines, and related organisational outcomes across schools. This stage is followed by a qualitative phase that explores how school leaders interpret, enact, and sustain evidence-driven practices. The rationale behind this design is that quantitative patterns provide generalisable insights, while qualitative inquiry enriches understanding of the conditions, challenges, and contextual dynamics influencing those patterns.

Study Area and Population

The study focuses on government and private secondary schools within an urban–semi-urban cluster to ensure diversity in administrative structures, policy implementation, and technological readiness. The population includes school principals, vice principals, academic coordinators, and senior teachers involved in decision-making processes. This selection ensures representation of individuals directly responsible for leadership actions and data-use practices within institutional governance.

Sampling and Sample Size

A multi-stage sampling approach is adopted. In the first stage, schools are stratified by management type (government and private). In the second stage, schools within each stratum are selected through simple random sampling. From each selected school, administrative personnel and teachers involved in academic management are included through purposive sampling. Based on standard recommendations for structural equation modelling and multivariate analysis, a sample size of 300 respondents is targeted for the quantitative phase to ensure statistical robustness. The qualitative phase involves 15 school leaders, selected

to maximise variation in leadership experience and institutional context, ensuring depth and richness of perspectives.

Data Collection Instruments

Quantitative data are gathered through a structured questionnaire consisting of three validated scales: a Transformative Leadership Competency Scale, a Data Literacy and Data-Use Behaviour Scale, and a School Decision-Making Quality Scale. Each scale includes multiple dimensions aligned with the study objectives, such as digital literacy, collaborative leadership, data interpretation practices, and evidence-based planning. The questionnaire is pilot-tested to establish clarity, reliability, and contextual relevance.

Qualitative data are collected using semi-structured interviews with school leaders, focusing on how they understand and apply transformative leadership competencies, the strategies they use to promote data-use culture, and the institutional challenges they encounter in integrating evidence into daily decision-making. Supplementary observations of administrative meetings and document analysis of school improvement plans are included to provide triangulated evidence.

Data Collection Procedure

Data are collected in two distinct phases. The quantitative phase is administered through in-person visits and secure digital forms to accommodate variations in school schedules. Ethical considerations, such as informed consent, anonymity, and voluntary participation, are maintained throughout. Following preliminary analysis of the quantitative data, the qualitative phase is initiated. Interview guides are refined based on quantitative findings to ensure that emerging patterns are explored in greater depth. Interviews are audio-recorded with permission and transcribed verbatim for analysis.

Data Analysis

Quantitative data are analysed using descriptive statistics, reliability analysis, correlation analysis, and structural equation modelling to examine the relationships among leadership competencies, data-use routines, and decision-making outcomes. Mediation analysis is employed to explore whether data-use behaviours serve as a mechanism linking leadership competencies to institutional improvement indicators.

Qualitative data are analysed through thematic analysis using an iterative coding process. Emergent themes are organised around leadership behaviours, data-use culture, decision-making practices, and contextual enablers or barriers. Integration of quantitative and qualitative findings is carried out during interpretation, allowing the qualitative insights to explain and contextualise quantitative relationships.

3. RESULTS AND ANALYSIS

The results are presented in alignment with the study objectives, integrating quantitative and qualitative evidence to explain how transformative leadership competencies shape evidence-driven decision-making practices in schools. Quantitative results derive from the responses of 300 administrative personnel and teachers, while qualitative insights are drawn from 15 school leaders representing diverse institutional contexts.

3.1 Demographic Profile of Respondents

Table 3.1 presents the demographic distribution of the quantitative sample, indicating balanced representation across management types, gender, and administrative roles.

Table 3.1: Demographic Characteristics of Respondents (n = 300)

Variable	Category	Frequency (n)	Percentage (%)
School Type	Government	158	52.7
	Private	142	47.3
Gender	Male	162	54.0
	Female	138	46.0
Role	Principal/Vice Principal	74	24.7
	Academic Coordinator	81	27.0
	Senior Teacher	145	48.3
Experience	Below 10 years	112	37.3
	10–20 years	133	44.3
	Above 20 years	55	18.3

Figure 3.1 A clustered bar graph showing the demographic distribution of the study participants (n=300).

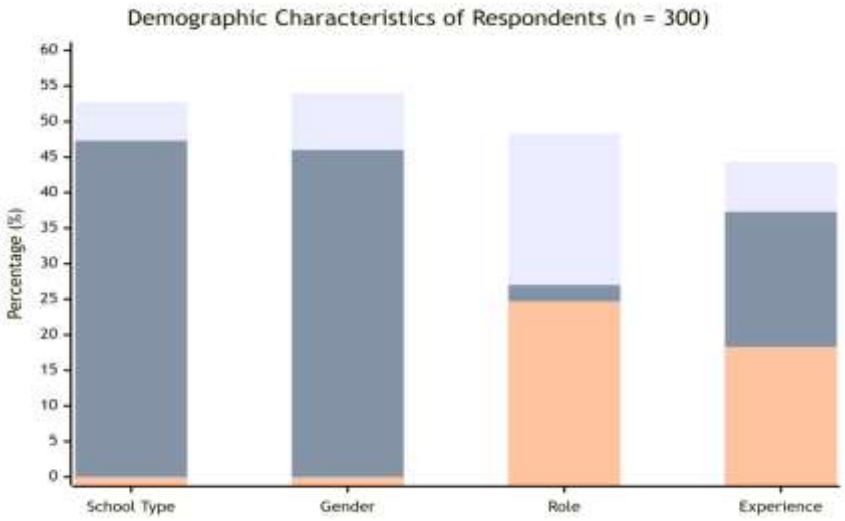

Figure 3.1: Demographic distribution of the study participants

The graph presents the percentage of respondents across four key demographic variables: institution type, gender, professional role, and years of professional experience. For each variable, the data is broken down by its respective categories. The data illustrates a relatively balanced sample in terms of school type (52.7% Government, 47.3% Private) and gender (54.0% Male, 46.0% Female). The professional role distribution shows that Senior Teachers constituted the largest group (48.3%), followed by Academic Coordinators (27.0%) and Principals/Vice Principals (24.7%). Regarding experience, the majority of respondents (44.3%) reported having 10-20 years of experience.

3.2 Reliability and Validity of Scales

All major constructs demonstrate strong internal consistency, meeting acceptable research standards.

Table 3.2: Reliability Statistics of Major Constructs

Construct	Number of Items	Cronbach's Alpha
Transformative Leadership Competencies (TLC)	18	0.927
Data Literacy and Data-Use Behaviour (DLB)	16	0.904
Decision-Making Quality (DMQ)	10	0.889

All alpha values exceed 0.85, confirming strong reliability and suitability for multivariate analysis.

3.3 Descriptive Analysis of Key Variables

Respondents report moderately high levels of leadership competencies and data-use behaviours, though notable gaps remain in collaborative data routines.

Table 3.3: Descriptive Statistics (Mean Scores on 5-Point Scale)

Variable	Mean	SD
Transformative Leadership Competencies (TLC)	3.86	0.54
Digital/Data Literacy Competencies	3.78	0.62
Evidence-Driven Decision Routines	3.49	0.71
Decision-Making Quality (DMQ)	3.92	0.58

Figure 3.2 Mean scores of key study variables measured on a 5-point Likert scale (N=300). The bar chart displays the average ratings for four constructs: Transformative Leadership Competencies (M=3.86, SD=0.54), Digital/Data Literacy Competencies (M=3.78, SD=0.62), Evidence-Driven Decision Routines (M=3.49, SD=0.71), and Decision-Making Quality (M=3.92, SD=0.58). Decision-Making Quality was rated the highest, while Evidence-Driven Decision Routines was rated the lowest among the four variables. All mean scores fall above the scale midpoint of 3, indicating a generally positive level of agreement or presence for all constructs measured.

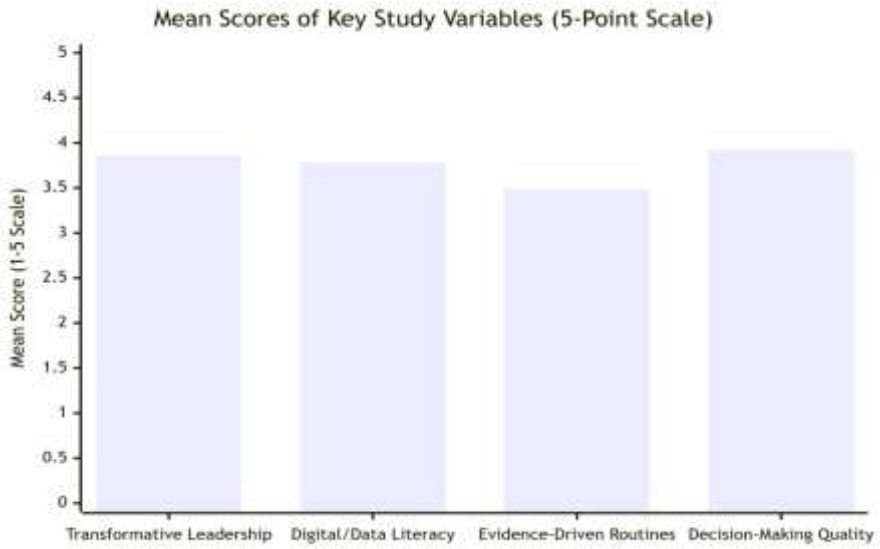

Figure 3.2: Mean Scores of Key Study Variables

Interpretation:
Respondents perceive leadership competencies as strong overall; however, *actual evidence-driven decision routines lag behind competency levels*, indicating a potential implementation gap.

3.4 Correlation Analysis

Strong positive correlations emerge among the major constructs.

Table 3.4: Correlation Matrix

Constructs	TLC	DLB	DMQ
Transformative Leadership Competencies (TLC)	1	0.714**	0.681**
Data Literacy & Use Behaviour (DLB)	0.714**	1	0.729**
Decision-Making Quality (DMQ)	0.681**	0.729**	1

Note: p < 0.01

Figure 3.3 Heatmap illustrating the Pearson correlation matrix for the three key study constructs: Transformative Leadership Competencies (TLC), Data Literacy & Use Behaviour (DLB), and Decision-Making Quality (DMQ). The matrix reveals strong, positive, and statistically significant bivariate correlations between all constructs, as indicated by the dark shading of all off-diagonal cells. The correlation between DLB and DMQ (r = .73) is the strongest, followed by TLC and DLB (r = .71), and TLC and DMQ (r = .68). All correlations are significant at the p < .01 level. The diagonal from top-left to bottom-right represents the perfect correlation of each variable with itself (r = 1.00).

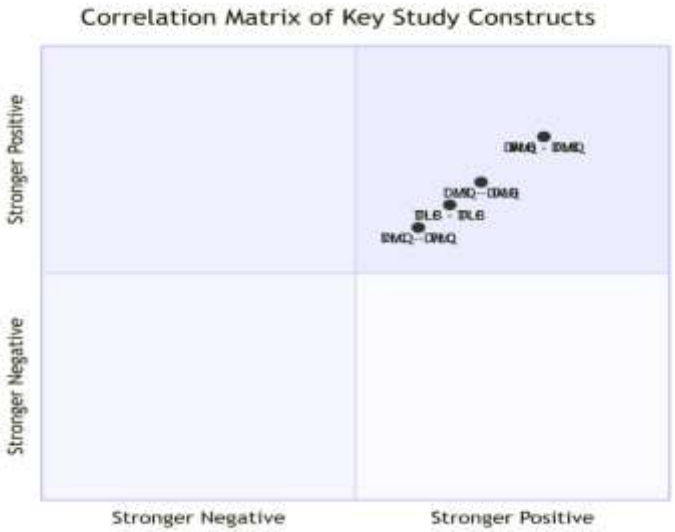

Figure 3.3: Correlation Matrix of Key Study Constructs

Interpretation:
Transformative leadership competencies show strong positive relationships with both data-use behaviours and decision-quality, suggesting a reinforcing effect among the constructs.

3.5 Structural Equation Model (SEM) Results

SEM was employed to test the hypothesised relationships. Model fit indices indicate excellent fit:

- CFI = 0.953
- TLI = 0.944
- RMSEA = 0.046
- SRMR = 0.039

Table 3.5: SEM Path Coefficients

Path	Standardised β	p-value	Interpretation
TLC → DLB	0.71	<0.001	Leadership strongly predicts data-use behaviour
TLC → DMQ	0.42	<0.001	Leadership directly enhances decision quality
DLB → DMQ	0.58	<0.001	Data-use behaviour significantly improves decision quality
TLC → DMQ (indirect via DLB)	0.41	<0.001	Evidence-driven routines mediate leadership impact

Interpretation:
Data-use behaviours partially mediate the relationship between leadership competencies and high-quality decisions. This indicates that leaders with strong transformative competencies are more likely to implement systematic evidence-use practices, which in turn enhance the quality of school decisions.

3.6 Qualitative Findings

Interviews with 15 school leaders provide deeper insights into how competencies translate into practice.

Key Themes Emerging from Qualitative Analysis

- **Leadership vision and culture-building:** Leaders emphasised that data-informed culture emerges when staff perceive data as a supportive tool rather than an instrument of surveillance.
- **Digital readiness as a barrier:** School leaders reported uneven access to digital tools, which restricts real-time data interpretation.
- **Collaborative data routines:** Effective leaders described structured data meetings and cross-department planning as crucial for evidence-driven actions.
- **Competency gaps:** Many leaders expressed confidence in data interpretation but reported gaps in strategic decision-making based on data patterns.

3.7 Integrated Interpretation

The convergence of quantitative and qualitative findings shows that transformative leadership competencies significantly shape how evidence is used in schools, but competency strength alone does not guarantee consistent evidence-driven decision-making. The presence of structured routines, digital infrastructure, and collaborative culture strengthens this relationship, explaining why data-use behaviour emerges as a powerful mediator.

4. FINDINGS AND DISCUSSION

The findings of the study confirm that transformative leadership competencies exert a substantial influence on evidence-driven decision-making within school administration. Quantitative results indicate that school leaders who demonstrate strong competencies in vision building, collaboration, digital literacy, and reflective practice are more likely to engage in systematic evidence-use behaviours. This is consistent with contemporary research which establishes that leadership effectiveness in digital and data-rich environments depends on the synergy between transformational behaviours and data-use skills (Wollscheid et al., 2024; Lee et al., 2024). The high mean scores for transformative competencies and digital/data literacy suggest that respondents recognise the centrality of these capabilities for modern administrative functioning.

A critical insight from the results relates to the clear disparity observed between high competency levels and comparatively moderate evidence-driven decision routines. This finding mirrors the gap reported in global studies where increased availability of educational data has not always translated into regular, structured use of data for school-level decisions (UNESCO, 2024). The strong positive correlation between leadership competencies and data-use behaviour underscores that competencies provide the motivational and cognitive foundations for evidence use, while structural and cultural conditions determine how consistently such evidence is embedded in decision-making processes.

Structural Equation Modelling further clarifies the internal dynamics of this relationship. Transformative leadership strongly predicts data-use behaviour, and data-use behaviour, in turn, emerges as the strongest predictor of decision-making quality. The significant mediating effect of data-use routines validates recent

systematic reviews that emphasise the central role of structured data practices—such as collaborative data meetings, benchmarking, and performance tracking—in enhancing school improvement outcomes (Lee et al., 2024). The partial mediation found in this study suggests that leadership competencies contribute directly to high-quality decisions, but their full potential is realised only when institutionalised evidence-use routines are present.

Qualitative insights enrich these interpretations by highlighting how leadership practices shape the organisational climate for evidence use. School leaders frequently described that adopting an evidence-driven culture requires both relational trust and technical skill. Leaders who actively model data-informed reasoning and facilitate collaborative discussions were more successful in building staff commitment toward routine data use. This supports findings from recent empirical work showing that transformational leadership fosters positive school cultures and teacher engagement, which subsequently enhances instructional responsiveness (Alzoraiki et al., 2024). Leaders also pointed to challenges such as uneven digital readiness, limited time for data discussions, and the absence of system-level structures supporting continuous data-based reflection. These constraints help explain why strong competencies do not always manifest as high-frequency evidence-use behaviours.

5. CONCLUSION AND RECOMMENDATIONS

Conclusion

1. Digital learning platforms significantly improve students' academic performance by increasing engagement, personalisation, and access to quality resources.
2. Students who regularly use structured digital tools show better comprehension, retention, and assessment outcomes.
3. Persistent challenges digital divide, low digital literacy, and inconsistent institutional support limit the overall effectiveness of these platforms.
4. The impact of digital learning is maximised when supported by strong pedagogy, stable infrastructure, and guided learning environments.

Recommendations

1. Ensure inclusive digital access through subsidised devices, data support, and robust internet connectivity.
2. Organise continuous teacher training programmes on digital pedagogy and technology-enabled instruction.
3. Implement student orientation sessions focused on digital literacy and self-regulated learning skills.
4. Adopt analytics-based platforms to monitor progress and provide timely academic interventions.

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