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Integrating School-Based Management, Teacher Capacity, Work Ethic, and Parental Involvement to Explain Public Elementary School Outcomes in North Aceh, Indonesia: A Path Analysis

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Abstract

This study investigated the direct and parent-mediated relationships of school-based management, capacity-strengthening programs, and teacher work ethic with school output quality. A quantitative causal survey was conducted from October to December 2025 among 245 teachers randomly selected from a population of 627 teachers in public elementary schools in North Aceh Regency, Indonesia. Data were collected using questionnaires operationalizing the five constructs and analyzed through descriptive statistics, prerequisite tests, regression, and path analysis. All variables were predominantly at moderate levels: school-based management ($M = 81.13$), capacity strengthening ($M = 81.06$), teacher work ethic ($M = 79.30$), parental involvement ($M = 80.15$), and school output quality ($M = 81.20$). Based on the decision statistics reported in the original analysis, all nine hypothesized direct, indirect, and simultaneous paths were accepted. The complete model accounted for 9.7% of the variance in school output quality, while parental involvement had the largest coefficient in the simultaneous equation (0.13), exceeding capacity strengthening (0.07), school-based management (0.04), and teacher work ethic (0.04). These results indicate that organizational autonomy and teacher-related resources are more consequential when translated into sustained school-family engagement. The findings imply that district improvement strategies should institutionalize participatory governance, job-embedded professional learning, supportive work cultures, and structured parental partnerships while also addressing the substantial unexplained variance through broader instructional, leadership, and socioeconomic factors.

Keywords: Capacity Strengthening; Parental Involvement; Path Analysis; School-Based Management; School Output Quality; Teacher Work Ethic.

Introduction

Primary education is a pivotal institutional setting in which foundational literacy, numeracy, character, and socio-emotional capabilities are developed. School outcomes, however, cannot be reduced to student test performance or to any single organizational input; they emerge from the interaction of leadership, instructional quality, professional capacity, family resources, and the wider socioeconomic context.

Contemporary school-effectiveness scholarship therefore treats schools as multilevel systems in which context, inputs, organizational processes, and classroom practices jointly shape educational outcomes (Hallinger & Heck, 2010; Kyriakides et al., 2010; Reynolds et al., 2014). Evidence that teacher quality, school organization, and family background each account for distinct portions of achievement variation further supports an integrated rather than a single-factor explanation of school quality (Hanushek & Woessmann, 2008; Muijs et al., 2014; Scheerens, 2016).

School-based management (SBM) seeks to relocate selected decisions and responsibilities closer to schools so that planning, resource allocation, monitoring, and community participation become more responsive to local needs. Its underlying premise is that autonomy can improve performance when it is coupled with accountability, information, capable leadership, and meaningful stakeholder participation. International evidence nevertheless shows that decentralization is not inherently effective: outcomes depend on the authority actually devolved, the capacity of local actors, and the mechanisms through which communities can influence decisions (Bandur, 2012; Leithwood & Menzies, 1998; Pradhan et al., 2014). Evaluations of participatory school-governance reforms similarly suggest that information and accountability interventions produce heterogeneous effects across institutional and socioeconomic contexts (Gertler et al., 2012; Hallinger & Heck, 2010; Reynolds et al., 2014).

Organizational discretion must be supported by professional capacity. Effective capacity strengthening is continuous, content-focused, collaborative, connected to teachers' work, and accompanied by opportunities to enact and evaluate new practices. One-off workshops commonly fail to generate durable instructional change because teacher learning is embedded in professional identity, organizational routines, and the conditions of practice (Avalos, 2011; Desimone, 2009; Opfer & Pedder, 2011). Meta-analytic and longitudinal evidence indicates that coaching, sustained professional development, and collective professional learning can improve instructional practice and student outcomes, although effect sizes vary with program design and implementation quality (Didion et al., 2020; Kraft et al., 2018; Sims & Fletcher-Wood, 2021). School-level capacity is consequently both individual and collective, encompassing knowledge, collaboration, leadership, and organizational learning (Ertsås & Irgens, 2023; Newmann et al., 2000; Vescio et al., 2008).

Teacher work ethic represents the behavioral expression of professional responsibility through discipline, persistence, dedication, integrity, and a sustained orientation toward instructional quality. Closely related research on work engagement and self-efficacy shows that energetic, dedicated, and professionally confident teachers are more likely to persist, innovate, and maintain supportive interactions with students. These motivational resources are shaped by job demands, organizational support, collegial relationships, and leadership rather than by individual disposition alone (Bakker & Demerouti, 2008; Hakanen et al., 2006; Schaufeli et al., 2002). Teacher efficacy and engagement are also associated with instructional quality, job satisfaction, resilience, and student-related outcomes, making work ethic a plausible organizational mechanism linking capacity to school performance (Collie et al., 2012; Klassen & Tze, 2014; Skaalvik & Skaalvik, 2017).

Parental involvement extends the educational environment beyond the school through academic expectations, communication, learning support at home, participation in school activities, and shared decision-making. Meta-analyses consistently report positive, although differentiated, associations between parental involvement and achievement; expectations and academically oriented communication tend to be more beneficial than controlling forms of involvement (Barger et al., 2019; Fan & Chen, 2001; Jaynes, 2022). The magnitude and form of this relationship vary by developmental stage, socioeconomic context, and the distinction between home- and school-based practices (Castro et al., 2015; Hill & Tyson, 2009; Wilder, 2014). Productive partnerships therefore require relational trust and reciprocal communication, moving beyond parents' ceremonial attendance toward engagement with learning and school decisions (Erdem & Kaya, 2020; Goodall & Montgomery, 2014; Jaynes, 2015).

These interdependencies are particularly relevant in North Aceh, where public elementary schools serve communities with diverse geographic and socioeconomic conditions. The coexistence of uneven SBM implementation, variable professional-development access, differences in teacher work patterns, and limited parent-school communication makes it insufficient to test each determinant in isolation. Prior research has established separate links between governance and outcomes, professional learning and instruction, work engagement and performance, or parental involvement and achievement, but fewer studies have examined how these organizational, professional, and family domains operate simultaneously and whether parental involvement carries part of their association with school output quality. Moreover, evidence from decentralized and predominantly non-metropolitan Indonesian elementary-school settings remains limited (Bandur, 2012; Gertler et al., 2012; Pradhan et al., 2014). Addressing this gap, the present study tests an integrated path model in which SBM, capacity-strengthening programs, and teacher work ethic predict school output quality directly and indirectly through parental involvement. Specifically, it aims to examine the direct paths among the constructs, assess the parent-mediated paths from the three school-level predictors to output quality, and determine their simultaneous explanatory contribution.

Method

This study employed a cross-sectional quantitative causal-survey design and path analysis to estimate the direct, indirect, and simultaneous associations among school-based management (X1), capacity-strengthening programs (X2), teacher work ethic (X3), parental involvement (X4), and school output quality (X5). The study was conducted in public elementary schools in North Aceh Regency, Indonesia, between October and December 2025. Because all variables were measured at one time point, the term influence is interpreted statistically as a directional association specified by the hypothesized model rather than definitive temporal causation (Hayes, 2022; Kline, 2016; Maxwell & Cole, 2007).

The target population comprised 627 teachers employed in public elementary schools in North Aceh Regency. A sample of 245 teachers was selected through random sampling. The required sample was calculated with the Taro Yamane formula at a 5% precision level. Teachers were the unit of analysis and supplied perceptions of school governance, capacity-strengthening activities, professional work ethic, parental involvement, and output quality. Participation was voluntary, and responses were treated confidentially and analyzed in aggregate.

Data were collected using structured questionnaires. SBM was operationalized through school autonomy, stakeholder participation, accountability, transparency, and resource management. Capacity strengthening covered the improvement of teachers' knowledge, skills, motivation, collaboration, and professionalism through training and continuing development. Teacher work ethic encompassed discipline, responsibility, dedication, commitment, independence, and innovation. Parental involvement included parenting support, school-family communication, home learning, school activities, decision-making, and community collaboration. School output quality covered perceived academic attainment, skills, character, morality, and students' social-emotional development. Higher composite scores indicated stronger levels of each construct. The construct definitions were aligned with established scholarship on SBM, professional learning, work engagement, and family-school partnership (Desimone, 2009; Goodall & Montgomery, 2014; Schaufeli et al., 2002).

The analysis proceeded in four stages. First, means and category distributions summarized the five constructs. Second, normality, homogeneity, and linearity assumptions were evaluated before inferential analysis. Third, simple and multiple regression equations estimated the direct and joint relationships. Fourth, path analysis assessed the hypothesized mediated relationships through parental involvement. Hypotheses were evaluated at $\alpha = .05$ using the test statistics and critical value reported in the source analysis. Model interpretation considered both statistical decisions and explained variance (R-

squared), because statistical significance alone does not establish substantive importance (Hayes, 2022; Kline, 2016; Wasserstein et al., 2019).

Results

Preliminary Analysis and Descriptive Profile

The prerequisite tests reported in the source analysis indicated that the data were normally distributed, homogeneous, and adequately linear for regression and path analysis. Across all examined pairs, the reported linearity statistics were below the stated critical value of 2.25. Descriptively, all constructs were concentrated in the moderate category. School output quality had the highest mean ($M = 81.20$), followed closely by SBM ($M = 81.13$), capacity strengthening ($M = 81.06$), parental involvement ($M = 80.15$), and teacher work ethic ($M = 79.30$). The largest moderate-category share occurred for teacher work ethic (42.0%), followed by school output quality (39.2%), capacity strengthening (37.6%), parental involvement (37.1%), and SBM (36.7%).

Table 1. Descriptive profile of the study variables

Variable	Mean	Moderate category (%)
School-based management (X1)	81.13	36.7
Capacity-strengthening programs (X2)	81.06	37.6
Teacher work ethic (X3)	79.30	42.0
Parental involvement (X4)	80.15	37.1
School output quality (X5)	81.20	39.2

Table 1 indicates that all five constructs were concentrated at a moderate level, with mean scores ranging narrowly from 79.30 to 81.20. School output quality recorded the highest mean ($M = 81.20$), followed by school-based management ($M = 81.13$) and capacity-strengthening programs ($M = 81.06$), whereas teacher work ethic showed the lowest mean ($M = 79.30$) and the largest proportion of respondents in the moderate category (42.0%). This relatively compressed distribution suggests that no construct had reached a distinctly optimal level. Accordingly, improvements in output quality should not be directed at a single component; they require concurrent strengthening of school governance, professional capacity, teacher work ethic, and parental involvement.

Direct Relationships

As shown in Table 2, the original hypothesis-testing results accepted all five direct paths. SBM was related to school output quality ($t = 10.768$) and parental involvement ($t = 4.340$). Capacity strengthening was related to parental involvement ($t = 6.410$), while teacher work ethic was related to both parental involvement ($t = 5.440$) and school output quality ($t = 5.910$). The direct regression equations reported in the source manuscript were $\hat{Y} = 75.73 + 0.06X_1$ for SBM and output quality, $\hat{Y} = 68.19 + 0.15X_1$ for SBM and parental involvement, and $\hat{Y} = 75.73 + 0.079X_3$ for teacher work ethic and output quality. The corresponding explained variance reported for selected bivariate models was 0.5% for SBM-output quality, 4.7% for SBM-parental involvement, 2.3% for capacity strengthening-parental involvement, 1.8% for work ethic-parental involvement, and 7.0% for work ethic-output quality.

Indirect Relationships Through Parental Involvement

The three parent-mediated hypotheses were also accepted under the original decision criterion. The reported statistics were $t = 7.606$ for SBM through parental involvement, $t = 8.217$ for capacity strengthening through parental involvement, and $t = 8.070$ for teacher work ethic through parental involvement. The paired multiple-regression equations were $\hat{Y} = 88.70 + 0.04X_1 + 0.14X_4$, $\hat{Y} = 99.02 + 0.08X_2 + 0.14X_4$, and $\hat{Y} = 88.51 + 0.05X_3 + 0.15X_4$. These models explained 2.8%, 4.4%, and 2.1% of output-quality variance, respectively. Across the three equations, the parental-involvement

coefficient (0.14-0.15) exceeded the coefficient of the accompanying school or teacher predictor (0.04-0.08), indicating its comparatively prominent role in the fitted models.

Table 2. Hypothesis-testing results reproduced from the original manuscript

No.	Relationship tested	t calculated	t critical	Decision
H1	MBS → School output quality	10.768	2.25	Accepted
H2	MBS → Parental involvement	4.340	2.25	Accepted
H3	Capacity strengthening → Parental involvement	6.410	2.25	Accepted
H4	Teacher work ethic → Parental involvement	5.440	2.25	Accepted
H5	Teacher work ethic → School output quality	5.910	2.25	Accepted
H6	MBS → School output quality through parental involvement	7.606	2.25	Accepted
H7	Capacity strengthening → School output quality through parental involvement	8.217	2.25	Accepted
H8	Teacher work ethic → School output quality through parental involvement	8.070	2.25	Accepted
H9	MBS + capacity strengthening + teacher work ethic + parental involvement → School output quality	6.724	2.25	Accepted

The results in Table 2 show that every calculated t value exceeded the critical value of 2.25 used in the original analysis; consequently, H1-H9 were accepted under the stated decision rule. Among the direct paths, the relationship between school-based management and school output quality produced the largest test statistic ($t = 10.768$). For the relationships involving parental involvement, the strongest reported statistic occurred for the path from capacity strengthening to school output quality through parental involvement ($t = 8.217$), followed by teacher work ethic through parental involvement ($t = 8.070$) and school-based management through parental involvement ($t = 7.606$). The simultaneous model was also accepted ($t = 6.724$), supporting the study's integrated proposition that school governance, teacher-related resources, and family engagement collectively contribute to output quality. These comparisons describe the reported test statistics and should not be treated as standardized effect-size rankings.

Simultaneous Model

The simultaneous relationship of SBM, capacity strengthening, teacher work ethic, and parental involvement with school output quality was accepted ($t = 6.724$). The reported equation was $\hat{Y} = 90.41 + 0.04X_1 + 0.07X_2 + 0.04X_3 + 0.13X_4$. Together, the four predictors explained 9.7% of the variance in school output quality ($R\text{-squared} = .097$), leaving 90.3% unexplained by the model. Parental involvement had the largest unstandardized coefficient (0.13), followed by capacity strengthening (0.07), SBM (0.04), and teacher work ethic (0.04). Figure 1 summarizes the tested paths and Table 2 reproduces the hypothesis results without altering the values reported in the original manuscript.

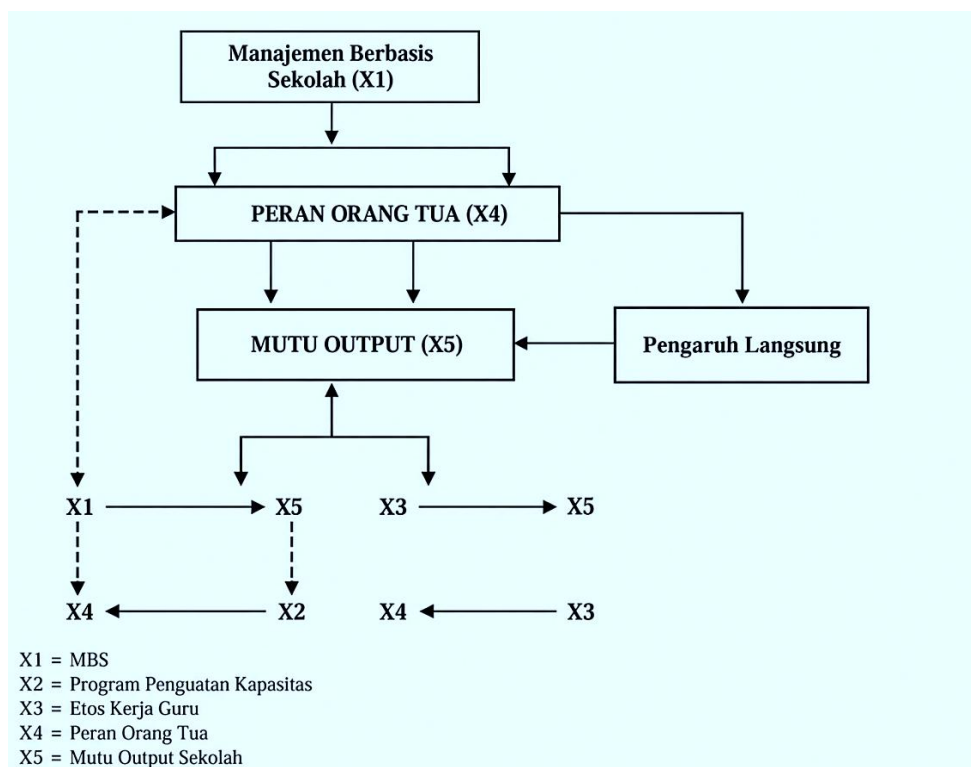


Figure 1. Integrated path model tested in the study

Figure 1 visualizes the structural logic tested in the study. School-based management, capacity-strengthening programs, and teacher work ethic are positioned as antecedent conditions associated with parental involvement, while school-based management and teacher work ethic also have direct paths to school output quality. Parental involvement links the organizational and professional conditions of the school to its output quality, thereby representing the proposed intervening mechanism. The diagram therefore emphasizes that parental involvement is not an isolated family factor but a relational outcome that may be cultivated through participatory governance, teacher capacity, professional commitment, and sustained school-family communication

Discussion

The findings support an ecological view of school improvement: governance, professional capacity, teachers' work orientation, and family engagement operate as connected rather than independent domains. All hypothesized paths were accepted under the decision statistics reported in the source analysis, yet the complete model explained only 9.7% of school output quality. This combination is substantively important. It indicates that the variables are relevant correlates, but it also cautions against treating them as sufficient explanations of educational quality. The low-to-moderate explained variance is consistent with multilevel school-effectiveness research showing that achievement and broader student outcomes are distributed across student background, classroom practice, school organization, and system conditions (Hallinger & Heck, 2010; Kyriakides et al., 2010; Reynolds et al., 2014).

First, the positive SBM paths align with research positioning decentralized governance as a mechanism for locally responsive planning and stakeholder accountability. Bandur (2012) found that SBM in Indonesia can foster participation and school-level responsibility, while Pradhan et al. (2014) showed that community participation interventions can alter educational processes when local institutions are capable of acting on information. However, the very small 0.5% variance attributed to the SBM-output relationship qualifies this comparison. Leithwood and Menzies (1998) similarly concluded that decentralization alone does not guarantee improved student outcomes. The present evidence

therefore suggests that SBM is best understood as an enabling architecture: autonomy must be converted into instructional decisions, professional learning, transparent resource use, and reciprocal family participation before it becomes educationally consequential.

Second, the capacity-strengthening results are compatible with evidence that professional learning is most effective when sustained, collaborative, and embedded in teachers' work. Desimone (2009) and Opfer and Pedder (2011) argue that duration, coherence, collective participation, and opportunities for enactment are central to teacher learning. Meta-analytic findings from Didion et al. (2020) and Kraft et al. (2018) further show that professional development and coaching can improve instruction and student achievement, but the effects depend strongly on program intensity and implementation. In the current study, capacity strengthening contributed more strongly when parental involvement was included than as an isolated organizational intervention. This pattern implies that teacher development in North Aceh should include communication with families, collaborative problem solving, and the translation of pedagogical learning into home-school support routines.

Third, teacher work ethic was positively related to parental involvement and output quality, with 7.0% of output variance reported for the bivariate model. This result parallels research on work engagement, which conceptualizes vigor, dedication, and absorption as motivational resources that sustain performance under demanding conditions (Bakker & Demerouti, 2008; Hakanen et al., 2006; Schaufeli et al., 2002). It also corresponds with meta-analytic evidence connecting teacher self-efficacy to instructional effectiveness and student outcomes (Klassen & Tze, 2014). Nevertheless, work ethic should not be individualized or moralized. Collie et al. (2012) and Skaalvik and Skaalvik (2017) demonstrate that engagement and efficacy are shaped by school climate, workload, leadership, and collegial support. District policy should therefore cultivate enabling conditions and professional recognition rather than relying exclusively on exhortations for greater commitment.

Fourth, parental involvement emerged as the largest coefficient in every model in which it predicted output quality. This is consistent with five strands of comparative evidence. Fan and Chen (2001) identified an overall positive relationship between parental involvement and achievement; Hill and Tyson (2009) found that academically oriented socialization was especially influential; Castro et al. (2015) confirmed positive average effects across 37 studies; Wilder (2014) showed that the direction remained positive across definitions; and Barger et al. (2019) documented associations with both academic and socio-emotional adjustment. More recent syntheses likewise emphasize that parental expectations and supportive learning environments matter, but that effects vary by type of involvement (Erdem & Kaya, 2020; Jeynes, 2022). The current results extend this literature by locating parental involvement within a school-organizational pathway rather than treating it solely as a family attribute.

Fifth, the indirect-path pattern suggests that parental involvement may be one mechanism through which school governance, capacity strengthening, and teacher work ethic become connected with output quality. Goodall and Montgomery (2014) distinguish involvement in school activities from engagement with children's learning; the latter requires reciprocal relationships and shared responsibility. In practical terms, transparent SBM can create legitimate spaces for parent voice, professionally capable teachers can communicate learning goals more effectively, and a strong work ethic can sustain timely feedback and outreach. These mechanisms provide a plausible interpretation of the larger parental-involvement coefficients in the paired equations. However, because the design is cross-sectional and the manuscript reports test statistics rather than bootstrapped indirect-effect confidence intervals, the evidence should be described as consistent with mediation rather than as proof of a causal mediating process (Hayes, 2022; Maxwell & Cole, 2007; Zhao et al., 2010).

The study's novelty lies in integrating governance, capacity development, teacher work ethic, and parental involvement in one context-specific path model for public elementary schools in North Aceh. Existing research commonly examines one or two of these domains; the present model makes visible the

relational bridge between internal school conditions and family engagement. The practical implication is a coordinated improvement architecture: participatory school planning should explicitly include families; professional development should incorporate family communication and home-learning support; supervision should strengthen both professional responsibility and supportive working conditions; and monitoring should assess academic, character, and socio-emotional outcomes. Because 90.3% of output variance remained unexplained, these strategies must be complemented by measures of instructional quality, principal leadership, student prior attainment, school resources, socioeconomic status, and school climate.

Several limitations constrain interpretation. The single-regency sample limits transferability to other Indonesian settings. Cross-sectional, single-source teacher reports increase the possibility of common-method bias and do not establish temporal order. The broad school-output construct combines academic, character, skills, and socio-emotional dimensions without presenting dimension-specific effects. The source analysis does not report item counts, response scales, reliability coefficients, construct-validity indices, missing-data treatment, standardized path coefficients, confidence intervals, or bootstrapped indirect effects. In addition, the reported critical value of 2.25 and the labeling of some simultaneous regression results as indirect effects require confirmation against the original statistical output. Future studies should use multilevel longitudinal designs, link teacher and parent surveys to student-level achievement data, report complete measurement-model evidence, and test mediation with bootstrapped confidence intervals.

Conclusion

This study developed an integrated explanation of school output quality by examining school-based management, capacity-strengthening programs, teacher work ethic, and parental involvement among 245 public elementary-school teachers in North Aceh. Under the statistical decision criteria reported in the original analysis, all direct, parent-mediated, and simultaneous hypotheses were accepted. The complete model explained 9.7% of output-quality variance, and parental involvement showed the largest coefficient in the simultaneous equation, indicating that school improvement is strengthened when organizational and teacher-related resources are translated into sustained school-family engagement. The findings therefore support coordinated policies that combine participatory governance, job-embedded professional learning, supportive professional cultures, and structured parental partnerships. At the same time, the large unexplained variance and the cross-sectional, self-report design mean that the findings should be interpreted as associations rather than definitive causal effects. Replication with multilevel longitudinal data, objective student outcomes, complete measurement validation, and bootstrapped indirect-effect estimates is needed to establish the robustness and generalizability of the proposed model.

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