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TEACHER COMPETENCE AND SCHOOL CULTURE IN DIGITAL CHARACTER EDUCATION: EVIDENCE FROM AN INDONESIAN SECONDARY SCHOOL

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ABSTRACT

This study examines character education management in the digital era by positioning teacher competence and school culture as central mechanisms associated with student character. A quantitative survey was conducted with 135 respondents at SMP Plus Latansa Demak, including teachers, principals, administrative staff, students, and parents. The model was analyzed using Partial Least Squares Structural Equation Modeling in SEMinR with 1,000 bootstrap resamples. Internal consistency was acceptable to strong, with Cronbach's alpha values of 0.7994-0.8821 and outer loadings of 0.7618-0.9085. Character education management was positively related to teacher competence (β=0.6117), school culture was positively related to teacher competence (β=0.3824), and teacher competence was positively related to student character (β=1.2669). However, the direct relationship between character education management and student character was negative (β=-0.2896). HTMT values of 1.1008-1.1824 and very high FCVIF values indicate serious discriminant validity and collinearity concerns. Therefore, the structural findings should be interpreted cautiously. The study highlights the need for more distinct construct measurement, multi-informant designs, and sustained teacher competence development within a digitally supportive school culture.
Keywords: character education; teacher competence; school culture; digital era; PLS-SEM

INTRODUCTION

Digital transformation has changed how schools organize learning, communicate norms, and build relationships among teachers, students, families, and school leaders. Character education therefore no longer operates only through face-to-face instruction or formal school routines. It also develops through digital communication, platform-based learning, online collaboration, and students' daily participation in digital environments. Recent scholarship frames teacher digital competence as a multidimensional capacity that combines technical skill, pedagogical judgment, ethical awareness, and the ability to design meaningful digital learning experiences (Falloon, 2020; Cabero-Almenara et al., 2020; Howard et al., 2021). More recent studies also show that teachers' digital competence depends on professional learning, school support, self-efficacy, collaboration, and institutional conditions rather than technology access alone (Dai, 2023; Chiu et al., 2024; Claro et al., 2024; Suzer & Koc, 2024).

This shift is important for character education because students increasingly encounter moral decisions in digitally mediated settings. Digital citizenship research emphasizes responsibility, critical judgment, respectful interaction, privacy, safety,

participation, and ethical use of information as educational outcomes that schools must deliberately cultivate (Tangül & Soykan, 2021; Villar-Onrubia et al., 2022; Örtegren, 2024). Indonesian evidence also shows that teachers and students do not automatically reach the same level of digital citizenship merely because digital technology is widely used (Ananto & Ningsih, 2023). This distinction matters. Technology can expand opportunities for collaborative learning and reflection, but it can also reproduce weak norms, fragmented attention, and uncritical participation when schools lack coherent educational guidance. International studies similarly show that digital citizenship education becomes more effective when it is integrated into curriculum, teacher practice, and school-level strategies rather than treated as a stand-alone topic (Alenezi & Alfaleh, 2024).

Teacher competence is a key mechanism in this process. Contemporary competence frameworks move beyond the ability to operate digital tools and include content creation, information management, pedagogical design, assessment, communication, professional engagement, and learner empowerment (Gümüş & Kukul, 2023; Aydin et al., 2024). Teacher competence also shapes how technology is translated into classroom norms. A technically capable teacher who cannot model fairness, responsibility, empathy, or disciplined learning may not strengthen student character. Conversely, research on effective teacher personality shows that role modelling, respect, discipline, patience, fairness, and relational competence are central to character formation (Lukman et al., 2021). Evidence from Indonesian Islamic education also links teacher quality and pedagogical competence to stronger student learning outcomes, reinforcing the importance of teachers as the operational bridge between school policy and student experience (Rokimin & Manaf, 2024).

School culture forms the second institutional mechanism. Culture represents shared values, routines, expectations, relationships, and practices that make character education visible in everyday school life. Indonesian studies show that school culture can strengthen character through habituation, role modelling, collaboration, supervision, and consistent school routines (Rahayu et al., 2022; Juliana et al., 2023). Character assessment research also indicates that student character should be connected to observable school practices rather than abstract moral statements alone (Hidayah & Setiawati, 2022). In digital settings, culture must also govern how technology is used. Research on digital-based school culture shows that sustainable technology integration requires shared vision, coordinated change management, digital skill development, and organizational support (Purnomo et al., 2024). Collaboration at school level has also been linked to more effective student-centered practices during digitally mediated teaching (Tammets et al., 2024), while digital school culture has been connected to broader literacy and adaptive learning practices (Litina & Rubene, 2024).

Character education management should therefore be understood as an organizational process rather than a collection of isolated moral activities. It involves planning, implementation, coordination, supervision, evaluation, leadership, and the alignment of curriculum with school values. Studies in Islamic education emphasize that character education becomes stronger when school leadership, teacher practice, parents, and community actors work within a coherent management system (Idham et al., 2024). Leadership research also links collaborative school management with students' emotional development and character-related outcomes (Rokimin et al., 2025). School-based management can strengthen guidance and counseling when stakeholders participate

transparently and share responsibility for student development (Rosidi & Khuriyah, 2024). These findings suggest that formal character education management may influence student outcomes partly through the competence of teachers who enact programs and through the school culture that sustains them.

The digital context adds another layer. Digital leadership and artificial intelligence are reshaping institutional expectations about teacher competence, quality, equity, and educational decision making (Rokimin et al., 2026). Interactive learning platforms can improve engagement and learning outcomes when teachers align the technology with pedagogical goals, as shown in research using Educaplay in Indonesian secondary education (Setianingsih et al., 2025). Cloud-based collaboration can also support deeper learning when digital tools are embedded within structured pedagogical processes and a culture of collaboration (Mumtaz et al., 2025). At the same time, teacher attitudes toward emerging technologies such as artificial intelligence are associated with their digital competence (Galindo-Domínguez et al., 2024), while nationwide evidence indicates that teacher digital competence remains uneven and is affected by professional and contextual factors (Althubyani, 2024). These developments strengthen the case for studying character education through an integrated model of management, competence, and culture.

Despite this growing literature, three gaps remain. First, many studies examine teacher competence, school culture, digital citizenship, or character education separately. This makes it difficult to understand how formal character education management is translated into student outcomes through teachers and school culture. Second, studies often emphasize structural significance while giving less attention to whether the measured constructs are empirically distinct. This is critical in education research because concepts such as school culture, teacher competence, character management, and student character may share similar value-oriented wording. Third, the Indonesian secondary school context needs empirical models that connect organizational management with teacher-level and student-level outcomes while also acknowledging the methodological risks of single-survey designs.

This study addresses these gaps by examining a PLS-SEM model that links Character Education Management, School Culture, Teacher Competence, and Student Character at SMP Plus Latansa Demak. The study tests whether character education management is associated with student character, whether character education management is associated with teacher competence, whether school culture is associated with teacher competence, and whether teacher competence is associated with student character. Rather than treating high reliability and large R-square values as sufficient evidence of model quality, the study also re-examines convergent validity, discriminant validity, and common-method or collinearity diagnostics. This measurement-focused interpretation is important because a statistically strong structural model can still produce misleading substantive conclusions when latent constructs overlap.

The expected contribution is both substantive and methodological. Substantively, the model clarifies the role of teacher competence as a central mechanism connecting school-level management and culture with student character in a digital environment. Methodologically, the study demonstrates why measurement distinctiveness must be evaluated before strong causal interpretations are made. Recent PLS-SEM guidance stresses that reliability, convergent validity, discriminant validity, structural paths, and predictive

interpretation should be assessed as an integrated sequence rather than as separate formalities (Hair et al., 2020; Hair & Alamer, 2022). This approach provides a stronger basis for designing future character education research and for improving school management practice.

RESEARCH METHOD

This study used a quantitative cross-sectional survey design. The empirical setting was SMP Plus Latansa Demak, Indonesia. The study population included stakeholders directly involved in school life: teachers, principals, administrative staff, students, and parents. Purposive sampling was used to obtain respondents who could evaluate the school's character education practices, teacher competence, school culture, and student character. After screening for complete responses, 135 questionnaires were retained for analysis. The reported composition was 35% teachers, 25% principals, 20% administrative staff, 15% students, and 5% parents. This heterogeneous respondent structure was intended to capture the school ecosystem, but it also requires caution because different stakeholder groups may interpret the same questionnaire items from different positions.

Data were collected through a structured closed-ended questionnaire using a five-point Likert scale. The measurement model contained four latent constructs. Character Education Management used four indicators (CEM1-CEM4). Teacher Competence used four indicators (TC1-TC4). School Culture used three indicators (SC1-SC3). Student Character used four indicators (SCH1-SCH4). In the study framework, teacher competence represents the pedagogical, professional, social, and personal capabilities through which teachers translate educational goals into practice. School culture captures shared norms, values, routines, collaboration, and practices that support character formation. Student character represents positive behavioral and value-oriented outcomes such as responsibility, integrity, cooperation, and respectful conduct. Character Education Management represents the organized planning, implementation, coordination, and evaluation of school character education.

The analysis used Partial Least Squares Structural Equation Modeling (PLS-SEM) with SEMinR. PLS-SEM is suitable for examining models with multiple latent constructs, prediction-oriented relationships, and relatively modest samples, but its use still requires careful evaluation of the measurement model before interpreting structural paths (Hair et al., 2020; Hair & Alamer, 2022). Bootstrapping with 1,000 resamples was used to evaluate path significance. The study used the reported two-tailed critical value of 1.96 at the 5% level. Because the original output reported a negative t value for the negative path, this article uses the absolute t statistic for significance interpretation.

Measurement quality was evaluated through Cronbach's alpha, indicator loadings, composite reliability, and average variance extracted (AVE). Composite reliability and AVE were recalculated from the reported outer loadings to ensure that the statistics were internally consistent with the measurement model. Indicator loadings above approximately 0.70 were treated as strong. Composite reliability above 0.70 and AVE above 0.50 were treated as acceptable evidence of internal consistency and convergent validity. Discriminant validity was evaluated with the Fornell-Larcker pattern reported in the dataset and with the Heterotrait-Monotrait ratio (HTMT). In line with recent PLS-SEM practice, HTMT values

substantially above 0.90 indicate that constructs may not be empirically distinct (Hair et al., 2020; Hair & Alamer, 2022).

The study also examined the reported Full Collinearity Variance Inflation Factor (FCVIF) values as a diagnostic for severe collinearity and potential common method contamination. Common method bias is a serious concern when predictor and outcome variables are captured through similar survey procedures, particularly when respondents evaluate conceptually adjacent constructs in one sitting (Kock et al., 2021). The reported FCVIF values were therefore interpreted as diagnostics rather than as proof of bias absence. This distinction is important because measurement overlap can inflate correlations, R-square values, and path coefficients even when individual indicators show strong reliability.

RESULTS AND DISCUSSION

Respondent profile and internal consistency

The final dataset contained 135 complete responses. The composition reflected multiple school stakeholder groups, with teachers forming the largest group. The multi-stakeholder design broadens the perspective on school management, but it also creates a measurement challenge because teacher competence, school culture, and student character may be judged through different informational lenses. Teachers can directly observe their own practice, students can directly experience classroom interaction, parents can observe behavior outside school, and school leaders can assess management processes. Combining these perspectives in one measurement model can be useful for institutional diagnosis, but future studies should test measurement invariance across respondent groups before treating all responses as equivalent.

Table 1. Respondent profile

Respondent group	Reported proportion
Teachers	35%
Principals	25%
Administrative staff	20%
Students	15%
Parents	5%

All four constructs showed acceptable to strong internal consistency. Cronbach's alpha ranged from 0.7994 for School Culture to 0.8821 for Student Character. The reported outer loadings ranged from 0.7618 to 0.9085, so every indicator exceeded the commonly used 0.70 benchmark. Recalculation from these loadings produced composite reliability values between 0.8821 and 0.9187 and AVE values between 0.7053 and 0.7389. On this evidence, the indicators converge strongly on their assigned constructs. These results are consistent with recent digital competence measurement research that stresses the importance of reliable multidimensional indicators when evaluating teacher practice (Gümüş & Kukul, 2023; Aydin et al., 2024).

Table 2. Internal consistency and convergent validity

Construct	Cronbach's alpha	Composite reliability*	AVE*	Assessment
Character Education Management	0.8603	0.9053	0.7053	Acceptable
Teacher Competence	0.8678	0.9105	0.7184	Acceptable
School Culture	0.7994	0.8821	0.7142	Acceptable
Student Character	0.8821	0.9187	0.7389	Acceptable

**Composite reliability and AVE were recalculated from the reported outer loadings.*

Table 3. Outer loadings

Construct	Indicator 1	Indicator 2	Indicator 3	Indicator 4
Character Education Management	0.8430	0.8715	0.7827	0.8593
Teacher Competence	0.8779	0.7618	0.8779	0.8670
School Culture	0.8115	0.8254	0.8960	-
Student Character	0.8110	0.8585	0.8576	0.9085

The convergent validity results are substantively plausible. Character education management, teacher competence, school culture, and student character each have indicators that move together strongly. This aligns with the literature. Character education management is expected to be internally coherent because planning, implementation, monitoring, and value integration are usually coordinated through the same organizational system (Idham et al., 2024). Teacher competence is also multidimensional but integrated, especially in digital environments where pedagogical, ethical, communicative, and technological judgments interact (Falloon, 2020; Smestad et al., 2023). School culture similarly operates through reinforcing norms and routines rather than isolated activities (Rahayu et al., 2022; Purnomo et al., 2024). Strong convergence within each construct is therefore not problematic by itself.

Discriminant validity and collinearity diagnostics

The major measurement problem appears when the constructs are compared with each other. The Fornell-Larcker matrix shows extremely high inter-construct correlations, ranging from 0.9635 to 0.9891. Each of these correlations exceeds the square root of AVE on the corresponding diagonal, which ranges from 0.8398 to 0.8596. This pattern indicates that the constructs share more variance with one another than they retain as distinct latent concepts. In practical terms, respondents may have interpreted character education management, teacher competence, school culture, and student character as different expressions of the same positive school condition.

Table 4. Fornell-Larcker matrix reported in the dataset

Construct	CEM	TC	SC	Student Character
CEM	0.8398			
TC	0.9891	0.8476		
SC	0.9872	0.9862	0.8451	
Student Character	0.9635	0.9804	0.9830	0.8596

HTMT provides the same diagnosis more clearly. All six pairwise HTMT values exceed 1.00, ranging from 1.1008 to 1.1824. These values are far above commonly used cutoffs of 0.85 or 0.90. Discriminant validity is therefore not established. This is not a minor technical issue. If constructs are empirically indistinguishable, structural coefficients can represent statistical separation among nearly identical measures rather than distinct educational mechanisms. A coefficient may change sign or exceed one because the model attempts to allocate shared variance across highly collinear predictors.

Table 5. HTMT discriminant validity results

Construct pair	HTMT	Interpretation
TC - CEM	1.1442	Not established
SC - CEM	1.1824	Not established
SC - TC	1.1780	Not established
Student Character - CEM	1.1008	Not established
Student Character - TC	1.1158	Not established
Student Character - SC	1.1721	Not established

The reported full collinearity VIF values reinforce this concern. Student Character had an FCVIF of 27.10 and Teacher Competence had an FCVIF of 55.866. Both values are many times larger than the conservative 3.3 benchmark often used as a warning threshold. They should not be interpreted as evidence that common method bias is absent. Instead, they indicate severe collinearity and a strong possibility that shared survey method, overlapping item content, or both have inflated the relationships. Contemporary common method research recommends combining procedural controls with statistical diagnostics rather than relying on a single post hoc test (Kock et al., 2021).

The measurement issue is especially relevant in character education research because all four constructs contain positive normative content. A respondent who perceives the school positively may score every domain highly. This halo effect can generate strong internal consistency and very high R-square values while reducing conceptual separation. Digital citizenship research warns that responsible behavior, ethical judgment, digital competence, and school practice should not be treated as interchangeable outcomes (Villar-

Onrubia et al., 2022; Örtegren, 2024). Likewise, teacher competence frameworks distinguish professional competence from student outcomes even though the two are theoretically related (Claro et al., 2024). The present measurement results show why this distinction must be preserved empirically.

Structural model and hypothesis testing

The structural model reports significant relationships for all four tested paths under the study's t-value criterion. Character Education Management was negatively associated with Student Character (β=-0.2896, |t|=3.2036). Character Education Management was positively associated with Teacher Competence (β=0.6117, t=10.7498). School Culture was positively associated with Teacher Competence (β=0.3824, t=6.7586). Teacher Competence was positively associated with Student Character (β=1.2669, t=13.9589). The magnitude of the final coefficient exceeds one, which can occur in the presence of severe multicollinearity or suppression and should not be interpreted as a standardized causal effect of ordinary size.

Table 6. Structural path results

Path	Original sample (β)	SD	t statistic	Decision at 5%
CEM -> Student Character	-0.2896	0.0904	3.2036	Significant
CEM -> Teacher Competence	0.6117	0.0569	10.7498	Significant
School Culture -> Teacher Competence	0.3824	0.0566	6.7586	Significant
Teacher Competence -> Student Character	1.2669	0.0908	13.9589	Significant

The positive association between Character Education Management and Teacher Competence is theoretically reasonable. Effective character education management can provide goals, program structure, professional development, supervision, and a shared language for classroom practice. This interpretation is consistent with Indonesian character education literature, which emphasizes the role of coordinated leadership and teacher involvement in implementing value-based curriculum (Idham et al., 2024; Rokimin et al., 2025). It also aligns with recent work on digital leadership, which positions teacher competence as a capability that grows through organizational direction, support, and institutional learning (Rokimin et al., 2026). Thus, management may matter most when it changes what teachers can actually do.

The positive relationship between School Culture and Teacher Competence also fits previous evidence. A collaborative and digitally supportive culture gives teachers

opportunities to exchange practices, solve instructional problems, observe norms, and experiment with new tools. Research on emergency remote teaching found that school-level collaboration supported effective student-centered teaching strategies (Tammets et al., 2024). Research on digital school transformation also shows that shared vision, change management, skill development, and organizational support are necessary for moving from isolated technology use toward a digital culture (Purnomo et al., 2024). Digital competence studies similarly identify collegial collaboration, infrastructure, professional motivation, and contextual support as important conditions for teacher competence (Dai, 2023; Chiu et al., 2024; Althubyani, 2024).

The strong positive association between Teacher Competence and Student Character is also substantively consistent with the role of teachers as daily models and instructional designers. Teachers influence character not only by teaching moral concepts but by structuring classroom interaction, applying rules consistently, using feedback fairly, facilitating reflection, and modelling respectful communication. Indonesian qualitative evidence identifies role modelling, discipline, respect, patience, and fairness as effective teacher characteristics for character education (Lukman et al., 2021). In digital settings, teacher competence also influences whether students experience technology as a space for responsible participation or merely as a delivery channel. Studies on digital citizenship and teacher competence reinforce the importance of teachers in connecting digital learning with ethical participation (Tangül & Soykan, 2021; Ananto & Ningsih, 2023; Alenezi & Alfaleh, 2024).

However, the coefficient of 1.2669 should not be interpreted as a stable standardized effect because the measurement model shows severe construct overlap. The same caution applies to the negative direct relationship between Character Education Management and Student Character. On the surface, the negative coefficient could suggest that more management is associated with weaker student character after teacher competence is controlled. A more plausible statistical interpretation is suppression caused by highly correlated predictors. When Character Education Management and Teacher Competence correlate at 0.9891, the model has very little unique variance with which to estimate separate paths. The negative sign can therefore emerge from the attempt to partition nearly identical variance rather than from a real harmful effect of character education management.

This pattern also implies that teacher competence may carry much of the shared association between formal management and student character. The positive CEM-to-TC path and the positive TC-to-Student Character path are consistent with a possible indirect mechanism, but mediation cannot be claimed because the dataset does not report a bootstrapped indirect effect. A future model should explicitly test indirect effects after revising the measurement model. The theoretical expectation would be that management improves teacher capability, and teacher capability then shapes students' experiences and behavior. This is more defensible than interpreting the negative direct coefficient in isolation.

Explained variance and model interpretation

The model reports an R-square of 0.9631 for Student Character and 0.9821 for Teacher Competence, with adjusted values of 0.9625 and 0.9819. These values indicate that

the predictor set explains nearly all observed variance in the two endogenous constructs. In many educational contexts, such values would appear exceptionally strong. Here, however, the discriminant validity and collinearity results make a different interpretation necessary. Extremely high explained variance can arise when predictor and outcome measures are almost indistinguishable. The R-square values should therefore be treated as evidence of strong shared variance, not as proof that the model has near-perfect real-world predictive power.

Table 7. Explained variance

Endogenous construct	R-square	Adjusted R-square	Interpretive note
Student Character	0.9631	0.9625	Very high; interpret with discriminant validity caution
Teacher Competence	0.9821	0.9819	Very high; interpret with collinearity caution

This diagnostic perspective is one of the study's main methodological contributions. Character education research can produce apparently excellent statistical models because the underlying concepts are all positively valenced and institutionally connected. Yet strong correlations are not automatically evidence of a strong theory. A useful theory requires constructs that are conceptually related but empirically distinguishable. Recent PLS-SEM guidance emphasizes that measurement quality precedes structural interpretation (Hair et al., 2020; Hair & Alamer, 2022). The present results illustrate that principle directly. Reliability and convergent validity are necessary, but they cannot compensate for failed discriminant validity.

Implications for digital character education management

For school management, the most defensible substantive finding is that teacher competence sits at the center of the observed model. Character education management and school culture are both positively associated with teacher competence. This suggests that school leaders should not treat character education as a schedule of ceremonies, slogans, or isolated projects. Management should build teacher capacity to integrate character goals into lesson planning, classroom interaction, digital communication, assessment, and feedback. The digital era requires teachers to combine pedagogical competence with ethical and technological judgment. Research shows that digital competence is related to teachers' readiness to use emerging technologies and to their ability to design meaningful learning experiences (Galindo-Domínguez et al., 2024; Chiu et al., 2024).

A second implication concerns school culture. Digital character education requires consistent norms across physical and online environments. Students receive mixed messages when schools promote responsibility in formal lessons but tolerate disrespectful online communication, weak data privacy, uncritical copying, or inconsistent digital

behavior. School culture should therefore include clear norms for digital communication, academic integrity, collaboration, cyber safety, privacy, and responsible use of artificial intelligence. Digital citizenship studies show that students need structured learning opportunities to practice responsible participation rather than merely receive warnings about technology (Assante et al., 2022; Alenezi & Alfaleh, 2024). This approach also fits the growing emphasis on critical digital literacy as part of citizenship and teacher professional competence (Villar-Onrubia et al., 2022).

A third implication is the need to connect technology with meaningful pedagogy. Digital tools are not character education interventions by themselves. The Educaplay study involving Ayep Rosidi and colleagues shows that interactive media can improve learning outcomes when embedded in planned instruction (Setianingsih et al., 2025). Research involving Rosidi on cloud-based collaboration similarly shows that digital tools can support deeper cognitive engagement when the learning design structures collaboration and progression (Mumtaz et al., 2025). These studies support a broader principle: technology becomes educationally valuable when teachers use it to organize participation, reflection, feedback, and responsibility.

A fourth implication concerns instrument design and evaluation. Schools need separate indicators for management, culture, teacher competence, and student character. Management items should focus on planning, coordination, resource allocation, supervision, and program evaluation. School culture items should focus on shared norms, collaboration, routines, and collective expectations. Teacher competence items should focus on observable pedagogical, professional, social, personal, and digital practices. Student character items should focus on student behavior and value enactment. Mixing similar positive statements across these domains will recreate the overlap found in the present model. Recent scale development studies show that digital competence measurement benefits from clear dimensional boundaries and rigorous validation (Gümüş & Kukul, 2023; Aydin et al., 2024). Character assessment should follow the same standard (Hidayah & Setiawati, 2022).

Theoretical contribution, limitations, and future research

The study contributes to character education management by proposing a more cautious interpretation of integrated school models. The empirical pattern supports a theoretical sequence in which organizational management and school culture shape teacher competence, while teacher competence is closely associated with student character. This sequence is consistent with recent research on digital school culture, professional digital competence, school leadership, and character formation (Purnomo et al., 2024; Örtegren, 2024; Rokimin et al., 2025). It also extends digital competence literature by positioning teacher competence not only as a technology integration capability but as a mechanism through which institutional values can reach student behavior.

At the same time, the study shows that the current instrument cannot cleanly separate the four constructs. This is a substantive limitation, not only a statistical one. The HTMT values above 1.00, inter-construct correlations above 0.96, and very high FCVIF values indicate severe overlap. The cross-sectional design also prevents causal inference. All variables were measured at one time, and the multi-stakeholder sample was pooled without group-specific measurement tests. The use of one structured survey for conceptually

adjacent constructs further increases the risk of common method effects. Finally, the study was conducted in one school, so the findings should not be generalized to Indonesian secondary education without replication.

Future research should address these limitations in five ways. First, researchers should redesign the measurement items and conduct content validation with experts before field testing. Second, a pilot study should use exploratory and confirmatory procedures to ensure that management, culture, competence, and character form distinct dimensions. Third, data should come from multiple sources. School leaders can report management practices, teachers can report competence and classroom implementation, students can report classroom climate and digital citizenship, and parents can report selected behavioral outcomes. Fourth, longitudinal or time-lagged designs should separate predictors and outcomes temporally. Fifth, future PLS-SEM studies should test indirect effects, out-of-sample prediction, and measurement invariance across respondent groups after discriminant validity has been established.

These improvements are especially important as schools adopt artificial intelligence and more complex digital learning systems. Teacher competence is now connected not only to tool use but also to ethical judgment, critical evaluation, data awareness, and responsible AI use. Studies show that teacher attitudes toward AI are associated with digital competence (Galindo-Domínguez et al., 2024), while current Indonesian scholarship on digital leadership and deep learning emphasizes the need for institutional capacity and pedagogical alignment (Idham et al., 2026; Rokimin et al., 2026). Character education research should therefore move toward models that integrate digital competence and ethical digital participation without collapsing them into a single general perception of school quality.

CONCLUSION

This study examined Character Education Management, School Culture, Teacher Competence, and Student Character in a digital-era secondary school context using PLS-SEM. The measurement model showed strong internal consistency and convergent validity. Cronbach's alpha ranged from 0.7994 to 0.8821, all outer loadings exceeded 0.76, composite reliability ranged from 0.8821 to 0.9187, and recalculated AVE ranged from 0.7053 to 0.7389. The structural model showed significant paths from Character Education Management to Teacher Competence (β=0.6117), School Culture to Teacher Competence (β=0.3824), Teacher Competence to Student Character (β=1.2669), and Character Education Management to Student Character (β=-0.2896). However, discriminant validity was not established. Inter-construct correlations exceeded 0.96, HTMT ranged from 1.1008 to 1.1824, and the reported FCVIF values were extremely high. These diagnostics mean that the structural coefficients and very high R-square values should not be treated as clean causal evidence. The most defensible implication is that teacher competence is closely embedded in the school's character education management and culture. Schools should strengthen teacher pedagogical, personal, social, professional, and digital competence while building consistent norms for ethical digital participation. Future studies should redesign the instrument, use multi-informant data, test measurement invariance, separate measurement occasions, and evaluate indirect effects only after discriminant validity is achieved.

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