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Beyond digital readiness: Learning process quality and perceived learning outcomes in distance education for school-based management courses

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Abstract

Distance education requires more than technological readiness; it also depends on the quality of learning processes that integrate governance, engagement, and self-regulated learning. This study examines the relationships of Learning Governance, Digital Readiness, Engagement, and Self-Regulated Learning with Process Quality and Perceived Learning Outcomes in a School-Based Management course. A quantitative explanatory approach was employed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze data from 203 students based on 29 indicators representing six constructs. The findings show that all four factors are significantly associated with Process Quality, while Digital Readiness has no significant direct relationship with Perceived Learning Outcomes ($\beta = 0.108$; $p = 0.061$). Process Quality demonstrates the strongest direct relationship with Perceived Learning Outcomes ($\beta = 0.398$; $p < 0.001$). These findings highlight the importance of process quality in distance education and suggest that improving learning outcomes requires integrating technological readiness with effective governance, instructional design, engagement, and self-regulated learning.

Keywords: MBS learning governance; Distance education; Digital readiness; Process quality; Perceived learning outcomes.

Abstrak

Pendidikan Jarak Jauh (PJJ) tidak hanya bergantung pada kesiapan teknologi, tetapi juga pada kualitas proses pembelajaran yang mengintegrasikan tata kelola, keterlibatan, dan regulasi diri mahasiswa. Penelitian ini bertujuan menganalisis hubungan Tata Kelola Pembelajaran, Kesiapan Digital, Keterlibatan, dan *Self-Regulated Learning* dengan Kualitas Proses dan Hasil Belajar yang Dipersepsikan pada mata kuliah Manajemen Berbasis Sekolah (MBS). Penelitian menggunakan pendekatan kuantitatif eksplanatori dengan *Partial Least Squares Structural Equation Modeling* (PLS-SEM) terhadap data 203 mahasiswa berdasarkan 29 indikator yang merepresentasikan enam konstruk. Hasil menunjukkan bahwa keempat faktor berhubungan signifikan dengan Kualitas Proses, sedangkan Kesiapan Digital tidak memiliki hubungan langsung yang signifikan dengan Hasil Belajar yang Dipersepsikan ($\beta = 0{,}108$; $p = 0{,}061$). Kualitas Proses menunjukkan hubungan langsung paling kuat dengan Hasil Belajar yang Dipersepsikan ($\beta = 0{,}398$; $p < 0{,}001$). Temuan ini menegaskan pentingnya kualitas proses pembelajaran dan perlunya integrasi kesiapan teknologi, tata kelola, desain pembelajaran, keterlibatan, serta regulasi diri mahasiswa dalam penguatan PJJ.

Kata Kunci: Tata kelola pembelajaran MBS; Pendidikan Jarak Jauh (PJJ); Kesiapan digital; Kualitas proses; Hasil belajar.

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Introduction

Distance education (PJJ) transforms learning from a classroom-centered activity into a process that relies on governance, technology, student engagement, and the ability to manage learning independently. In the Indonesian context, Pannen (2021) demonstrates that the expansion of online education requires stronger quality assurance because the flexibility of virtual learning also makes the learning process more difficult to monitor directly. The challenges of PJJ, therefore, extend beyond internet access and the ability to use digital devices; they also concern how different learning components function in a structured and consistent manner. MBS learning governance is important because it encompasses the organization of instructional design, implementation, assessment, monitoring, and quality improvement. From this perspective, learning process quality is an essential component in ensuring that available learning resources and conditions are translated into learning experiences that support the achievement of Perceived Learning Outcomes.

The need to ensure process quality is particularly important in MBS learning because students are expected not only to understand school management concepts but also to analyze problems, design programs, and evaluate their implementation. These competencies require a learning environment in which objectives, activities, assessment, and feedback are well aligned. In their study of a leadership development MOOC, Barthakur et al. (2022) demonstrate that alignment between learning objectives and assessment activities can be examined using learning data, while also showing that alignment established during the course design stage can still be improved. These findings suggest that process quality cannot be assessed solely in terms of the availability of modules, assignments, or learning platforms. Rather, quality needs to be evaluated based on how these components are organized and implemented to support learning activities. In PJJ, learning analytics, instructional procedures, assessment mechanisms, and evaluation are therefore important components of a high-quality MBS learning process.

However, the digitalization of learning does not necessarily guarantee the achievement of Perceived Learning Outcomes. Digital readiness is necessary for students to access and use online learning environments, but academic success also depends on their ability to use these environments effectively for learning. In a study involving 262 students at a four-year university in China who were participating in online learning for the first time, Dai et al. (2023) found that students with higher levels of online learning readiness also demonstrated stronger self-regulated learning strategies, including goal setting, time management, help-seeking, and self-evaluation. These findings suggest that online learning readiness is associated with students' ability to manage the demands of the learning process rather than merely their technical skills. Similarly, through a systematic review of 31 articles on students and

self-regulated learning (SRL) in online environments, Dong et al. (2024) highlight the importance of self-regulation in online learning. Accordingly, digital readiness needs to be considered within a learning environment that enables students to use technology to participate actively and purposefully in learning.

Attention to the learning process has also become increasingly important as the use of digital data in education continues to expand. Through an analysis of Moodle data, Hadisoebroto and Subandoro (2022) found that the frequency of assignment completion had a positive and significant association with final grades, whereas the duration and frequency of certain other activities were not significantly associated with them. In an experiment involving undergraduate students engaged in online learning, Li et al. (2022) found that providing learning analytics on students' own efforts and those of their peers increased effort attribution and subsequent effort among students who reported low performance, although it did not improve overall performance. These findings suggest that data and technology can help educators understand and guide the learning process, but their use does not automatically lead to improved academic achievement. Asy-Syifa and Khaerudin (2026) also propose a knowledge acquisition model that positions preparation, acquisition, internalization, and dissemination as interconnected stages. Nevertheless, these studies do not specifically explain how MBS learning governance, digital readiness, engagement, and self-regulated learning are jointly associated with process quality and Perceived Learning Outcomes in PJJ.

This research gap highlights the need to examine PJJ not only from the perspective of technological readiness but also in terms of the process quality that emerges from the interaction of technology, governance, and student characteristics within the learning environment. The central question is not simply whether students are ready to use technology, but whether such readiness is associated with a high-quality learning process and, ultimately, with Perceived Learning Outcomes. This perspective is relevant because different learning factors may have distinct relationships with process quality and Perceived Learning Outcomes. Technology can facilitate access to and participation in learning activities, governance can provide structure, while engagement and self-regulated learning can shape how students use the learning environment. Therefore, process quality needs to be positioned as an important construct for understanding the relationships between learning conditions and Perceived Learning Outcomes.

Based on this research gap, this study aims to analyze the relationships of MBS Learning Governance, Digital Readiness, Engagement, and Self-Regulated Learning with Process Quality and Perceived Learning Outcomes in Distance Education. The research model examines the direct relationships of each factor with Process Quality and Perceived Learning Outcomes, as well as the relationship between Process Quality

and Perceived Learning Outcomes. This approach enables the study to determine whether Digital Readiness has similar relationships with Process Quality and Perceived Learning Outcomes, while also examining the role of Process Quality within the overall model. The urgency of this study lies in the need to move PJJ management beyond a technology-provision orientation toward a learning system in which technology, governance, engagement, and students' self-regulation contribute to a high-quality learning process. This perspective is consistent with Kumalasari et al. (2026), who show that the complexity of educational regulations and responsibilities can increase administrative burdens when they are not managed in an integrated manner, and Rifani (2026), who demonstrates that service quality is shaped by process consistency, competence, communication, and resource constraints. Accordingly, this study seeks to generate empirical evidence on the importance of process quality in the development of MBS learning within PJJ.

Method

This study employed a quantitative approach with a cross-sectional explanatory survey design to examine the relationships among Learning Governance, Digital Readiness, Engagement, Self-Regulated Learning (SRL), Process Quality, and Perceived Learning Outcomes in the context of Distance Education (DE). The study was conducted among students at Universitas Terbuka (UT) who were enrolled in the School-Based Management (MBS) course. Data were collected from May to July 2026 using an online questionnaire administered through Google Forms. Eligible participants were UT students enrolled in the MBS course who had direct experience with its distance-learning activities. Participation was voluntary. Before completing the questionnaire, respondents were informed of the research objectives, the confidentiality of their data, and their right to decline participation. Informed consent was obtained from all participants before data collection. Ethical approval for this study was granted by the relevant institutional ethics committee at Universitas Terbuka.

The research model comprised six constructs and nine hypothesized direct relationships. As presented in Figure 1, Learning Governance, Digital Readiness, Engagement, and SRL were examined as direct predictors of Process Quality (H1–H4). These four constructs were also examined as direct predictors of Perceived Learning Outcomes (H5–H8), while Process Quality was specified as a direct predictor of Perceived Learning Outcomes (H9). These relationships were theoretically grounded in organizational coordination and quality assurance, technological readiness, student engagement, self-regulated learning, and instructional-process alignment. The model places particular emphasis on the relationships between the four predictor constructs and Process Quality, as well as the relationship between Process Quality and Perceived Learning Outcomes. Although Process Quality is positioned between the predictor

constructs and Perceived Learning Outcomes in the structural model, this study examines direct relationships and does not test a mediation mechanism. Accordingly, no indirect effects are claimed or inferred solely from the direct path coefficients.

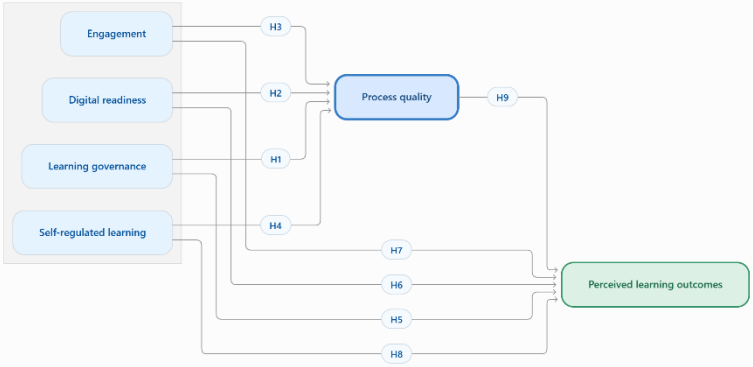


Figure 1. Research model and hypothesized direct relationships.

Source: Authors' own elaboration (2026).

The study population consisted of Universitas Terbuka students enrolled in the MBS course during the data collection period. The final analytical sample comprised 203 students with direct experience of distance-based MBS learning. The research instrument consisted of 29 indicators representing the six constructs. The operational sample-size target was determined using a ratio of seven respondents per indicator, yielding a target of 29 × 7 = 203 respondents. Because the data had already been collected, sample adequacy was further examined through a sensitivity analysis based on the most complex endogenous construct, namely Perceived Learning Outcomes, which had five incoming predictors. Using a fixed-model multiple regression approach, with one predictor tested, five predictors in total, a significance level of 0.05, and statistical power of 0.80, the minimum detectable effect size for a sample of 203 respondents was approximately $f^2 = 0.039$. The smallest effect size observed in the structural model was $f^2 = 0.021$, indicating limited statistical power to detect relationships of this magnitude. Therefore, findings involving small effect sizes should be interpreted cautiously. This assessment follows the statistical power analysis approach described by Faul et al. (2009), while taking into account the importance of model complexity in PLS-SEM sample-size estimation discussed by Kock and Hadaya (2018).

The research instrument comprised 29 indicators measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Learning Governance consisted of six indicators covering role clarity, learning procedures, assessment accountability, information transparency, quality assurance, and the use of LMS analytics. Digital Readiness comprised four indicators addressing device availability, internet connectivity, information and communication technology literacy, and technology-use efficacy. Engagement consisted of five indicators covering LMS access, participation in learning forums, task completion, interaction with lecturers or other

students, and cognitive engagement. SRL comprised five indicators addressing planning, goal setting, monitoring, learning strategies, and reflection. Process Quality was measured using four indicators concerning instructional alignment, assessment consistency, feedback, and learning-process management. Perceived Learning Outcomes was measured using five self-reported indicators reflecting students' perceived abilities to understand, explain, apply, analyze, and evaluate MBS-related knowledge and practices.

The instrument was developed with reference to relevant construct dimensions rather than by adopting a single standardized questionnaire without modification. Digital Readiness drew on Hung et al. (2010), Engagement on Ahmadi et al. (2023), SRL on Pintrich and De Groot (1990), and Perceived Learning Outcomes on the revised Bloom's taxonomy proposed by Anderson and Krathwohl (2001). Garrison et al. (2000) provided conceptual support for understanding interaction in technology-mediated learning environments. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), following the measurement- and structural-model evaluation procedures described by Hair et al. (2017). The measurement model was assessed using outer loadings, Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and the Heterotrait-Monotrait Ratio (HTMT). The structural model was evaluated using path coefficients, the coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and the inner-model Variance Inflation Factor (VIF). Hypotheses were tested using bootstrapping at a 5% significance level.

Results and Discussion

Assessment of the measurement model

The measurement model was evaluated to determine whether the research indicators adequately represented the constructs under investigation. The research model comprised six constructs: Learning Governance, Digital Readiness, Engagement, Self-Regulated Learning, Process Quality, and Perceived Learning Outcomes, measured using 29 indicators. The evaluation involved outer loadings, Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and the Heterotrait-Monotrait Ratio (HTMT). The results showed that all indicators had outer loading values above 0.70, indicating that each indicator adequately represented its respective construct. No indicators needed to be removed during the initial evaluation. Accordingly, all six constructs and their corresponding indicators were retained for the subsequent structural model assessment.

Table 1. Outer loading results for the indicators

Construct	Indicator	Outer loading	Decision
Learning Governance	GOV1	0.812	Valid

	GOV2	0.846	Valid
	GOV3	0.793	Valid
	GOV4	0.828	Valid
	GOV5	0.861	Valid
	GOV6	0.775	Valid
Digital Readiness	DR1	0.824	Valid
	DR2	0.801	Valid
	DR3	0.867	Valid
	DR4	0.839	Valid
Engagement	ENG1	0.791	Valid
	ENG2	0.823	Valid
	ENG3	0.854	Valid
	ENG4	0.816	Valid
	ENG5	0.778	Valid
Self-Regulated Learning	SRL1	0.835	Valid
	SRL2	0.862	Valid
	SRL3	0.811	Valid
	SRL4	0.847	Valid
	SRL5	0.793	Valid
Process Quality	PQ1	0.842	Valid
	PQ2	0.818	Valid
	PQ3	0.876	Valid
	PQ4	0.805	Valid
Perceived Learning Outcomes	LO1	0.814	Valid
	LO2	0.851	Valid
	LO3	0.878	Valid
	LO4	0.833	Valid
	LO5	0.796	Valid

Source: Authors' analysis (2026).

As shown in Table 1, the outer loading values ranged from 0.775 to 0.878, with all values exceeding the threshold of 0.70. These results indicate that all indicators met the criterion for indicator reliability. The highest outer loading was recorded for LO3 (0.878), whereas the lowest was recorded for GOV6 (0.775). Although GOV6 had the lowest loading, its value remained above the specified threshold; therefore, the

indicator was retained. Overall, the results demonstrate that the indicators of Learning Governance, Digital Readiness, Engagement, Self-Regulated Learning, Process Quality, and Perceived Learning Outcomes adequately represented their respective constructs. Consequently, all 29 indicators were retained for the subsequent assessment of construct reliability and validity.

Table 2. Reliability and convergent validity results

Construct	Cronbach's alpha	Composite reliability	AVE	Decision
Learning Governance	0.908	0.929	0.685	Reliable and valid
Digital Readiness	0.864	0.908	0.712	Reliable and valid
Engagement	0.883	0.915	0.685	Reliable and valid
Self-Regulated Learning	0.902	0.927	0.718	Reliable and valid
Process Quality	0.866	0.911	0.720	Reliable and valid
Perceived Learning Outcomes	0.893	0.921	0.700	Reliable and valid

Source: Authors' analysis (2026).

The reliability and convergent validity results presented in Table 2 indicate that all constructs met the established criteria. Cronbach's alpha values ranged from 0.864 to 0.908, while Composite Reliability values ranged from 0.908 to 0.929. Both measures demonstrated adequate internal consistency across the six constructs. Furthermore, AVE values ranged from 0.685 to 0.720, exceeding the minimum threshold of 0.50. This indicates that each construct accounted for an adequate proportion of the variance in its indicators. Accordingly, Learning Governance, Digital Readiness, Engagement, Self-Regulated Learning, Process Quality, and Perceived Learning Outcomes all satisfied the criteria for construct reliability and convergent validity. These findings support the adequacy of the measurement model and provide a basis for proceeding to the assessment of discriminant validity.

Table 3. Discriminant validity results based on HTMT

Construct	GOV	DR	ENG	SRL	PQ	LO
GOV	—	0.721	0.684	0.673	0.758	0.701
DR		—	0.746	0.718	0.692	0.665
ENG			—	0.783	0.812	0.774
SRL				—	0.795	0.821

PQ	–	0.846
LO		–

Source: Authors' analysis (2026).

Discriminant validity was assessed using the HTMT criterion, as reported in Table 3. The HTMT values ranged from 0.665 to 0.846, with none exceeding the threshold of 0.90. The highest value was observed between Process Quality and Perceived Learning Outcomes (0.846), whereas the lowest was found between Digital Readiness and Perceived Learning Outcomes (0.665). These results indicate that the constructs were empirically related while maintaining adequate discriminant validity. In particular, although Process Quality and Perceived Learning Outcomes exhibited the highest HTMT value among the construct pairs, the value remained below the specified threshold, supporting their treatment as distinct constructs in the research model. Overall, the measurement model assessment indicates that all indicators and constructs met the specified criteria for reliability, convergent validity, and discriminant validity. The analysis could therefore proceed to the evaluation of the structural model.

Structural model assessment and predictive performance

After the measurement model had met the validity and reliability criteria, the analysis proceeded to the structural model assessment to examine the direction and strength of the relationships among the constructs and the model's explanatory capacity for the endogenous constructs. The assessment included path coefficients, the coefficient of determination (R^2), effect sizes (f^2), predictive relevance (Q^2), and significance testing through bootstrapping. In the structural model, Learning Governance, Digital Readiness, Engagement, and Self-Regulated Learning were specified as exogenous constructs, whereas Process Quality and Perceived Learning Outcomes were specified as endogenous constructs. Process Quality was also specified as a predictor of Perceived Learning Outcomes. This model structure enabled the study to identify the factors associated with learning process quality and examine how process quality and student-related learning characteristics were associated with Perceived Learning Outcomes.

Table 4. Path coefficient results of the structural model

Hypothesis	**Path**	**Path coefficient (β)**
H1	GOV → PQ	0.214
H2	DR → PQ	0.183
H3	ENG → PQ	0.291
H4	SRL → PQ	0.337
H5	GOV → LO	0.126

H6	DR → LO	0.108
H7	ENG → LO	0.184
H8	SRL → LO	0.229
H9	PQ → LO	0.398

Source: Authors' analysis (2026).

As shown in Table 4, all path coefficients were positive. For Process Quality, the coefficients were 0.214 for Learning Governance, 0.183 for Digital Readiness, 0.291 for Engagement, and 0.337 for Self-Regulated Learning. The corresponding coefficients for Perceived Learning Outcomes were 0.126 for Learning Governance, 0.108 for Digital Readiness, 0.184 for Engagement, and 0.229 for Self-Regulated Learning. The relationship between Process Quality and Perceived Learning Outcomes yielded a coefficient of 0.398, the largest in the model. Although all relationships had positive coefficients, their magnitudes alone did not establish statistical significance. Therefore, the interpretation of the hypothesized relationships also considered the bootstrapping results.

Table 5. Coefficient of determination (R^2) of the structural model

Endogenous construct	**R^2**	**Explained variation**
Process Quality	0.612	61.2%
Perceived Learning Outcomes	0.687	68.7%

Source: Authors' analysis (2026).

The coefficient of determination results presented in Table 5 indicate that the model explained a substantial proportion of the variance in both endogenous constructs. The R^2 value of 0.612 for Process Quality indicates that 61.2% of its variance was explained by Learning Governance, Digital Readiness, Engagement, and Self-Regulated Learning. Meanwhile, the R^2 value of 0.687 for Perceived Learning Outcomes indicates that 68.7% of its variance was explained by the predictor constructs in the model, including Process Quality. These results demonstrate that the model had considerable explanatory power for both learning process quality and Perceived Learning Outcomes. Nevertheless, the remaining unexplained variance suggests that other factors not included in the model may also be associated with these two endogenous constructs.

Table 6. Effect size (f^2) results

Relationship	**f^2**	**Interpretation**
GOV → PQ	0.071	Small
DR → PQ	0.052	Small
ENG → PQ	0.126	Small–medium

SRL → PQ	0.171	Medium
GOV → LO	0.028	Small
DR → LO	0.021	Small
ENG → LO	0.067	Small
SRL → LO	0.092	Small
PQ → LO	0.204	Medium

Source: Authors' analysis (2026).

The effect size (f^2) values presented in Table 6 reveal differences in the relative contributions of the individual relationships within the model. For Process Quality, the f^2 values were 0.071 for GOV → PQ, 0.052 for DR → PQ, 0.126 for ENG → PQ, and 0.171 for SRL → PQ. Regarding Perceived Learning Outcomes, the direct relationships with the predictor constructs had relatively small effect sizes: 0.028 for GOV → LO, 0.021 for DR → LO, 0.067 for ENG → LO, and 0.092 for SRL → LO. In contrast, the relationship between Process Quality and Perceived Learning Outcomes had an f^2 value of 0.204, representing a medium effect size. This pattern highlights the relative importance of Process Quality in explaining Perceived Learning Outcomes within the structural model.

Table 7. Predictive relevance based on Q^2 values

Endogenous construct	**Q^2**	**Interpretation**
Process Quality	0.421	Predictive relevance
Perceived Learning Outcomes	0.468	Predictive relevance

Source: Authors' analysis (2026).

The predictive relevance assessment presented in Table 7 shows that both endogenous constructs had Q^2 values greater than zero. Process Quality had a Q^2 value of 0.421, while Perceived Learning Outcomes had a value of 0.468. These results indicate that the model demonstrated predictive relevance for both endogenous constructs. Thus, the model linking Learning Governance, Digital Readiness, Engagement, Self-Regulated Learning, Process Quality, and Perceived Learning Outcomes not only explained a substantial proportion of the variance in the endogenous constructs, as indicated by the R^2 values, but also demonstrated predictive relevance based on the Q^2 results.

Table 8. Bootstrapping results and hypothesis testing

Hypothesis	**Path**	**β**	**t-statistic**	**p-value**	**Decision**
H1	GOV → PQ	0.214	3.182	0.001	Supported
H2	DR → PQ	0.183	2.647	0.008	Supported
H3	ENG → PQ	0.291	4.126	<0.001	Supported

H4	SRL → PQ	0.337	5.018	<0.001	Supported
H5	GOV → LO	0.126	2.031	0.042	Supported
H6	DR → LO	0.108	1.876	0.061	Not supported
H7	ENG → LO	0.184	2.719	0.007	Supported
H8	SRL → LO	0.229	3.284	0.001	Supported
H9	PQ → LO	0.398	6.127	<0.001	Supported

Source: Authors' analysis (2026).

The bootstrapping results presented in Table 8 show that eight of the nine hypothesized relationships were statistically supported at the 5% significance level. Learning Governance, Digital Readiness, Engagement, and Self-Regulated Learning were all significantly associated with Process Quality. Regarding Perceived Learning Outcomes, Learning Governance, Engagement, and Self-Regulated Learning showed significant direct relationships, whereas Digital Readiness did not. Process Quality was significantly associated with Perceived Learning Outcomes, with a path coefficient of 0.398 and a p-value below 0.001. This finding is particularly relevant to interpreting the model because Digital Readiness was significantly associated with Process Quality but did not have a statistically significant direct relationship with Perceived Learning Outcomes. Accordingly, the results provide an empirical basis for further discussing the distinction between technological readiness, learning process quality, and Perceived Learning Outcomes in the context of Distance Education.

Beyond digital readiness: The central role of learning process quality

The findings indicate that learning quality in Distance Education (PJJ) cannot be explained solely by digital technology or students' ability to use it. The model explains 61.2% of the variance in Process Quality and 68.7% in Perceived Learning Outcomes, indicating that both constructs are associated with institutional, technological, and student-related factors. However, these factors exhibit different relationships with the two constructs. Digital Readiness is significantly associated with Process Quality but does not have a significant direct relationship with Perceived Learning Outcomes. By contrast, Process Quality has the strongest direct relationship with Perceived Learning Outcomes. This pattern shifts attention from technological readiness toward the quality of the learning experience. Karam et al. (2021) similarly propose an integrated framework that connects virtual course design and delivery. Thus, the digitalization of MBS learning should be evaluated not only in terms of students' technological capabilities but also in terms of the quality of the learning processes enabled by technology.

The differing relationships of Digital Readiness with Process Quality and Perceived Learning Outcomes represent a key finding. Digital Readiness is positively associated with Process Quality ($\beta = 0.183$; $p = 0.008$), but its direct relationship with Perceived

Learning Outcomes is not statistically significant ($\beta = 0.108$; $p = 0.061$). This suggests that students' ability to access, use, and adapt to learning technologies is more closely associated with the implementation of learning activities than with their perceived learning attainment. This finding extends Vishnu et al.'s (2022) view of digital competence as the effective use of technology for learning. In their review of 55 empirical studies, Hu and Xiao (2025) identify digital experience and literacy as factors influencing online engagement, alongside motivation, self-efficacy, emotional conditions, and self-directed learning. Their synthesis reinforces the view that digital competence is one component of a broader learning environment rather than a sufficient condition for learning success. Digital readiness should therefore be understood as a supporting condition rather than a standalone indicator of learning success.

These findings suggest that digital transformation requires a distinction between digital access, digital competence, and learning quality. Access to devices and technological skills is necessary for participation in PJJ, but technology remains a means of facilitating learning. Herhan and Khaerudin (2026) position digital literacy as part of knowledge development within educational digital transformation. Nevertheless, digital readiness needs to be accompanied by instructional designs that translate technology use into meaningful learning experiences. Karam et al. (2021) propose a quality assurance framework for virtual, real-time courses that emphasizes coordination between course design and delivery. Their approach supports the argument that virtual learning quality depends on how instructional components are organized rather than simply on the availability of a learning platform. In MBS learning, access to the LMS is insufficient when learning materials, activities, assessment, feedback, and interaction are not designed consistently. Attention should therefore extend beyond whether students can use technology to encompass how technology strengthens the learning process.

Process Quality is particularly important because it has the strongest direct relationship with Perceived Learning Outcomes among the relationships examined ($\beta = 0.398$; $p < 0.001$; $f^2 = 0.204$). This finding indicates that MBS learning in PJJ is closely associated with how instruction is designed, implemented, monitored, and evaluated. Joosten et al. (2019), in a study involving two-year and four-year higher education institutions, examined learner support, course organization, content delivery, interaction, and assessment. Their regression analyses identified significant relationships between instructional characteristics and student outcomes, supporting a multidimensional understanding of online course quality. Bolliger and Martin (2021) likewise identify learning materials, assessment, student support, and interaction as important elements of online course design. Through a meta-analysis of the Community of Inquiry framework, Martin et al. (2022) also report associations between teaching, social, and cognitive presence and learning outcomes. Taken

together, these studies support the view that learning quality depends on the coordination of instructional design, learning activities, assessment, feedback, and engagement.

Process Quality also needs to be considered in relation to student characteristics. Engagement and Self-Regulated Learning are positively associated with Process Quality ($\beta = 0.291$ and $\beta = 0.337$, respectively), with Self-Regulated Learning showing the strongest relationship among the four exogenous predictors. This suggests that process quality is associated not only with institutional design but also with students' capacity to manage their own learning. Edisherashvili et al. (2022) explain that distance learning increases learner autonomy and places greater demands on self-regulation. Biwer et al. (2021) similarly highlight the importance of managing attention, effort, and time in online learning. In their review of 25 empirical studies, Alhazbi et al. (2024) identify engagement, the regularity of learning activities, and anti-procrastination behavior as frequently used learning analytics indicators of SRL. They also note that many studies did not validate these indicators against theoretical SRL models, cautioning against treating digital traces as direct evidence of self-regulated learning. In the present study, SRL was measured through self-reported planning, goal setting, monitoring, learning strategies, and reflection.

Student engagement further reinforces this interpretation. Engagement is positively associated with both Process Quality ($\beta = 0.291$; $p < 0.001$) and Perceived Learning Outcomes ($\beta = 0.184$; $p = 0.007$), indicating that student participation is related to both constructs. Bond et al. (2020) demonstrate that engagement encompasses behavioral, affective, and cognitive dimensions rather than merely access to a learning platform. In their review of 55 empirical studies, Hu and Xiao (2025) identify both learner-related and environmental factors influencing online engagement. Teaching presence was examined in 14 studies and encompassed course organization, discussion facilitation, instruction, assessment, feedback, and technical support. Maré and Mutezo (2025), in their review of 21 studies, link the dimensions of the Community of Inquiry framework with shared metacognition and student engagement, while noting the limited research on learning presence and social regulation. These findings suggest that engagement develops through interactions among learners, instructional arrangements, and social conditions. In MBS learning, accessing materials, participating in discussions, completing assignments, and interacting with others can support active participation. Ferrer et al. (2022) also identify relationships between attitudes and motivation toward online learning and student engagement.

Learning Governance also contributes to the organization of learning quality. It is positively associated with both Process Quality ($\beta = 0.214$; $p = 0.001$) and Perceived Learning Outcomes ($\beta = 0.126$; $p = 0.042$), although its relationship is stronger with Process Quality. This suggests that governance is more closely associated with how

learning is organized than with students' perceived learning attainment directly. Caskurlu et al. (2020) report a positive relationship between teaching presence and perceived learning, while Martin et al. (2020) position course, instructor, and organizational factors within the online learning ecosystem. Zimmerman et al. (2020) analyzed 5,436 online course reviews from 360 higher education institutions, examining faculty development, course design, informal reviews, and peer-review results. They emphasize that the availability of quality standards does not automatically ensure their implementation. This distinction is relevant to Learning Governance: procedures, assessment requirements, transparency, and quality assurance need to be implemented and monitored consistently. In PJJ, these arrangements help establish a coherent and well-organized learning process.

Overall, the model indicates that the factors examined have different relationships with Perceived Learning Outcomes. Digital Readiness is significantly associated with Process Quality but not directly with Perceived Learning Outcomes, whereas Engagement and Self-Regulated Learning are significantly associated with both constructs. Learning Governance is also significantly associated with both, with a stronger relationship with Process Quality. Process Quality has the strongest direct relationship with Perceived Learning Outcomes. The literature supports this interpretation: instructional characteristics are associated with student outcomes (Joosten et al., 2019); quality standards require consistent implementation (Zimmerman et al., 2020); and engagement and self-regulation develop through interactions between learners and online environments (Alhazbi et al., 2024; Hu & Xiao, 2025; Maré & Mutezo, 2025). Although all these factors are relevant, they have distinct relationships with learning quality and perceived outcomes. Improving MBS distance education therefore requires a process-centered approach that integrates technology, governance, instructional design, interaction, assessment, feedback, and students' capacity for self-regulated learning.

Conclusion

The findings indicate that learning quality in Distance Education (PJJ) for the School-Based Management (MBS) course cannot be explained solely by Digital Readiness. Learning Governance, Digital Readiness, Engagement, and Self-Regulated Learning are significantly associated with Process Quality and collectively explain 61.2% of its variance. Meanwhile, the model explains 68.7% of the variance in Perceived Learning Outcomes. Among the factors associated with Process Quality, Self-Regulated Learning shows the strongest relationship ($\beta = 0.337$; $p < 0.001$), while Process Quality has the strongest direct relationship with Perceived Learning Outcomes ($\beta = 0.398$; $p < 0.001$). In contrast, Digital Readiness does not have a statistically significant direct relationship with Perceived Learning Outcomes ($\beta = 0.108$; $p = 0.061$). These findings indicate that technological readiness is more closely associated with supporting the

learning process, whereas Perceived Learning Outcomes are more strongly associated with the quality of the learning process experienced by students. Accordingly, improving the quality of MBS learning in PJJ requires attention not only to digital infrastructure and competence but also to instructional design, assessment, feedback, interaction, student engagement, and self-regulation.

This study contributes to research on MBS learning governance in the context of PJJ by demonstrating that different learning factors have distinct relationships with Process Quality and Perceived Learning Outcomes. From a practical perspective, the findings provide a basis for strengthening learning procedures, monitoring LMS activities, improving feedback mechanisms, ensuring consistency in assessment rubrics, and developing strategies to enhance students' Self-Regulated Learning. However, this study has several limitations. The research model includes only six constructs and does not incorporate student satisfaction, which was included in the initial research design. In addition, the cross-sectional design limits the ability to capture changes in learning behavior and Perceived Learning Outcomes over time. Future research could incorporate student satisfaction into the model, investigate indirect relationships involving Process Quality and Perceived Learning Outcomes more specifically, and employ longitudinal designs across more diverse PJJ contexts. Such developments could provide a more comprehensive understanding of the relationships among governance, digital readiness, student characteristics, process quality, and Perceived Learning Outcomes in MBS learning.

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