

The Role of Learning Engagement in Mediating the Effect of LMS Quality and Mentoring on Training Participants' Satisfaction at BP2TL Jakarta

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Abstract

This study aims to analyze the effect of Learning Management System (LMS) quality and work-unit mentoring on training participant satisfaction, with learning engagement as a mediating variable. The research was conducted on participants of the 2025 Priority Functional Technical Training at BP2TL Jakarta. This study uses a quantitative method with a survey approach. The research sample consisted of 140 respondents determined using a purposive sampling technique. Data were collected through a Likert-scale questionnaire and analyzed using the Structural Equation Modeling–Partial Least Square (SEM-PLS) method. The results show that LMS quality has a positive effect on learning engagement and training participant satisfaction. Work-unit mentoring is also proven to have a positive effect on learning engagement and training participant satisfaction. In addition, learning engagement has a positive effect on training participant satisfaction. Compared to LMS quality, work-unit mentoring has a greater effect on learning engagement, while learning engagement is the strongest factor in shaping participant satisfaction. These findings confirm the importance of LMS quality, strengthened mentoring, and increased participant engagement in the implementation of self-directed learning. This study provides implications for BP2TL Jakarta to continue developing the role of mentoring sustainably and improving LMS quality to support the competency development of civil servants (ASN).

Keywords: lms, mentoring, engagement, satisfaction, training

Introduction

Digital transformation in the implementation of education and training for civil servants (*Aparatur Sipil Negara*/ASN) has driven a shift from conventional learning toward technology-based learning. In 2025, a budget efficiency policy at the Center for Education and Sea Transportation (BP2TL) Jakarta led to the implementation of functional technical training being converted into a self-directed learning scheme based on a Learning Management System (LMS) for priority training programs, prior to participants attending the main training. This scheme provides flexibility as well as time and cost efficiency. Based on BP2TL Jakarta's internal documents and 2025 training implementation reports, the self-directed learning scheme was applied to four priority functional technical training programs involving 379 prospective participants. The transition created a managerial challenge because participants were required to complete LMS-based learning while continuing to perform their official duties in their respective work units. Consequently, successful implementation depended not only on the availability of the LMS but also on whether the learning system could operate effectively and whether participants

received sufficient support from their work environment. However, its implementation also requires participants to be able to learn independently amid their obligations to carry out official duties at their work units. Therefore, LMS quality, work-environment support, and the level of participant engagement become important aspects in determining learning success.

Various studies show that LMS quality and utilization play an important role in enhancing learner engagement and satisfaction. Guo et al. (2024) found a significant relationship between LMS utilization and increased student engagement, particularly in academic activities, learning relevance, collaboration, and social interaction. Similar results were reported by Putra et al. (2025), showing that LMS use can support improvements in learning engagement, participant satisfaction, and the effectiveness of blended learning. In addition, Nisak (2025) showed that the presence of interactive features in an LMS can encourage participant motivation and participation. From the satisfaction perspective, Simelane-Mnisi and Mthimunye (2025) showed that system quality, information quality, and service quality significantly affect LMS user satisfaction, with service quality being one of the dominant factors. These findings indicate that the success of digital learning is determined not only by the availability of an LMS, but also by system quality and the LMS's ability to foster participant engagement.

In practice, several obstacles remain in the implementation of self-directed learning, such as technical issues during login, attendance recording, assignment uploads, and differences in the completion time of final evaluations. Participants also need to divide their concentration between self-directed learning and job responsibilities at their respective work units, making the achievement of learning engagement a challenge in itself. Mentoring support from the work unit is a supporting factor in self-directed learning. Mentor support is needed to help participants understand the material, complete assignments, and connect the knowledge gained with work at their unit. Ekuase-Anwansedo et al. (2018) emphasized the importance of stakeholder support in LMS implementation, while Hastuti et al. (2026) showed that interaction and collaboration in digital learning can enhance participant engagement.

Although previous studies have discussed the relationship between LMS, engagement, satisfaction, and learning effectiveness, limitations remain in the context of professional training for civil servants. Guo et al. (2024) focused on the relationship between LMS utilization and student engagement, while Simelane-Mnisi and Mthimunye (2025) examined the effect of LMS quality on student satisfaction. Meanwhile, Putra et al. (2025) used a systematic literature review approach to examine the role of LMS in the success of blended learning. Therefore, empirical research that simultaneously tests the effect of LMS quality and work-unit mentoring on participant satisfaction, with learning engagement as the mechanism explaining this relationship, remains relatively limited. This limitation is even more apparent in the context of self-directed learning within ASN training.

Theoretically, an important issue that remains unresolved is how technological and social resources work together to shape participant satisfaction. Existing studies generally demonstrate that LMS quality can influence engagement or satisfaction, while other studies emphasize stakeholder interaction and mentoring support. However, these relationships are often examined separately. This leaves limited empirical explanation of whether participants become satisfied simply because they have access to a high-quality technological system and workplace support, or because these resources first encourage them to become more behaviorally, emotionally, and

cognitively engaged in the learning process. This distinction is important because a technologically reliable LMS or available mentor may not automatically produce a satisfying learning experience when participants are not actively engaged in self-directed learning.

Accordingly, this study positions LMS quality as a technological learning resource, work-unit mentoring as a social learning resource, and learning engagement as a participant-level mechanism that connects these resources with training participant satisfaction. LMS quality provides accessibility, system reliability, relevant information, and learning services that facilitate independent learning. In contrast, work-unit mentoring provides interpersonal direction, motivation, assistance, and contextual support that help participants connect learning activities with their work responsibilities. These two resources are expected to encourage participants to invest greater attention, enthusiasm, and effort in the learning process. Learning engagement is therefore positioned not merely as another outcome of digital learning, but as the mechanism through which technological and social learning resources are translated into a more satisfying learning experience.

From this perspective, LMS quality is expected to strengthen learning engagement because an accessible, reliable, and informative system reduces technological barriers and allows participants to focus more effectively on learning activities. Prior evidence showing that LMS utilization and system features contribute to participant engagement supports this relationship (Guo et al., 2024; Putra et al., 2025). Therefore, the first hypothesis is proposed:

H1: LMS quality has a positive effect on learning engagement.

Work-unit mentoring is also expected to strengthen learning engagement because mentors can provide direction, encouragement, and assistance when participants experience difficulties in completing self-directed learning while continuing their official duties. Stakeholder support and interaction have been identified as important elements in technology-based learning environments (Ekuase-Anwansedo et al., 2018; Hastuti et al., 2026). Accordingly:

H2: Work-unit mentoring has a positive effect on learning engagement.

LMS quality may also directly shape participant satisfaction. A system that is stable, easy to access, provides clear information, and delivers adequate learning services can create a more positive user experience. This expectation is consistent with Simelane-Mnisi and Mthimunye (2025), who demonstrated that system, information, and service quality are important predictors of LMS user satisfaction. Therefore:

H3: LMS quality has a positive effect on training participant satisfaction.

In addition to technological resources, social support from the work unit may directly contribute to satisfaction. Participants who receive appropriate guidance and assistance are more likely to perceive self-directed learning as manageable, relevant, and supportive of their competency development. Therefore:

H4: Work-unit mentoring has a positive effect on training participant satisfaction.

Learning engagement is expected to contribute directly to satisfaction because participants who actively participate, maintain enthusiasm, and make cognitive efforts to understand learning materials are more likely to experience the training process positively. Engagement therefore represents an important participant-level condition for transforming available learning resources into meaningful learning experiences. Accordingly:

H5: Learning engagement has a positive effect on training participant satisfaction.

Beyond these direct relationships, LMS quality is also expected to influence participant satisfaction indirectly through learning engagement. A high-quality LMS can provide an enabling learning environment, but its contribution to satisfaction may become stronger when the system encourages participants to actively use learning materials, complete assignments, and remain involved throughout the learning process. Therefore:

H6: Learning engagement mediates the relationship between LMS quality and training participant satisfaction.

Similarly, mentoring support may increase satisfaction not only directly but also by strengthening participants' engagement in self-directed learning. Guidance and encouragement from the work unit can help participants maintain learning focus and connect training materials with their job context, which subsequently contributes to a more satisfying learning experience. Thus:

H7: Learning engagement mediates the relationship between work-unit mentoring and training participant satisfaction.

Based on this research gap, this study aims to examine the direct and indirect relationships between LMS quality, work-unit mentoring, learning engagement, and training participant satisfaction in the 2025 priority functional technical training at BP2TL Jakarta. Specifically, the study examines the effects of LMS quality and work-unit mentoring on learning engagement and participant satisfaction, the effect of learning engagement on participant satisfaction, and the mediating role of learning engagement in both relationships. Scientifically, this study contributes by integrating the aspects of learning technology and work-environment support into a single empirical model to explain the formation of learning engagement and participant satisfaction in LMS-based self-directed learning within the context of ASN competency development.

Method

This study uses a quantitative approach with an explanatory research design to analyze the relationships between LMS quality, work-unit mentoring, learning engagement, and training participant satisfaction. Data were collected through a survey of prospective participants of the 2025 priority functional technical training at BP2TL Jakarta who undertook self-directed learning using the LMS. The research population consisted of 379 civil servants from the Ministry of Transportation, spread across four priority training programs: Ship Accident Investigation, Ship Measurement–Domestic Measurement Method, Marine Inspector Type B, and Harbormaster Class B.

The sampling technique used was non-probability sampling with a purposive sampling method. Respondents were determined based on several criteria: being a Ministry of Transportation civil servant registered as a prospective participant of the 2025 priority functional technical training, undertaking self-directed learning through the BP2TL Jakarta LMS, completing the learning process from understanding the material to working on assignments and evaluations, receiving mentoring support from their work unit, and being willing to participate by completing the questionnaire. The minimum sample size was set at 130 respondents based on the indicator-based sampling rule applied in the study, with 26 measurement indicators and a minimum ratio of five observations per indicator ($26 \times 5 = 130$). The final analysis involved 140 respondents, thereby

exceeding the predetermined minimum sample requirement. Given that the largest endogenous construct in the structural model is predicted by three variables, the achieved sample size also provides adequate observations for estimating the proposed PLS-SEM model.

Primary data were obtained through a Likert-scale questionnaire used to measure LMS quality, work-unit mentoring, learning engagement, and participant satisfaction. The measurement model consisted of 26 items: six items for LMS quality, six items for work-unit mentoring, six items for learning engagement, and eight items for training participant satisfaction. LMS quality was conceptually represented through aspects of system quality, information quality, and service quality, consistent with the information-system quality perspective discussed by Simelane-Mnisi and Mthimunye (2025). Work-unit mentoring captured the provision of direction, motivation, learning assistance, and support in connecting the training material with participants' work, consistent with the mentoring functions discussed by Byars-Winston and Dahlberg (2019). Learning engagement reflected behavioral, emotional, and cognitive engagement as conceptualized by Fredricks et al. (2004). Training participant satisfaction represented participants' overall evaluation of their LMS-based self-directed learning experience. All questionnaire items were assessed using the Likert response format applied in the research instrument. Secondary data were sourced from BP2TL Jakarta's internal documents, training implementation reports, and various literature relevant to the study.

Data analysis was conducted using the Structural Equation Modeling–Partial Least Squares (SEM-PLS) method with the assistance of SmartPLS software. The analysis stages included an evaluation of the measurement model (*outer model*) to assess the validity and reliability of the instrument, as well as an evaluation of the structural model (*inner model*) to test the relationships between the research variables. Convergent validity was assessed through outer loading and Average Variance Extracted (AVE), while construct reliability was evaluated using Composite Reliability. The structural model was subsequently evaluated through the R-square values and hypothesis testing of the direct and indirect relationships. Furthermore, testing of direct and indirect effects was carried out through a bootstrapping procedure. In this research model, learning engagement is positioned as a mediating variable that explains the effect of LMS quality and work-unit mentoring on training participant satisfaction.

Results and Discussion

Table 1. Respondent Characteristics

Characteristic	Category	Number (people)	Percentage (%)
Age	≤ 25 years	3	2.1
	26–30 years	80	57.1
	31–35 years	10	7.1
	36–40 years	16	11.4
	41–45 years	22	15.7

	> 45 years	9	6.4
Last Education	Diploma (D3/D4)	85	60.7
	Bachelor's (S1)	29	20.7
	Master's (S2)	26	18.6
Work Unit	Directorate General of Sea Transportation	140	100
	Marine Inspector Type B (MIB) Training	64	45.7
Type of Training	Harbormaster Class B Training	29	20.7
	Ship Measurement Training: Domestic Measurement Method	24	17.1
	Ship Accident Investigation Training	23	16.4
Years of Service as Civil Servant	< 5 years	73	52.1
	5–10 years	23	16.4
	11–15 years	14	10.0
	16–20 years	18	12.9
	> 20 years	12	8.6
LMS Access Frequency	Once a week	1	0.7
	2–3 times a week	6	4.3
	4–6 times a week	72	51.4
	Every day	61	43.6
	Total	140	100.0

Source: Primary Data, processed by the researcher (2026)

This study obtained 140 respondents. Based on respondent characteristics, the majority of participants were aged 26–30 years (57.1%), held a Diploma (D3/D4) education (60.7%), and all came from the Directorate General of Sea Transportation. Based on the type of training, most participants took the Marine Inspector Type B Training (45.7%), followed by Harbormaster Class B (20.7%), Ship Measurement – Domestic Measurement Method (17.1%), and Ship Accident Investigation (16.4%). Most respondents had less than five years of service (52.1%), indicating a dominance of civil servants in the early stage of career development. In terms of LMS usage, the majority of participants accessed the system 4–6 times a week (51.4%) and every day (43.6%), indicating a high intensity of LMS utilization in the implementation of self-directed learning.

Outer Model

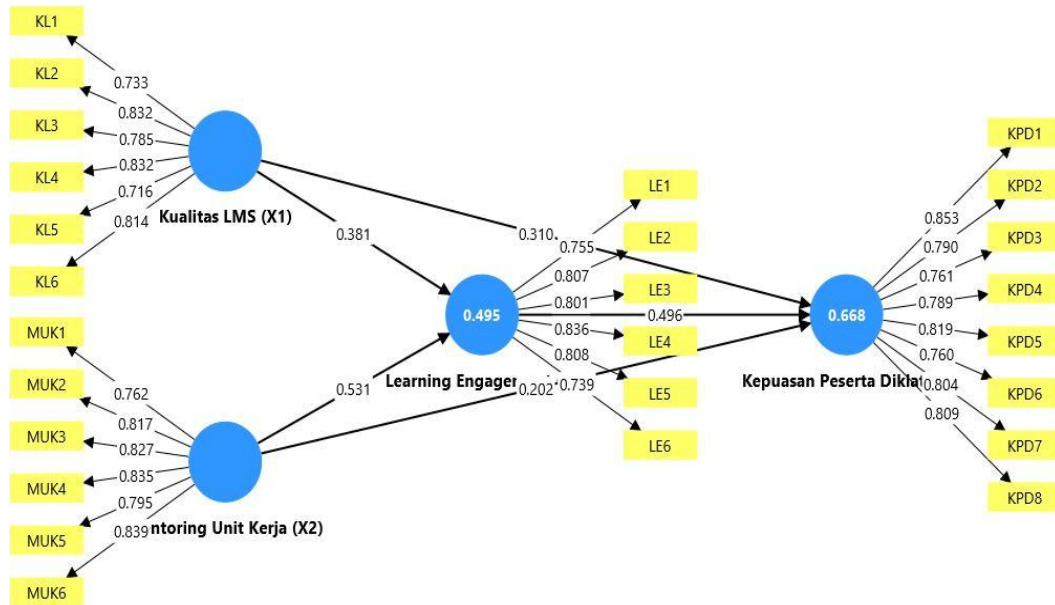


Table 2. Outer Model Results

Variable	Outer Loading	Composite Reliability	AVE
LMS Quality	0.716 – 0.832	0.920	0.619
Work-Unit Mentoring	0.762 – 0.839	0.886	0.661
Training Participant Satisfaction	0.760 – 0.853	0.882	0.638
Learning Engagement	0.739 – 0.836	0.898	0.627

Source: Primary Data, processed by the researcher (2026)

Table 2 shows the results of the outer model testing conducted to test the validity and reliability of the research constructs. All indicators had outer loading values between 0.716–0.853, so all of them exceeded the minimum threshold of 0.70 and met the convergent validity criteria. The Composite Reliability value for each construct ranged from 0.882–0.920, which is higher than the required threshold of 0.70. This indicates that each construct has good internal consistency. Furthermore, the Average Variance Extracted (AVE) value ranged from 0.619 to 0.661, and all were above the minimum value of 0.50. Based on these results, all constructs were declared valid and reliable, so they could be used in the structural model (inner model) testing stage.

R-Square

Table 3. R-Square Values of Endogenous Variables

Endogenous Variable	R-Square	Description
Learning Engagement	0.495	Moderate
Training Participant Satisfaction	0.668	Moderate

Source: Primary Data, processed by the researcher (2026)

Based on the results of the inner model testing, the R-Square value for learning engagement was 0.495, indicating that LMS quality and work-unit mentoring were able to explain 49.5% of the variation in learning engagement, while the remaining 50.5% was influenced by other factors outside the research model. Meanwhile, the R-Square value for the training participant satisfaction variable was 0.668, meaning that LMS quality, work-unit mentoring, and learning engagement were able to explain 66.8% of the variation in participant satisfaction, while the remaining 33.2% was explained by other factors outside the model. These results indicate that the research model has a fairly good ability to explain learning engagement and training participant satisfaction.

Hypothesis Testing (Path Coefficient)

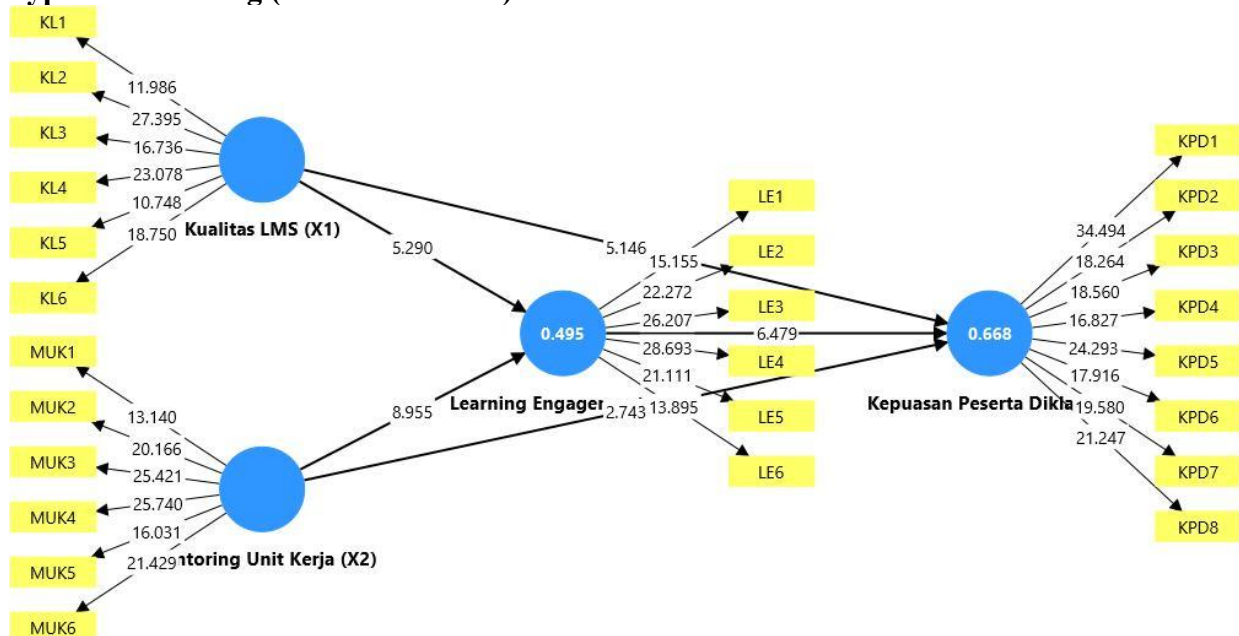


Figure 2. PLS Bootstrapping Results

Source: Primary Data, processed by the researcher (2026)

Table 4. Path Coefficient Hypothesis Testing Results

Hypothesis	Variable Relationship	Original Sample	T-Statistics	P-Values	Description
H1	LMS Quality (X1) → Learning Engagement (Z)	0.381	5.290	0.000	Accepted
H2	Work-Unit Mentoring (X2) → Learning Engagement (Z)	0.531	8.955	0.000	Accepted
H3	LMS Quality (X1) → Training Participant Satisfaction (Y)	0.310	5.146	0.000	Accepted
H4	Work-Unit Mentoring (X2) → Training Participant Satisfaction (Y)	0.202	2.743	0.006	Accepted
H5	Learning Engagement (Z) → Training Participant Satisfaction (Y)	0.496	6.479	0.000	Accepted

The hypothesis testing results show that all relationships between variables in the research model have a positive and significant effect. LMS quality has a positive effect on learning engagement (OS = 0.381; $t = 5.290$; $p < 0.001$), while work-unit mentoring has a greater effect on learning engagement (OS = 0.531; $t = 8.955$; $p < 0.001$). These results indicate that although LMS quality plays a role in encouraging participant engagement, work-unit mentoring support contributes more to supporting participant engagement during self-directed learning. LMS quality also has a positive and significant effect on training participant satisfaction, as shown by OS = 0.310, $t = 5.146$, and $p < 0.001$. A positive and significant effect is also shown by work-unit mentoring on participant satisfaction, with OS = 0.202, $t = 2.743$, and $p = 0.006$. Learning engagement provides the greatest direct effect on participant satisfaction, with OS = 0.496, $t = 6.479$, and $p < 0.001$. These findings indicate that participant satisfaction is determined not only by technology quality and mentoring support, but primarily by the extent to which participants are actively engaged, enthusiastic, and strive to understand the material during the learning process. Thus, all research hypotheses (H1–H5) are accepted.

Table 5. Specific Indirect Effects

Hypothesis	Indirect Relationship	Original Sample	T-Statistics	P-Values	Description
H6	LMS Quality (X1) → Learning Engagement (Z) → Training Participant Satisfaction (Y)	0.189	4.237	0.000	Accepted

H7	Work-Unit Mentoring (X2) → Learning Engagement (Z) → Training Participant Satisfaction (Y)	0.263	5.671	0.000	Accepted
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The specific indirect effect analysis indicates that learning engagement significantly mediates the relationship between LMS quality and training participant satisfaction. LMS quality has a positive and significant indirect effect on training participant satisfaction through learning engagement (OS = 0.189; $t = 4.237$; $p < 0.001$). This finding suggests that a high-quality LMS not only contributes directly to participant satisfaction but also increases satisfaction by encouraging participants to become more actively engaged in the learning process. Therefore, H6 is accepted

Work-unit mentoring also has a positive and significant indirect effect on training participant satisfaction through learning engagement (OS = 0.263; $t = 5.671$; $p < 0.001$). The indirect effect is greater than that of LMS quality, indicating that mentoring support from the work unit plays an important role in strengthening learning engagement, which subsequently contributes to higher participant satisfaction. Therefore, H7 is accepted.

The Effect of Learning Management System (LMS) Quality on Learning Engagement

The research results show that LMS quality has a positive and significant effect on learning engagement. An LMS that is easy to use, has a stable system, provides relevant and easily understood material, and is supported by adequate service can encourage participants to be more active during the self-directed learning process. In the context of ASN training, LMS flexibility also gives participants the opportunity to adjust learning activities to the official duties they must still carry out. This finding is in line with the information systems success model developed by William H. DeLone and Ephraim R. McLean, which explains that system quality, information quality, and service quality are the main factors influencing user experience when using an information system (Simelane-Mnisi & Mthimunye, 2025). This study's results also support Guo et al. (2024), who found that LMS utilization can improve participant engagement through academic participation, learning relevance, and interaction with learning resources. Similar findings were presented by Putra et al. (2025), who found that LMS flexibility and ease of access contribute to increased learning engagement, and by Ningsih et al. (2025), who showed that an LMS can enhance engagement when supported by adequate infrastructure and learning design. Nevertheless, the effect of LMS quality on learning engagement is lower than that of work-unit mentoring. This indicates that in ASN competency development, technology serves as a facilitator, but participant engagement also requires interpersonal support from the work environment.

The Effect of Work-Unit Mentoring on Learning Engagement

The research results show that work-unit mentoring has a positive and significant effect on learning engagement and has a greater effect than LMS quality. This result indicates that mentor guidance is an important factor in increasing participant engagement, because mentors can provide direction, motivation, and assistance in understanding the material, as well as connect learning with participants' work. Kram argued that mentoring consists of two main functions, namely career functions and psychosocial functions (Byars-Winston & Dahlberg, 2019). This finding is in line

with the research of Ekuase-Anwansedo et al. (2018), which showed that the success of LMS implementation is strongly influenced by the involvement and support of stakeholders in the learning environment. In this study, work-unit mentors can be understood as a form of external support that strengthens the success of LMS-based learning. In addition, this finding also supports the research of Hastuti et al. (2026), which showed that interaction and collaboration in digital learning can enhance participant engagement. Thus, work-unit mentoring strengthens the interaction dimension that is often a challenge in technology-based self-directed learning. The research results imply that the development of learning technology alone is not sufficient to produce optimal learning engagement. LMS quality needs to be maintained and improved, but mentor guidance is one important strategy for increasing participant engagement. Therefore, BP2TL Jakarta needs to ensure that mentors understand their mentoring duties, mentor readiness, and the intensity of communication between mentors and participants during LMS-based self-directed learning, so that it can run more effectively.

The Effect of Learning Management System (LMS) Quality on Training Participant Satisfaction

LMS quality has a positive and significant effect on training participant satisfaction. This indicates that LMS quality in providing easy access to learning materials, flexibility in system use, clarity of the learning flow, and systematic and easily understood presentation of material can create a more positive learning experience. In self-directed learning, the LMS becomes the main point of participant interaction with materials, assignments, evaluations, and various other learning activities, so good system quality will determine participants' assessment of the implementation of learning. This study's results support the findings of Simelane-Mnisi and Mthimunya (2025), who stated that LMS quality significantly affects user satisfaction, particularly through the aspects of system quality, information quality, and service quality. Abaricia and Delos Santos (2023) also showed that access flexibility, learning personalization, and interactive features in an LMS can improve the learning experience and participant satisfaction. In addition, Putra et al. (2025) explained that the LMS contributes to satisfaction through ease of obtaining information and support during the self-directed learning process. However, the effect of LMS quality on satisfaction is still lower than that of learning engagement. This means that technology quality is a supporting factor, while participant satisfaction is formed more by participants' engagement experience during the learning process.

The Effect of Work-Unit Mentoring on Training Participant Satisfaction

The research results show that work-unit mentoring has a positive and significant effect on training participant satisfaction. This finding indicates that participants who receive direction, motivation, assistance in understanding the material, and support in connecting learning with their work tend to have a more positive learning experience. In self-directed learning for civil servants, mentors function as a link between the knowledge gained through the LMS and its application in daily work. This role makes the learning process more relevant to participants' needs and work situations. This finding can be linked to the research of Ekuase-Anwansedo et al. (2018), which emphasized the importance of stakeholder support for the success of LMS-based learning. In addition, the studies of Mahabu et al. (2025) and Firmansyah and Basid (2025) also emphasized

that good support, interaction, and learning management can improve the quality of participants' learning experience. Thus, mentoring functions not only as a complement to self-directed learning, but also as a form of work-unit support that helps participants gain a more directed, relevant, and meaningful learning experience.

The Effect of Learning Engagement on Training Participant Satisfaction

The research results show that learning engagement has a positive and significant effect on training participant satisfaction and is the variable with the greatest direct effect on participant satisfaction. This finding indicates that participants who are active in learning activities, have interest and enthusiasm, and strive to understand the material in depth tend to obtain a more satisfying learning experience. This result is in line with the concept of student engagement proposed by Fredricks et al. (2004), which covers behavioral, emotional, and cognitive dimensions. This finding supports Edouard et al. (2023), who stated that participants' emotional engagement is related to more positive learning experiences and outcomes. Similar results were also found by Guo et al. (2024), who showed that high participant engagement in LMS-based learning can improve the quality of the learning experience. In addition, Abaricia and Delos Santos (2023) found that interactive LMS features can increase participant engagement, which in turn affects learning satisfaction. The greater effect of learning engagement compared to LMS quality confirms that participant satisfaction is determined not only by the facilities available, but also by the extent to which those facilities are actively utilized in the learning process. Therefore, participant engagement becomes an important element linking learning resources with the formation of a satisfying learning experience.

The Mediating Role of Learning Engagement in the Relationship between LMS Quality and Training Participant Satisfaction

The findings indicate that learning engagement mediates the relationship between LMS quality and training participant satisfaction. This suggests that a high-quality LMS does not contribute to participant satisfaction solely through its technical functionality. Its contribution also operates through the extent to which the system encourages participants to become actively involved in the learning process. An LMS that is accessible, reliable, informative, and easy to navigate can reduce technological barriers and create conditions that allow participants to devote greater attention and effort to self-directed learning.

This finding is consistent with Luo and Li (2026), who demonstrated that learning engagement serves as an important mechanism linking perceived e-learning system quality with student satisfaction. Their study emphasizes that the quality of an e-learning system becomes more meaningful when it encourages learners to participate actively in the learning process. Similarly, Zhang et al. (2024) found that learning engagement plays an intermediary role in explaining how digital technology use contributes to student satisfaction in vocational education. These studies reinforce the argument that technology alone does not automatically create a satisfying learning experience; technological resources must first be translated into meaningful learner involvement.

The present finding also complements Li and Zhu (2022), who showed that system quality and information quality are important determinants of satisfaction with online learning platforms. While their study primarily highlights the role of platform quality in shaping satisfaction, the

present research provides a more process-oriented explanation by positioning learning engagement as the participant-level mechanism connecting LMS quality with satisfaction. In other words, participants may perceive a learning system positively not only because it works properly, but because it enables them to engage more effectively with learning materials, assignments, and evaluations.

This mechanism is particularly relevant in the context of ASN competency development. Unlike full-time students, ASN participants undertake self-directed learning while simultaneously carrying out official responsibilities within their work units. Therefore, the value of LMS quality extends beyond technical convenience. A well-functioning LMS can help participants manage learning activities more independently, but its contribution to satisfaction depends on whether the system can sustain their involvement throughout the learning process.

Accordingly, the contribution of this finding lies in positioning LMS quality as a technological learning resource and learning engagement as the mechanism through which that resource is transformed into a satisfying learning experience. This interpretation suggests that BP2TL Jakarta should not focus solely on improving system stability, accessibility, and information quality. LMS development should also be accompanied by learning designs that encourage active participation, meaningful interaction with learning materials, timely completion of assignments, and continuous engagement throughout self-directed learning.

The Mediating Role of Learning Engagement in the Relationship between Work-Unit Mentoring and Training Participant Satisfaction

The findings also indicate that learning engagement mediates the relationship between work-unit mentoring and training participant satisfaction. This suggests that mentoring contributes to satisfaction not merely because participants receive assistance from their work units, but because such support helps them remain involved, motivated, and focused during self-directed learning. Work-unit mentors can therefore play an important role in transforming external support into a more meaningful learning experience.

This finding is consistent with Yang et al. (2025), who demonstrated that learning engagement serves as an important mechanism linking teacher support and learning satisfaction in blended learning. Their findings indicate that learners who perceive stronger support are more likely to become involved in the learning process, which subsequently contributes to a more positive evaluation of their learning experience. The present study extends this mechanism to a professional training environment, where support comes not primarily from teachers but from mentors located within participants' work units.

A similar pattern is reflected in Fan (2024), who found that perceived teacher support contributes to multiple dimensions of online learning engagement. Intellectual and emotional support were particularly relevant in maintaining learners' cognitive, emotional, behavioral, and social involvement. Although the setting differs from ASN training, the underlying mechanism is comparable. Participants engaged in self-directed professional learning may need more than access to learning materials; they also require interpersonal support that helps them interpret the material, maintain motivation, and connect learning activities with practical work responsibilities.

The present finding can also be compared with Dai and Zhen (2026), who showed that mentorship may influence employee satisfaction through an intervening individual condition.

Although their study focused on work-life balance rather than learning engagement, both studies highlight that the value of mentoring does not operate only through direct interpersonal assistance. Mentoring becomes more meaningful when it enables individuals to develop a condition or experience that subsequently improves satisfaction. In the present context, that condition is sustained engagement in the learning process.

This distinction is important because work-unit mentoring in ASN training should not be interpreted merely as administrative support. Mentors can serve as a social learning resource by providing direction, motivation, clarification, and assistance in connecting training material with participants' actual work. Such support becomes particularly important when participants must divide their attention between learning requirements and official duties.

Conclusion

This study shows that LMS quality, work-unit mentoring, and learning engagement play an important role in influencing participant satisfaction in self-directed learning within ASN functional technical training at BP2TL Jakarta. LMS quality is proven to contribute to increasing learning engagement and participant satisfaction, indicating that a learning system that is easy to use, well accessible, and provides relevant information and materials can create a more supportive learning experience for participants. Work-unit mentoring is also proven to improve learning engagement and participant satisfaction, with a greater effect on learning engagement than LMS quality. This indicates that in self-directed learning, support and guidance from the work environment play an important role in encouraging participant engagement. In addition, learning engagement has the greatest direct effect on participant satisfaction, so satisfaction is determined not only by the availability and quality of the LMS or mentor support, but also by the level of participant activeness during the learning process. The indirect-effect analysis further confirms that learning engagement mediates the relationship between LMS quality and training participant satisfaction, indicating that LMS quality contributes to satisfaction partly by strengthening participants' engagement in the learning process. Learning engagement also mediates the relationship between work-unit mentoring and participant satisfaction, demonstrating that mentoring support becomes more meaningful when it encourages participants to remain actively involved in self-directed learning. Since the direct and indirect relationships remain positive and significant, learning engagement functions as a complementary mediator in both relationships. Overall, the research findings confirm that self-directed learning in ASN competency development needs to integrate the quality of learning technology, work-unit mentoring, and participant engagement in order to produce a more effective and satisfying learning experience.

The research findings also suggest that the management of self-directed learning in ASN competency development should not focus solely on providing an LMS. Learning success also requires work-unit support and active participant engagement. Therefore, BP2TL Jakarta needs to prioritize strengthening work-unit mentoring through more structured mentoring guidelines, increased communication intensity, and the provision of ongoing direction and feedback. Learning activities also need to be designed to be more applicable and relevant to participants' work in order to increase learning engagement, along with improvements in LMS quality, particularly regarding system stability, ease of access, clarity of information, and material quality. The mediation findings

specifically suggest that improvements in LMS quality and mentoring should be directed toward strengthening participant engagement, because engagement serves as the mechanism through which technological and social learning resources are translated into greater satisfaction. Academically, these findings open up opportunities for developing a self-directed ASN learning model that integrates learning technology, workplace mentoring, and participant engagement in competency development. Future research could develop the model by incorporating learning motivation, self-efficacy, technology readiness, or organizational support, as well as expanding the research to other types of training and training units.

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