

THE EFFECT OF LEARNING TECHNOLOGY, TRAINING MOTIVATION, AND TRAINING SATISFACTION ON TRAINING EFFECTIVENESS FOR EDUCATIONAL PERSONNEL AT MUHAMMADIYAH UNIVERSITY OF YOGYAKARTA: A MEDIATION TEST

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Abstract

This study analyzes the effect of learning technology on training effectiveness through the mediating role of training motivation and training satisfaction among educational staff at Universitas Muhammadiyah Yogyakarta. This research addresses the limited empirical studies regarding online training effectiveness in higher education administrative staff contexts. The study employed a quantitative explanatory approach using survey methods involving 126 respondents who participated in institutional online training programs from December 2025 to March 2026. Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The findings indicate that learning technology significantly affects training effectiveness, training motivation, and training satisfaction. Furthermore, training motivation and training satisfaction significantly influence training effectiveness. Both variables also mediate the relationship between learning technology and training effectiveness. These findings highlight the importance of participant engagement and satisfaction in improving the success of online training programs.

Keywords: learning technology, training motivation, training satisfaction, training effectiveness, educational staff

INTRODUCTION

The development of information technology has driven transformation in various organizational activities, including the implementation of training and human resource development in higher education. The use of learning technology through *Learning Management Systems* (LMS), virtual conference platforms, and various digital media allows for more flexible, efficient, and integrated training processes. However, the success of technology-based training implementation is determined not only by the availability of digital infrastructure, but also by the ability and readiness of users to utilize the technology optimally. (Ryan & Deci, 2000) Information technology plays a strategic role in improving organizational effectiveness by accelerating work processes, increasing information accuracy, and enhancing human resource productivity (Anggraini, 2022; Mei et al., n.d.). In the context of online training, the quality of learning technology is a critical factor because it determines participants' comfort, ease of access, and learning experience during training. Previous research has shown that interactive and user-friendly learning technology can increase learning motivation and participant satisfaction (Sardo & Parwoto, 2024). Furthermore, the quality of digital systems, such as platform stability, ease of navigation, and interactivity, also contribute to the quality of the online learning experience (Martin & Bolliger, 2022).

The effectiveness of online training is a crucial indicator in assessing the success of digital-based competency development programs. This success is influenced not only by the quality of the technology used, but also by participants' psychological factors, such as motivation and satisfaction with the training process. Training motivation plays a role in encouraging participants' active engagement during the learning process, while training satisfaction reflects participants' evaluation of the learning experience (Kasmawati & Kuncoro, 2021). Therefore, a more comprehensive study of the relationship between learning technology, motivation, satisfaction, and training effectiveness is crucial. Muhammadiyah University of Yogyakarta (UMY), as a higher education institution, has implemented online training for educational staff through the MyKlass and Microsoft Teams platforms. The training program includes digital competency development,

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office application proficiency, and English language enhancement as part of efforts to improve the quality of campus administrative and operational services. However, based on initial observations, the implementation of online training still faces several challenges, particularly related to participant engagement, which must balance training participation with routine work responsibilities. This situation has the potential to affect participant focus, motivation, and satisfaction, ultimately impacting training effectiveness. Studies on the effectiveness of online training have been primarily conducted in the context of students, educators, or the industrial sector, while research specifically focusing on educators in higher education settings remains relatively limited. Furthermore, research that considers training motivation and satisfaction as mediating variables in the relationship between learning technology and online training effectiveness is also scarce. This gap highlights the need for more specific empirical research in the context of higher education administration. Based on this background, this study aims to analyze the influence of learning technology on the effectiveness of online training by considering the mediating role of training motivation and training satisfaction among educational personnel at Muhammadiyah University of Yogyakarta. This research is expected to provide theoretical contributions to the development of literature on the effectiveness of digital-based training, while also providing practical implications for higher education institutions in designing more effective and experience-oriented online training programs.

LITERATURE REVIEW

Previous research has shown that learning technology positively contributes to training effectiveness because good system quality can increase participant engagement and learning outcomes (Sardo & Parwoto, 2024). Furthermore, learning technology has also been shown to increase participant motivation and satisfaction (Kasmawati & Kuncoro, 2021; Murcahyanto, 2024). On the other hand, motivation has a positive effect on the effectiveness of online learning (Selfiana *et al.*, 2025), while satisfaction is related to learning retention and perceived training benefits (Martin & Bolliger, 2022). Previous research also shows that motivation and satisfaction act as mediators in the relationship between learning technology and training effectiveness (Sardo & Parwoto, 2024). Based on the theoretical and empirical studies, the research hypothesis is formulated as follows.

The Influence of Learning Technology on Training Effectiveness

Learning technology is a key element in online training because it enables flexible and integrated learning. The use of a *Learning Management System* (LMS), a virtual conferencing platform, and stable digital media can improve learning quality and training effectiveness (Jain *et al.*, 2024). Interactive and user-friendly technology also helps increase participant understanding and engagement during training (Martin & Bolliger, 2022). Previous research has shown that the quality of learning technology positively influences the effectiveness of online training by enhancing participants' learning experiences (Sardo & Parwoto, 2024). Therefore, the following hypothesis is proposed:

H1: Learning technology has a positive and significant effect on the effectiveness of online training for educational staff at Muhammadiyah University of Yogyakarta.

The Influence of Learning Technology on Training Motivation

Training motivation is an internal or external drive that encourages participants to actively engage in the learning process (Ryan & Deci, 2000). In the context of online training, accessible, flexible, and interactive technology can increase participant interest and engagement (Murcahyanto, 2024). Previous research has shown that the quality of learning technology has a positive effect on participant motivation in online learning (Kasmawati & Kuncoro, 2021; Sardo & Parwoto, 2024). Therefore, the following hypothesis is proposed:

H2: Learning technology has a positive and significant effect on the motivation of online training of educational staff at Muhammadiyah University of Yogyakarta.

The Influence of Learning Technology on Training Satisfaction

Training satisfaction reflects participants' evaluation of the learning experience gained during online training. Stable and user-friendly learning technology is an important factor in creating a comfortable learning experience (Martin & Bolliger, 2022). Research shows that the quality of digital systems has a positive effect on participant satisfaction (Kasmawati & Kuncoro, 2021), including in the context of online training (Sardo & Parwoto, 2024). Therefore, the following hypothesis is proposed:

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H3: Learning technology has a positive and significant effect on the satisfaction of online training for educational staff at Muhammadiyah University of Yogyakarta.

The Influence of Training Motivation on Training Effectiveness

Training motivation is a crucial factor in determining the success of online training because motivated participants tend to be more active, focused, and committed to learning (Ryan & Deci, 2000). Research shows that participant motivation positively influences the effectiveness of online learning (Sardo & Parwoto, 2024; Selfiana *et al.*, 2025). Based on this, the following hypothesis is proposed:

H4: Training motivation has a positive and significant effect on the effectiveness of online training for educational staff at Muhammadiyah University of Yogyakarta.

The Influence of Training Satisfaction on Training Effectiveness

Training satisfaction indicates the extent to which training meets participants' needs and expectations. Participants who are satisfied with the materials, methods, and technological support are more likely to understand and apply the training findings in their work (Martin & Bolliger, 2022). Previous research has also shown that satisfaction positively influences the effectiveness of online training (Sardo & Parwoto, 2024) and is an early indicator of training success based on Kirkpatrick's model (Dwikurnaningsih & Waruwu, 2022). Therefore, the following hypothesis is proposed:

H5: Training satisfaction has a positive and significant effect on the effectiveness of online training for educational staff at Muhammadiyah University of Yogyakarta.

The Mediation Role of Training Motivation

Training motivation is suspected to mediate the relationship between learning technology and training effectiveness. Good technology can increase participant motivation through ease of access, flexibility, and a more engaging learning experience (Murcahyanto, 2024). Previous research also shows that motivation mediates the influence of learning technology on the effectiveness of online training (Sardo & Parwoto, 2024). Therefore, the following hypothesis is proposed:

H6: Training motivation significantly mediates the influence of learning technology on the effectiveness of online training for educational staff at Muhammadiyah University of Yogyakarta.

The Mediating Role of Training Satisfaction

Training satisfaction is also suspected to mediate the relationship between learning technology and training effectiveness. Quality learning technology can enhance the learning experience, thereby increasing participant satisfaction (Martin & Bolliger, 2022). Previous research has shown that satisfaction mediates the relationship between learning technology and online training effectiveness (Sardo & Parwoto, 2024). Therefore, the following hypothesis is proposed:

H7: Training satisfaction significantly mediates the influence of learning technology on the effectiveness of online training for educational staff at Muhammadiyah University of Yogyakarta.

Based on the explanation of the relationship between the variables above, the framework can be described as follows:

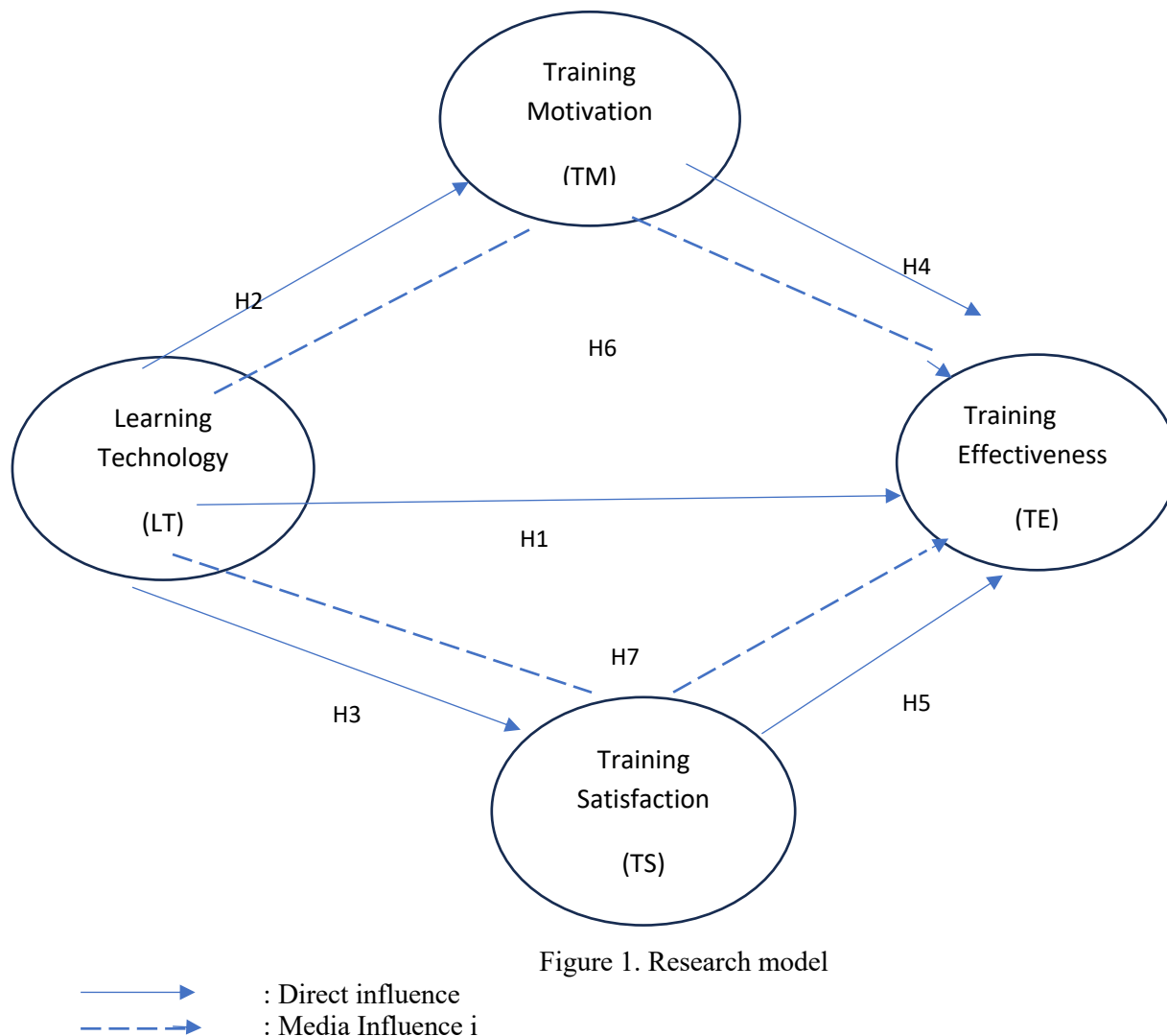


Figure 1. Research model

METHODOLOGY

This study uses a quantitative approach with a survey method and an explanatory design to analyze the influence of learning technology, training motivation, and training satisfaction on the effectiveness of online training among educational staff at Muhammadiyah University of Yogyakarta (UMY). The quantitative approach was chosen because it can empirically test the relationship between variables through statistical analysis. The research object was Muhammadiyah University of Yogyakarta, while the subjects were educational staff participating in the institution's online training program. The study population consisted of 511 permanent and contract educational staff, based on data from the Directorate of Human Resources and Organization (DSDMO). However, there were approximately 300 active participants who met the research criteria. The sampling technique used *purposive sampling*, namely respondents who had participated in online training and were still active as educational staff at UMY (Sugiyono, 2019). The sample size was determined using the Slovin formula with a 7% error rate as follows:

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$$n = \frac{N}{1 + N(e^2)}$$

With $N = 300$ and $e = 0,07$, then:

$$n = \frac{300}{1 + 300(0,07^2)} = \frac{300}{1 + 300(0,0049)} = \frac{300}{1 + 1,47} = \frac{300}{2,47} = 121,45$$

So the number of samples was rounded to **121 respondents**.

The research data used primary data obtained through the distribution of a questionnaire based on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The use of questionnaires was considered effective in measuring respondents' perceptions in a systematic and structured manner (Romdona et al., 2025; Rumina, 2024).

Table 1. Operational Definition of Variables

Variables	Key Indicators	Scale
Learning Technology (LT)	Ease of use, system stability, navigation, interactive features, accessibility	Likert 1–5
Motivation Training (TM)	Desire to learn, relevance of material, commitment, sincerity, enthusiasm	Likert 1–5
Training Satisfaction (TS)	Satisfaction with material, presenters, implementation, technical support, overall experience	Likert 1–5
Training Effectiveness (TE)	Improvement of knowledge, skills, application of results, performance, work unit contribution	Likert 1–5

Data analysis was conducted using Structural Equation Modeling based on Partial Least Squares (SEM-PLS) because it is able to test causal relationships between latent variables simultaneously and is suitable for mediation models. The analysis stages include evaluating the outer model and inner model. Convergent validity was tested through *outer loading* ≥ 0.70 and *AVE* ≥ 0.50 . Construct reliability was tested through Composite Reliability and Cronbach's Alpha ≥ 0.70 . Discriminant validity was tested using Fornell-Larcker and HTMT < 0.90 . Structural model evaluation was conducted using R-Square (R^2), Effect Size (f^2), and Predictive Relevance (Q^2) values (Hair et al., 2019). Hypothesis testing was conducted through a *bootstrapping procedure* with a 5% significance level, so the hypothesis was accepted if the t-statistic value was > 1.96 and the p-value < 0.05 .

RESEARCH RESULT

Outer Model Evaluation

This research was conducted on UMY education staff who participated in the online training program. The number of respondents used in this study was 126 respondents, consisting of 70 male employees, 56 female employees. The work period of 1-5 years was 35 people or 27.8%, 6-10 years was 25 people (19.8%), 11-15 years was 15 people or 11.9% and above 16 years was 51 people or 40.5%. The majority of respondents were permanent education staff as much as 73.8%, while the rest consisted of contract employees and PUPK.

Validity Testing:

a. Convergent Validity

The validity and reliability of the data in this study were evaluated using SEM-PLS 4 software. Factor loading, cross-loading, Average Variance Extracted (AVE), and Cronbach's alpha were used to assess the validity and reliability of the data.

The test results are presented as follows:

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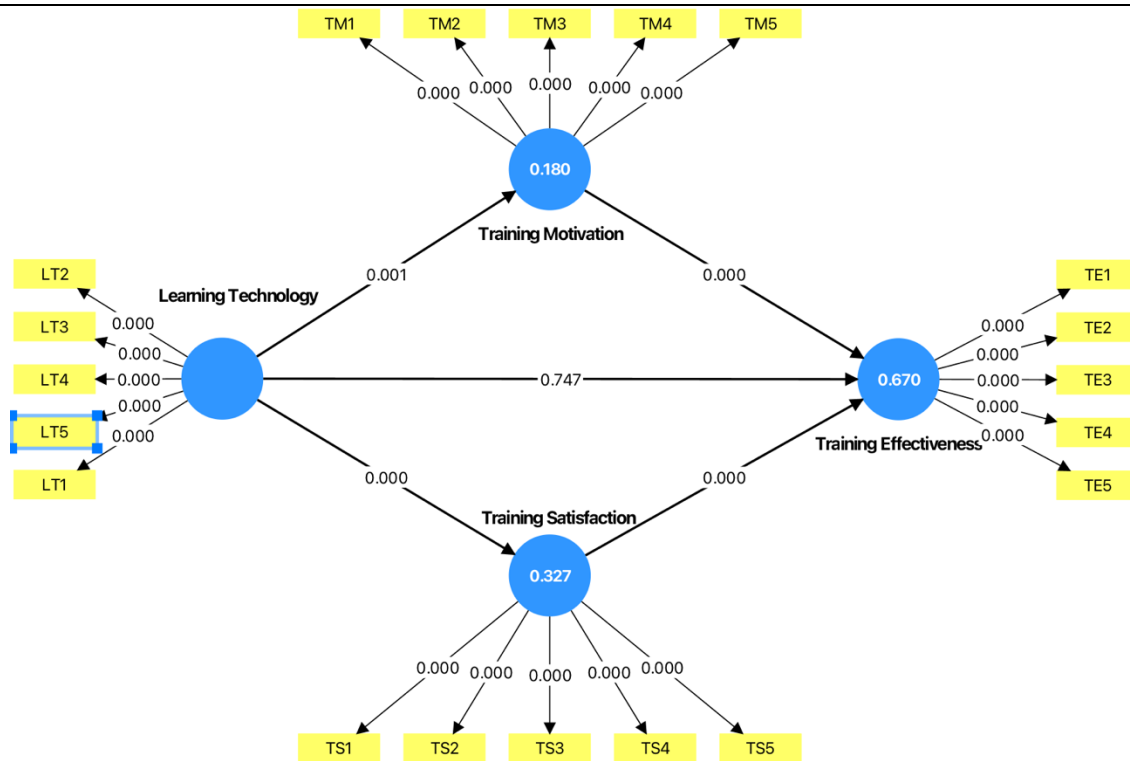


Figure 2. Validity and reliability testing model

Table 2. Construct validity and reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)	Information
Learning Technology	0.868	0.874	0.905	0.656	True & Trusted
Training Effectiveness	0.936	0.937	0.951	0.797	True & Trusted
Motivational Training	0.845	0.848	0.890	0.619	True & Trusted
Satisfaction Training	0.908	0.908	0.931	0.730	True & Trusted

Source: Primary data processed using SmartPLS, 4.0.

The results of the validity and reliability tests shown in the figure above indicate that all items in the variables Learning Technology, Training Motivation and Training Satisfaction, and Online Training Effectiveness have loading values exceeding 0.70. This indicates that all items validly measure the variables in this study. The results of the factor loadings are presented in the following table:

Outer Model Evaluation

An outer model evaluation was conducted to test the construct's validity and reliability. Based on the analysis using SEM-PLS, all indicators in the variables *Learning Technology*, *Training Motivation*, *Training Satisfaction*, and *Training Effectiveness* had outer loading values above 0.70. This indicates that all indicators met the convergent validity criteria.

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In addition, the Composite Reliability value And Cronbach's Alpha for all constructs was above 0.70, and the Average Variance Extracted (AVE) value was above 0.50. Thus, all variables in this study were deemed reliable and valid for use in further analysis. Discriminant validity testing also showed good results. The HTMT values between variables were below 0.90, indicating that each construct had adequate discriminatory ability and that there was no overlap between variables.

Table 3. Outer Loading Results

Variables	Indicator	Outer Loading	Limit	Notes
Learning Technology	LT1	0.830	0.700	Correct
Learning Technology	LT2	0.818	0.700	Correct
Learning Technology	LT3	0.889	0.700	Correct
Learning Technology	LT4	0.790	0.700	Correct
Learning Technology	LT5	0.714	0.700	Correct
Training Effectiveness	TE1	0.900	0.700	Correct
Training Effectiveness	TE2	0.894	0.700	Correct
Training Effectiveness	TE3	0.862	0.700	Correct
Training Effectiveness	TE4	0.887	0.700	Correct
Training Effectiveness	TE5	0.919	0.700	Correct
Motivational Training	TM1	0.734	0.700	Correct
Motivational Training	TM2	0.725	0.700	Correct
Motivational Training	TM3	0.793	0.700	Correct
Motivational Training	TM4	0.843	0.700	Correct
Motivational Training	TM5	0.832	0.700	Correct
Satisfaction Training	TS1	0.861	0.700	Correct
Satisfaction Training	TS2	0.859	0.700	Correct
Satisfaction Training	TS3	0.848	0.700	Correct
Satisfaction Training	TS4	0.870	0.700	Correct
Satisfaction Training	TS5	0.833	0.700	Correct

Source: Primary data processed using SmartPLS, 4.0.

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b. Discriminant Validity

Discriminant validity testing is conducted to ensure that each construct in the study has different characteristics from other constructs. In this study, discriminant validity was tested using the method *Fornell-Larcker Criterion* And *Heterotrait-Monotrait Ratio* (HTMT). A construct is declared to meet discriminant validity if the square root value of the AVE on the construct is greater than the correlation between other constructs and the HTMT value is below 0.90 (Hair et al., 2019). The test results indicate that all research variables meet the criteria for discriminant validity, as the square root of the AVE for each construct is higher than the correlation between the other variables. Thus, each construct in this study is able to explain its own variables differently, and there are no inter-construct discriminant issues.

Table 4. Discriminant Validity (Fornell-Larcker Criterion)

Variables	LT	TM	TS	TE
Learning Technology (LT)	0.810			
Motivation Training (TM)	0.425	0.787		
Training Satisfaction (TS)	0.572	0.641	0.854	
Training Effectiveness (TE)	0.633	0.541	0.741	0.893

Note:

The bold diagonal value is the square root of AVE.

Based on the table above, all AVE square root values for each construct are greater than the correlations between the other constructs. Thus, all research variables meet the discriminant validity criteria based on the Fornell-Larcker Criterion method.

Table 5. HTMT Results

Variables	LT	TM	TS	TE
Learning Technology (LT)				
Motivation Training (TM)	0.503			
Training Satisfaction (TS)	0.648	0.731		
Training Effectiveness (TE)	0.711	0.684	0.842	

The HTMT values for all variables were below 0.90, indicating that all research constructs met the criteria for discriminant validity. Thus, each variable was able to explain its construct differently, and there was no overlap between research variables.

Inner Model Evaluation

Evaluation *inner model* carried out using the R-Square (R^2) value to determine the ability of the independent variable to explain the dependent variable.

Table 6. R-Square Value

Endogenous Variables	R-Square	Category
Motivational Training	0.180	Weak
Satisfaction Training	0.327	Moderate
Training Effectiveness	0.670	Strong

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Based on the table above, the R-Square value for the variable *Training Effectiveness* of 0.670, which shows that the effectiveness of online training can be explained by the variable *Learning Technology*, *Motivational Training*, and *Satisfaction Training* amounting to 67.0%, while the remainder is explained by other variables outside the research.

Hypothesis Testing

Hypothesis testing was conducted using a bootstrapping procedure with a 5% significance level. A summary of the hypothesis testing results is presented in the following table:

Table 7. Hypothesis Testing Results

Hypothesis	Variable Relationship	Original Sample	T-Statistics	P-Values	Information
H1	Learning Technology → Training Effectiveness	0.243	2,481	0.013	Accepted
H2	Learning Technology → Training Motivation	0.425	5,911	0,000	Accepted
H3	Learning Technology → Training Satisfaction	0.572	8,216	0,000	Accepted
H4	Training Motivation → Training Effectiveness	0.214	2,270	0.024	Accepted
H5	Training Satisfaction → Training Effectiveness	0.529	5,731	0,000	Accepted
H6	Learning Technology → Training Motivation → Training Effectiveness	0.091	2,041	0.042	Accepted
H7	Learning Technology → Training Satisfaction → Training Effectiveness	0.303	4,588	0,000	Accepted

The test results show that all research hypotheses are accepted because they have a value *t-statistics* > 1.96 and *p-values* < 0.05. This indicates that learning technology has a positive influence on online training effectiveness, training motivation, and training satisfaction. Furthermore, training motivation and training satisfaction have also been shown to mediate the influence of learning technology on online training effectiveness.

DISCUSSION

Evaluation results *outer model* shows that all indicators in the variable *Learning Technology*, *Motivation Training*, *Satisfaction Training*, and *Training Effectiveness* have value *outer loading* above 0.70. In addition, the value *Composite Reliability* And *Cronbach's Alpha* All constructs were above 0.70 and the AVE value was above 0.50. This indicates that all constructs met the validity and reliability criteria and are therefore suitable for use in testing the structural model. The results of the discriminant validity test using *Fornell-Larcker Criterion* and HTMT also showed that all research variables had good discrimination ability. Thus, each construct in this study was able to explain the variables differently, and there was no overlap between constructs.

Based on the test results *inner model*, variables *Training Effectiveness* has a relatively strong coefficient of determination. This indicates that the effectiveness of online training can be explained by the variables of learning technology, training motivation, and training satisfaction. Meanwhile, the variables of training motivation and satisfaction are in the moderate category, indicating that learning technology contributes to explaining both variables. The results of the hypothesis testing indicate that learning technology has a positive and significant effect on the effectiveness of online training. This finding suggests that a high-quality digital learning system can improve the success of online training. Easy-to-use, interactive, and flexible learning technology helps participants understand training materials more effectively. These findings align with research (Sardo & Parwoto, 2024), which states that learning technology has a positive effect on the effectiveness of online training.

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Furthermore, learning technology has also been shown to have a positive effect on training motivation. This indicates that quality learning technology can increase participant interest and engagement during online training. This finding supports research (Kasmawati & Kuncoro, 2021)by [and] (Sardo & Parwoto, 2024), which explains that effective learning technology can increase participant motivation through more engaging learning experiences. Learning technology also positively impacts training satisfaction. This suggests that a stable and user-friendly digital learning system can create a better learning experience, thereby increasing participant satisfaction. This finding aligns with research (Martin & Bolliger, 2022), which found that the quality of learning technology has a positive relationship with participant satisfaction in online training.

Further research results showed that training motivation positively influenced the effectiveness of online training. Participants with high motivation tended to be more active and focused during training, thus better able to implement training outcomes in their work. This finding supports research (Selfiana *et al.*, 2025)and (Sardo & Parwoto, 2024). Training satisfaction has also been shown to positively influence the effectiveness of online training. This suggests that participants who are satisfied with the material, learning methods, and the quality of the learning system are more likely to understand and apply the training results. This research supports the findings of [[(Sardo & Parwoto, 2024)... The results of the mediation test indicate that training motivation mediates the relationship between learning technology and online training effectiveness. This suggests that effective learning technology can enhance participant motivation, which in turn improves training effectiveness. This finding is consistent with research (Sardo & Parwoto, 2024).

Furthermore, training satisfaction was also shown to mediate the relationship between learning technology and online training effectiveness. These results indicate that high-quality learning technology can increase participant satisfaction, thereby increasing training effectiveness. In this study, training satisfaction played a stronger mediating role than training motivation. Overall, the results of the study show that the effectiveness of online training for educational staff at Muhammadiyah University of Yogyakarta is influenced by the quality of learning technology, participant motivation, and participant satisfaction.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study aims to analyze the influence *learning technology* to *training effectiveness* with a mediating role *motivation training* And *training satisfaction* on educational staff at Muhammadiyah University of Yogyakarta. The results showed that learning technology had a positive and significant effect on the effectiveness of online training, training motivation, and training satisfaction. Furthermore, training motivation and training satisfaction were also shown to have a positive effect on the effectiveness of online training. Further research findings indicate that training motivation and training satisfaction mediate the influence of learning technology on the effectiveness of online training. These findings suggest that high-quality learning technology can enhance participant motivation and satisfaction, thereby increasing the effectiveness of online training. Overall, the effectiveness of online training for educational staff at Muhammadiyah University of Yogyakarta is influenced by the quality of learning technology as well as psychological factors of participants, namely motivation and training satisfaction.

Recommendation

Muhammadiyah University of Yogyakarta needs to improve the quality of its learning technology by developing a more interactive, stable, and user-friendly training platform to enhance the effectiveness of online training. Furthermore, the institution needs to address participant motivation and satisfaction by providing relevant training materials, engaging learning methods, and adequate technical support during the training. For further researchers, this study can be developed by adding other variables such as organizational support, digital competence, or participant engagement to obtain a more comprehensive research model regarding the effectiveness of online training.

FURTHER RESEARCH

This study still has several limitations that could provide opportunities for further research. First, the study was conducted only on educational staff at Muhammadiyah University of Yogyakarta, so the results cannot be generalized to other higher education institutions. Future research is recommended to expand the research sample to various universities, both public and private, to obtain more comprehensive results.

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Second, this study only used the variables of learning technology, training motivation, training satisfaction, and training effectiveness. Future research could add other variables such as digital competence, organizational support, participant engagement, self-efficacy, and learning culture, which could potentially influence the effectiveness of online training. Third, this study used a quantitative approach through questionnaires, thus not providing an in-depth description of participants' experiences. Future research could employ mixed methods or qualitative approaches to gain a deeper understanding of participants' experiences participating in online training. In addition, further research can also compare the effectiveness of online training and face-to-face training to determine the most effective training model in improving the competence of educational staff in higher education.

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