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METACOGNITIVE LISTENING STRATEGIES AND MALL: EFFECTS OF LEARNING STYLES AND SELF- EFFICACY

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Abstract: This study investigates the impact of metacognitive listening strategies on English listening performance among students at SMK Walisongo Jakarta, particularly in using Mobile-Assisted Language Learning (MALL). Using a purposive sampling method, 68 respondents were selected to participate in this research. The study examines the mediating effects of learning styles and self-efficacy to provide a comprehensive understanding of the interplay between these factors and listening performance. Data were collected through pre-tests, post-tests, and validated questionnaires measuring metacognitive strategy use, learning styles, and self-efficacy levels. The analysis results indicate that learning styles have a significant direct impact on listening performance, suggesting that individual differences in learning styles directly influence their listening abilities. This effect is especially important in the usage of Mobile-Assisted Language Learning (MALL), where students' learning preferences can affect how effectively they engage with learning materials presented through mobile devices. However, despite this significant direct relationship, the analysis also shows that the indirect effect of learning styles on listening performance through self-efficacy is not statistically significant. This suggests that, although self-efficacy is often considered a mediating factor in the learning process, in this study, it does not play a significant role in influencing the relationship between learning styles and listening performance. The findings offer valuable insights for language educators, emphasizing the importance of tailoring metacognitive strategy instruction to align with learners' characteristics in technology-enhanced learning environments.
Keywords: *learning styles; listening; metacognitive listening strategy; Mobile Assisted Language Learning; performance; self efficacy*

INTRODUCTION

In recent decades, advancements in information and communication technology have transformed educational paradigms, including language learning. One rapidly emerging innovation is Mobile-Assisted Language Learning (MALL), which enables language acquisition through mobile devices such as smartphones and tablets. The implementation of MALL involves the use of mobile-based or mobile-accessible applications and/or features of mobile devices (such as audio/video recording, picture/note-taking) for language teaching and learning within a defined learning environment, with specific participants and treatment conditions (Burston, 2024). This technology offers flexibility in terms of time, location, and learning methods, while also supporting the development of learner autonomy (Melliti & Henchiri, 2024). However, despite the significant benefits promised by MALL, challenges related to the cognitive load imposed by technology use in the learning process have emerged (Bahari, 2023) .

One key skill that must be mastered in language learning is listening skills. This skill often poses a significant challenge for many

language learners, as it requires intense attention and the ability to process information presented in real-time. Listening in English is a crucial component of communication and plays a significant role in the educational process. It is essential for understanding spoken information, engaging in effective conversations, and acquiring language skills (Ghafar & Raheem, 2023). Listening skills are fundamental in language learning, particularly in foreign language acquisition (Rakhimova, 2024). Listening skills are considered crucial in English as a Foreign Language (EFL) learning because they involve the ability to understand and process spoken language effectively (Gómez González & Rivadeneira Barreiro, 2025) . The development of speech skills cannot be carried out without listening skills (Zarina, 2024). In the study, listening skills are enhanced by integrating mobile technology, which allows for more flexible and personalized practice (Pyo & Lee, 2024). Although listening is often perceived as a passive skill, it actually involves active processes in understanding and interpreting orally conveyed messages (Susanto & Nanda, 2024).

MALL allows learners to study anytime and anywhere through mobile devices, creating a more flexible and interactive learning environment (Alisoy & Sadiqzade, 2024). The study conducted by (Li, 2023) emphasizes the importance of considering the learner's educational level when implementing Mobile-Assisted Language Learning (MALL) strategies. This finding highlights that tailoring MALL interventions to the specific educational background of the learners can significantly enhance the effectiveness of the learning experience.

Nevertheless, despite the numerous potentials of MALL, certain challenges persist, especially in enhancing listening skills. One critical factor for optimizing listening abilities is the use of metacognitive listening strategies. These strategies encompass planning, monitoring, and evaluating the listening process, which aids learners in becoming more aware of their learning processes and more effective in handling spoken texts (Madarbakus-Ring, 2024). Metacognition facilitates learners in developing the higher-order thinking skills necessary for completing complex listening tasks (Susanti et al., 2025).

In addition to listening strategies, two other important factors that can influence success in MALL are learning styles and self-efficacy. Learning styles refer to how learners receive and process information, which can vary significantly among individuals. Research has indicated that learning styles influence how students approach learning strategies, although there is limited exploration of how these styles interact with other factors in second or foreign language acquisition. While the relationship between learning styles and learning strategies is acknowledged, more studies are needed to fully understand how these styles intersect with other variables in the context of language learning (Liu, 2023).

Meanwhile, self-efficacy, or the belief in one's ability to accomplish listening tasks, can also significantly impact learning outcomes. Study conducted by (Y. Zhang & Xu, 2024) investigate that self-efficacy refers to learners' belief in their ability to successfully perform specific tasks—in this case, listening comprehension. The study found that high self-efficacy in listening is associated with better listening performance. Learners who believe in their abilities tend to use more effective metacognitive strategies, which can help them navigate and understand spoken language more successfully. With technological advancements, new approaches such as Mobile-Assisted Language Learning (MALL) have emerged as solutions for improving listening skills more effectively and efficiently. However, to maximize the potential of MALL, it is essential for learners to employ appropriate learning strategies, particularly when confronting complex oral texts (M. Zhang, 2024).

Metacognitive listening strategies play a vital role in this process. Metacognitive listening strategies are approaches that learners use to monitor and regulate their listening processes to improve comprehension and retention of spoken material (Al-Khresheh & Alruwaili, 2024). By utilizing these strategies, learners can plan, monitor, and evaluate their listening processes more systematically, thereby enhancing their ability to control and optimize their learning experiences. Furthermore, individual differences, such as learning styles and self-efficacy, also play a role in mediating the effectiveness of these strategies in improving listening performance (T. Shaojie et al., 2024) . The appropriate learning style can assist learners in tailoring their study methods to their personal needs, while self-efficacy can provide the motivation and self-confidence necessary to tackle various challenges in listening learning. Exploring the impact of meta-cognitive listening strategies on listening performance in MALL holds both

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theoretical and practical importance (T. Shaojie et al., 2024).

Mobile-Assisted Language Learning (MALL) has emerged as a significant innovation in language education, leveraging mobile technology such as smartphones and tablets to facilitate flexible, independent, and interactive learning processes (Alisoy & Sadiqzade, 2024). MALL provides learners with the opportunity to study languages anytime and anywhere, supporting learner autonomy (Omama Khan et al., 2024).

However, despite its considerable potential, MALL also presents challenges, one of which is the increased cognitive load resulting from the continuous use of technology (Lăpădat, 2023) . This cognitive load can impact students' ability to process information optimally, particularly when faced with complex spoken texts.

Pranowo et al. (2024) define metacognitive strategies as those that help learners become aware of, control, and direct their learning processes. In listening skills, these strategies aid learners in becoming more conscious of how they listen, what aspects to focus on, and how to correct misunderstandings in their listening comprehension.

Research indicates that the use of metacognitive listening strategies can enhance listening performance by helping students process audio information more effectively. Vandergrift in (Su, 2024) found that students employing metacognitive strategies achieved better results in listening tests compared to those who did not utilize such strategies. These strategies assist students in planning listening tasks, monitoring their understanding, and evaluating their performance after the tasks are completed.

Learning styles refer to individual preferences in how they receive and process information (Hattie & O'Leary, 2025) . In language learning, learning styles play a crucial role as they influence how students learn effectively, especially in the application of specific learning strategies. Learning style inventories, such as Visual, Auditory, Reading/Writing, Kinesthetic (VARK), help classify students' learning styles, which can vary significantly among individuals (Sayed et al., 2025). Visual learners tend to focus more on visual representations, while auditory learners are more effective in processing information that is heard (Jurayeva, 2025) .

In MALL, understanding students' learning styles is vital for tailoring effective learning methods. Learning styles mediate the effectiveness of listening strategies, particularly in the context of mobile technology use (Hsu & Lin, 2024). For instance, students with auditory learning styles may feel more comfortable using MALL for listening skills, while students with visual learning styles might require additional support through visual materials that complement audio content.

Self-efficacy, or an individual's belief in their capability to accomplish specific tasks, significantly influences learning performance (Bandura in Teng, 2024). In language learning, self-efficacy often relates to students' belief that they can successfully comprehend and use the target language, including in listening skills (Milliner & Dimoski, 2024). Students who possess high confidence in their listening abilities tend to be more motivated, persistent, and better equipped to tackle challenges in the listening process.

Self-efficacy can serve as a mediator in the relationship between metacognitive listening strategies and listening performance. According to a study by (Z. , X. Y. Shaojie & Zhang, 2024), students with high self-efficacy are more capable of effectively applying listening strategies in technology supported learning environments. Self-efficacy also encourages students to be more confident in using applications and mobile devices for language learning, ultimately contributing to improved listening performance (Hong & Tai, 2024).

Research demonstrates that metacognitive listening strategies, learning styles, and self-efficacy are interconnected in enhancing students' listening performance. The use of metacognitive listening strategies can be optimized through a better understanding of students' learning styles (Polatcan et al., 2025). A learning style that aligns with individual preferences aids students in utilizing listening strategies more effectively (Suparman & Irsandi, 2023). Additionally, self-efficacy plays a crucial role in enhancing students' motivation and confidence in implementing these strategies within the MALL usage (Rashid et al., 2025) .

Shaojie & Zhang (2024) investigate the mediating roles of learning styles and self-efficacy in the relationship between metacognitive listening strategies and listening performance in Mobile-Assisted Language Learning (MALL). A dual mediation model is proposed and tested using a sample of university students in China in EFL classes with multimodal teaching. The proposed hypotheses suggest that metacognitive listening

strategies, learning styles, and self-efficacy each positively influence listening performance, with learning styles and self-efficacy mediating the relationship between listening strategies and performance, highlighting the potential for chain mediation effects.

This study aims to explore the role of metacognitive listening strategies in enhancing listening performance using MALL, as well as to examine how learning styles and self-efficacy mediate this relationship.

METHOD

The research employed a quantitative method conducted in three stages. The data collection procedure began with the preparation stage, which involved constructing and piloting the questionnaire to ensure its validity and reliability. Subsequently, the questionnaire was distributed to the selected sample, followed by the implementation of the listening comprehension test. The questionnaire data were used to measure the variables of metacognitive listening strategies, learning styles, and self-efficacy, while the results of the listening test were utilized to measure students' listening performance.

Metacognitive listening strategies were measured using a questionnaire developed based on the theories of planning, monitoring, and evaluating listening by Vandergrift in (T. Shaojie et al., 2024). Learning styles were assessed using learning style inventories based on Visual, Auditory, Reading/Writing, Kinesthetic (VARK) diagnostic test by (Sayed et al., 2025). Self-efficacy was measured using an adapted self-efficacy scale developed by (Kim et al., 2024).

The second stage included a listening test in English supported by mobile technology, with the British Council Teens website serving as the primary tool for online testing. The third stage involved data analysis using SPSS29 software.

The research population comprised students at SMK Walisongo Jakarta who participated in English language learning, and samples were taken using purposive sampling techniques, with the criteria being students who actively used mobile devices for learning English. The sample size ranged from 68 students in grade 12th. The instruments used in this study included questionnaires consisting of several sections.

RESULTS AND DISCUSSION

Table 1. *Pretest and Post-test Correlation Analysis*

	Mean	N	Std. dev	Std err M
Pretest	64.8529	68	12.2465	1.485
posttest	95.3676	68	11.1072	1.346

The statistical analysis reveals an increase in the average score from 64.85 in the pre-test to 95.37 in the post-test for 68 participants, with an average improvement of 30.52 points. The standard deviation decreased from 12.25 (pre-test) to 11.11 (post-test), indicating a more consistent distribution of scores in the post-test. Additionally, the standard error of the mean reduced from 1.49 to 1.35, reflecting a more precise estimation of the population mean in the post-test. This data demonstrates a significant improvement in performance, likely due to the applied intervention or learning strategy. However, further analysis, such as a paired t-test, is required to confirm the statistical significance of this improvement. If the p-value is less than 0.05, the improvement can be considered statistically significant and unlikely to occur by chance.

Table 2. *Results of the paired samples test comparing pre-test and post-test scores*

	Mean stdev	Std eror Mean	95% Confidence Interval of the Difference lower	Upper	t	df	One Two side side p p
Pretest--Postest	-30.51 15.83	1.92	-34.34	-26.68	-15.88	67	<.00 <.001 1

The analysis from the Paired Samples Test reveals a significant improvement in scores, with a mean difference of -30.51, indicating that post-test scores were on average 30.51 points higher than pre-test scores. The standard deviation of 15.84 reflects some variability in individual improvements, while the standard error of

1.92 suggests precise estimation of the population mean difference. The 95%

confidence interval (-34.35 to -26.68) excludes zero, confirming the difference's significance. A large t-value of -15.888 (df = 67) and p-value < 0.001 indicate that the improvement is statistically significant and not due to chance. These results validate the effectiveness of the intervention or instructional strategy in enhancing participants' performance.

Table 3. *Descriptive statistics for listening performance across planning, monitoring, and evaluation variables*

	Listening Performance	N	Mean	Std. Deviation	Std. Error Mean
Planning	Skilled	35	23.34	.906	.153
	Less Skilled	33	20.28	1.509	.263
Monitoring	Skilled	35	23.51	.742	.126
	Less Skilled	33	21.52	1.584	.276
Evaluation	Skilled	35	23.46	.980	.166
	Less Skilled	33	21.64	1.388	.242

The group statistics reveal notable differences in Listening Performance between skilled and less-skilled groups across the variables of Planning, Monitoring, and Evaluation. For Planning, the skilled group (M = 23.34, SD = 0.906) outperformed the less-skilled group (M = 20.18, SD = 1.509), with lower variability in scores as reflected by a smaller standard error (SE = 0.153 vs. 0.263). Similarly, in Monitoring, the skilled group (M = 23.51, SD = 0.742) achieved higher scores compared to the less-skilled group (M = 21.52, SD = 1.584), again demonstrating less variability (SE = 0.126 vs. 0.276). For Evaluation, the skilled group (M = 23.46, SD = 0.980) continued to surpass the less- skilled group (M = 21.64, SD = 1.388), with a smaller standard error (SE = 0.166 vs. 0.242). Overall, the skilled group consistently demonstrated superior performance with higher mean scores and less variability across all variables, highlighting their stronger listening performance.

Table 4. *Descriptive statistics for listening performance across planning, monitoring, and evaluation variables*

		Levene's test		t-test for equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One side-p	Two side-p	Mean Difference	Std Error Difference	Lower	Upper
Planning	Equal Variances Assumed	7.7	.007	10.542	66	<.001	<.001	3.16	.300	2.562	3.76
	Equal variance not assumed			10.395	51.79	<.001	<.001	3.16	.304	2.551	3.77
Monitoring	Equal Variances Assumed	18.81	<.001	6.728	66	<.001	<.001	1.99	.297	1.40	2.59
	Equal variance not assumed			6.60		<.001	<.001	1.99	.303	1.38	2.60
Evaluation	Equal Variances Assumed	1.463	.231	6.27	66	<.001	<.001	1.82	.290	1.24	2.40
	Equal variance not assumed			6.21	57.62	<.001	<.001	1.82	.293	1.23	2.40

The Independent Samples T-Test revealed significant differences across the variables of Planning, Monitoring, and Evaluation. For Planning, the assumption of equal variances was not met (F=7.757, p=0.007), and the analysis using equal variances not assumed showed a mean difference of 3.161 (95% CI: 2.551 to 3.771; t(51.793)=10.395, p<0.001). Similarly, for Monitoring, the assumption of equal variances was not met (F=18.813, p<0.001), resulting in a mean difference of 1.999 (95% CI: 1.389 to 2.609; t(44.828)=6.600, p<0.001). For Evaluation, the assumption of equal variances was met (F=1.463, p=0.231), and the analysis indicated a mean difference of 1.821 (95% CI:
1.242 to 2.400; t(66)=6.277, p<0.001). Among the variables, Planning exhibited the largest mean difference (3.161), followed by Monitoring (1.999) and Evaluation (1.821), confirming significant differences between the groups across all aspects. The study also applied Model 4 of the path analysis approach, examining Learning Styles (LS) as the independent variable, Self-Efficacy (SE) as the mediating variable, and Listening Performance (LST) as the dependent variable.

Table 5. *Regression model summary and coefficients for predicting the outcome variable*
Model
Summary

R	R-sq	MSE	F	df1	df2	p
,0925	,0086	1639,3963	,5698	1,0000	66,0000	,4530
Model coeff						
	se	t	p	LICI	ULCI	
constant	100,9339	41,5827	2,4273	,0179	17,9110	183,9567
LS	,2404	,3185	,7548	,4530	-,3955	,8763
Standardized Coefficients						
LS	,0925					

The study found that Learning Styles (LS) do not significantly influence Self- Efficacy (SE) as a mediator in Mobile-Assisted Language Learning (MALL), with LS explaining only 0.86% of SE variability (R^2 = 0.0086, p = 0.4530). This suggests minimal contribution and calls for exploring other factors affecting SE.

In contrast, LS and SE together explain 22.58% of the variability in Listening Performance (LST) within MALL (R^2 = 0.2258, p = 0.0002). LS has a significant positive effect on LST (coefficient = 0.2222, p= 0.0003), while SE's impact is not statistically significant (coefficient = 0.0373, p = 0.0983). These findings highlight LS as a key factor in enhancing listening performance, whereas SE requires further investigation for its role in MALL-based learning.

Metacognitive listening strategies using MALL and listening performance

Metacognitive awareness allows learners to control and regulate their cognitive processes, which, in turn, can improve performance in tasks like listening. By applying these strategies, learners are able to actively engage in the listening process, anticipate difficulties, monitor their understanding, and make adjustments as needed, leading to better comprehension and retention of spoken material.

Furthermore, the use of a Mobile- Assisted Language Learning (MALL) platform appears to have been instrumental in facilitating the application of these metacognitive strategies. MALL offers an interactive environment that supports self- directed learning, allowing learners to engage with the material at their own pace and apply strategies in real-time. The Cognitive Theory of Multimedia Learning (CTML) reflects an ongoing and developing effort to comprehend the mechanisms underlying meaningful learning (Mayer, 2024). Cognitive theory of multimedia learning suggests that technology-enhanced learning environments, like MALL, can help learners process information more effectively by providing multiple modalities (e.g., audio and visual cues) that reinforce their cognitive strategies (Tang et al., 2024). The interaction between metacognitive strategies and the MALL platform likely contributed to the participants' improved listening performance, highlighting the importance of integrating technology to support and enhance metacognitive learning processes (Haerazi, 2023).

The influence of learning style on self efficacy (mediator)

Mobile-Assisted Language Learning (MALL) has gained attention as an effective approach to improving listening performance through the integration of technology and personalized learning strategies. This study explores the role of Learning Styles (LS) and its potential influence on Self-Efficacy (SE) as a mediating factor, providing valuable insights for optimizing learning outcomes. This section analyzes the statistical

relationship between LS and SE to determine whether LS significantly contributes to the variability in SE within the context of MALL.

The results indicate that LS plays a significant role in shaping LST, showing a strong and positive effect. This highlights the importance of aligning learning strategies with individual learning preferences to improve listening performance. In contrast, SE shows minimal direct impact on LST, suggesting that SE may not be the primary factor in this context. These findings suggest that while SE may play a supportive role, LS is a critical determinant of LST, highlighting the need to prioritize personalized learning approaches that align with individual learning styles in MALL.

The analysis results indicate that the interaction between Learning Styles (LS) and Self-Efficacy (SE) does not significantly affect Listening Performance (LST). Based on the interaction test, the value F(1, 64) = 2.0340 with p = 0.1587 shows that the relationship between LS and LST is not significantly mediated by SE. This suggests that SE does not serve as a meaningful mediator in strengthening or weakening the influence of LS on LST.

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Therefore, LS directly influences LST without significant contribution from the interaction or mediation of SE. The results of this analysis highlight the direct effects of LS on LST and reveal whether SE plays a significant mediating role in this relationship. These findings offer important insights into the role of individual learning preferences in enhancing listening performance using MALL (Kaliappan et al., 2023).

The total effect of learning style to listening performance

The analysis shows that Learning Styles (LS) significantly enhance Listening Performance (LST), emphasizing the importance of aligning learning strategies with individual preferences to improve listening skills. As LS improves, there is a direct and measurable improvement in LST, suggesting that personalized learning approaches can effectively boost listening performance.

The results further highlight that LS has a substantial and dominant impact on LST, reinforcing its critical role in enhancing listening skills. This finding emphasizes that

students who are taught in ways that align with their preferred learning styles are more likely to perform better in listening tasks.

Therefore, it can be concluded that LS is a key factor in improving LST within the context of Mobile-Assisted Language Learning (MALL), where technology can be leveraged to cater to different learning preferences and optimize the learning experience (Hu et al., 2023). This insight offers important implications for the design of MALL-based learning programs, suggesting that a more personalized and adaptive approach to teaching listening skills could lead to more effective language acquisition (Hwang et al., 2024).

The direct effect of learning style to listening performance

The analysis shows that learning styles (LS) have a significant direct effect on listening performance (LST), even when considering the role of self-efficacy (SE). The results indicate a strong positive relationship between LS and LST, suggesting that LS directly contributes to improvements in listening performance. The findings highlight that LS plays a key role in influencing LST, without SE acting as a mediating factor. These findings underscore that LS is a dominant factor in improving LST within the context of mobile-assisted language learning (MALL), reinforcing the importance of adapting learning activities and strategies (Ibarra, 2024).

The analysis also reveals that learning styles (LS) do not have a significant indirect effect on listening performance (LST) through self-efficacy (SE). The indirect effect is small, and the confidence interval includes zero, indicating that SE does not statistically mediate the relationship between LS and LST at the 95% confidence level. This suggests that while LS directly influences LST, SE does not play a significant mediating role in this relationship.

Therefore, the impact of LS on listening performance is independent of the levels of self-efficacy, highlighting the primacy of learning styles in enhancing LST within the MALL framework (Rawa, 2023). These insights can inform the design of more effective MALL-based programs that focus primarily on aligning learning strategies with students' learning preferences (Al-Abri et al., 2024).

Indirect effect of learning style on listening performance through self efficacy

The analysis indicates that Learning Styles (LS) do not significantly influence Listening Performance (LST) through Self- Efficacy (SE). The indirect effect of LS on LST is minimal and not statistically significant, suggesting that SE does not mediate the relationship between LS and LST. Additionally, the standardized indirect effect remains low, further supporting the conclusion that SE does not play a meaningful mediating role in this model.

In fact, the evidence points to a more direct, unmediated relationship between LS and LST. This direct effect suggests that the influence of LS on LST operates independently of SE, highlighting the importance of individual learning preferences in determining listening performance without the need for se to play a mediating role (Zhou & Thompson, 2023). Therefore, the findings imply that interventions focused on enhancing ls may have a more immediate and impactful effect on LST, without necessarily requiring changes in SE to strengthen this effect.

CONCLUSION

The analysis results indicate that Learning Styles (LS) have a significant direct effect on Listening Performance (LST), particularly in the context of technology- assisted learning, such as Mobile-Assisted Language Learning (MALL). This suggests that individual differences in learning styles influence their listening abilities. However,

the indirect effect of LS on LST through Self-Efficacy (SE) is not statistically significant, meaning that SE does not serve as a strong mediator in the relationship between LS and LST. Therefore, improvements in LST within the usage of Mobile-Assisted Language Learning (MALL) research are more strongly influenced by LS directly, rather than through the contribution of SE.

These findings offer valuable insights for educators and curriculum developers, who can focus their attention on adjusting learning styles to maximize students' listening performance improvement potential, without relying too heavily on the development of Self-Efficacy as the main factor in the learning process.

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