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Students' and Lecturers' Perceptions of Neuro-Linguistic Programming-Integrated Masked Language Model Twenty-Four Implementation in Test of English as a Foreign Language Learning

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A B S T R A C T

This study examines students' and lecturers' perceptions of the implementation of the Natural Language Processing (NLP)-integrated Marsiadapari Learning Model (MLM-24) in TOEFL learning at Institut Pendidikan Tapanuli Selatan. MLM-24 is a collaborative learning model rooted in the Batak Toba tradition of mutual cooperation. This study employed a mixed-method approach using questionnaires and semi-structured interviews. The findings indicate that the model improves students' understanding of TOEFL materials, motivation, confidence, and collaborative engagement. NLP integration supports grammar analysis, syntactic understanding, and automated feedback, enabling students to better comprehend complex linguistic structures. However, challenges such as time management and unequal participation were identified. Overall, the NLP-integrated MLM-24 provides a balanced approach by combining cultural values, collaborative learning, and technology to enhance TOEFL learning outcomes.

Keywords: *Collaborative Learning, Local Wisdom, MLM-24, NLP, TOEFL Learning,*

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INTRODUCTION

One of the most widely recognized instruments used to measure English proficiency is the TOEFL. The test evaluates integrated language skills, including listening, reading, speaking, and writing, and is required by more than 13,000 academic institutions worldwide. However, research shows that TOEFL demonstrate a high level of lexical and syntactic complexity, which often imposes a heavy cognitive load on learners compared with other English proficiency tests such as IELTS or CET-6 (Lubis et al., 2025; Chen & Luo, 2025; Yinyu, 2025). Consequently, many students experience difficulties in achieving satisfactory TOEFL scores despite having studied English for several years in formal education.

This challenge is also evident among students at the Institut Pendidikan Tapanuli Selatan (IPTS), where achieving a minimum TOEFL score is a mandatory requirement before students are allowed to participate in their *final thesis defense*. Despite its importance, many students fail to reach the required score on their first attempt, forcing them to retake the test several times and consequently delaying their graduation process (Lubis, 2025) . Previous studies conducted at IPTS reveal that these difficulties are influenced by several factors, including poor time management during the test, limited vocabulary mastery, and insufficient exposure to authentic TOEFL practice materials (Irmayana et al., 2025; Lubis, Nurbaidah, & Irmayana, 2025). Similar challenges have also been reported in other contexts where students struggle with standardized English tests due to limited strategic learning approaches and insufficient academic language exposure (Chen & Luo, 2025; Kim, 2021).

The persistence of these problems indicates that the learning approaches commonly used in TOEFL preparation classes may not be sufficiently effective. In many educational contexts, TOEFL instruction still relies heavily on teacher-centered learning approaches in which lecturers explain test strategies while students passively receive information (Lubis, Nurbaidah, & Irmayana, 2025). In addition, some preparation programs focus primarily on *test-wiseness* strategies, such as memorizing templates or guessing techniques, which may improve short-term test performance but do not necessarily develop students' genuine communicative competence (Kim, 2021; Yinyu, 2025). These limitations highlight the need for more innovative, collaborative, and student-centered learning models that encourage active participation and deeper understanding of TOEFL materials. In the context of North Sumatra, one form

local wisdom that reflects strong communal values is the Batak Toba tradition of *marsiadapari*. *Marsiadapari* refers to a cooperative tradition in which community members voluntarily help one another in agricultural and social activities without expecting direct compensation (Aricindy et al., 2023). The philosophy underlying this practice emphasizes solidarity, reciprocity, and collective responsibility within the community. Traditionally, *marsiadapari* plays a significant role in agricultural activities such as land preparation, planting, and harvesting, where villagers work together to accomplish tasks more efficiently (Nadeak, 2024). However, modernization and technological advancements in agriculture have gradually reduced the practice of *marsiadapari* among younger generations, particularly with the introduction of mechanized farming tools that replace traditional cooperative labor (Oktavia, 2023; Kristiyanto, 2025). For this reason, integrating local cultural values into educational practices is increasingly viewed as an important strategy to preserve cultural heritage while addressing contemporary educational challenges.

Based on these cultural principles, the MLM-24 was developed as an innovative pedagogical approach that integrates local wisdom into modern higher education practices. The model was introduced in 2024 by Lubis and her research team as part of a research initiative aimed at improving students' learning TOEFL outcomes at IPTS (Lubis, 2025). The MLM-24 is structured as a cooperative learning framework consisting of four main principles: collaborative learning through group discussions, adaptive learning that adjusts to students' needs, contextual learning that connects academic materials with real-world situations, and reflective learning through peer feedback and self-evaluation (Lubis, Nurbaidah, & Irmayana, 2025).

These components aim to transform the classroom into a more democratic and humanistic learning environment in which students actively participate in discussions and share strategies for solving TOEFL questions. Recent educational research emphasizes the importance of culturally responsive pedagogy, which integrates students' cultural backgrounds and local knowledge into learning practices to create more meaningful educational experiences (Ibnu Fitrianto & Muhammad Farisi, 2025; Munirah, M., Sulfasyah, S., Rahim, A. R., & Yusuf, 2025). This approach is closely aligned with the principles of Sustainable Development Goal 4 (SDG 4), which promotes inclusive, equitable, and high-quality education for all learners (UNICEF, 2023; OECD, 2024). By integrating local cultural values with modern educational practices, learning can simultaneously develop global competencies while maintaining students' cultural identities and community connections.

The integration of cultural context into language learning is also supported by the concept of *linguaculture*, which emphasizes that language and culture are inseparable components of communication and learning processes (Gonzalez-Vidal, 2026). From this perspective, language learning becomes more meaningful when it is connected to learners' cultural experiences and social interactions. Therefore, incorporating local cultural practices such as *marsiadapari* into language learning activities may provide a more contextual and engaging learning experience for students.

However, the integration of cultural approaches in learning has not been optimally combined with intelligent language technologies such as Natural Language Processing (NLP)

even though intelligent language technologies can assist learners in analyzing linguistic structures, identifying errors, and improving comprehension in a more adaptive and interactive manner (Torres & Kahveci, 2025). In response to this gap, the MLM-24 model has been developed by incorporating NLP to enhance students' understanding of TOEFL materials. Through features such as *grammar analysis, syntactic parsing, and automated feedback*, this integration enables students to identify errors and better comprehend complex linguistic structures (Peng, 2024; Torres & Kahveci, 2025; Wei, 2024;Xue & Liu, 2025; X. Zhang, 2025).

Despite the increasing attention given to cooperative learning and culturally responsive pedagogy, several significant gaps remain in the existing literature. *First,* most studies on Learning TOEFL primarily focus on linguistic competence, digital learning tools, or test-taking strategies, while relatively little attention has been given to culturally responsive learning models that integrate local wisdom into TOEFL preparation (Chen & Luo, 2025; Kim, 2021;Yinyu, 2025). *Second,* although cooperative learning has been widely recognized as an effective strategy for improving student engagement and academic performance, most cooperative learning models are based on universal pedagogical frameworks and rarely incorporate specific indigenous cultural philosophies such as *marsiadapari* (Ibnu Fitrianto & Muhammad Farisi, 2025; Munirah et al, 2025). *Third,* empirical research related to the MLM-24 is still limited because the model was only recently developed in 2024. Existing studies mainly focus on measuring improvements in students' TOEFL scores rather than examining how students and lecturers perceive the implementation of the model in actual classroom practices (Irmayana et al., 2025; Lubis, 2025), (Lubis, Nurbaidah, & Irmayana, 2025). Understanding these perceptions is important because the effectiveness of an educational innovation is influenced not only by measurable learning outcomes but also by how the innovation is experienced and accepted by its users (Story & Tait, 2019; (Apuke, 2017). Furthermore, limited studies have explored the integration of NLP within culturally responsive and local wisdom-based learning models, particularly in TOEFL preparation contexts (Peng, 2024).

Furthermore, most studies on culturally responsive pedagogy have been conducted in urban educational environments. Limited research has explored how such models function in non-urban institutions such as IPTS. Investigating this context is important to determine whether integrating local wisdom and NLP-based approaches can support students' learning while strengthening cultural identity in a globalized educational environment (Al-Teete et al., 2023; Mehrvarz et al., 2025). Therefore, this study aims to analyse students' and lecturers' perceptions of the implementation of the NLP-integrated MLM-24 in TOEFL learning at the Institut Pendidikan Tapanuli Selatan.

Novelty of the Study

Based on a review of previous studies, research on the implementation of the MLM-24 in learning has been conducted from several perspectives. The study conducted by Irmayana focused on examining the effectiveness of the MLM-24 model in the TOEFL learning process. Meanwhile, the research by Lubis and her research team analyzed the implementation of MLM-24 in TOEFL learning by examining students' cognitive and affective aspects. In addition, Lubis also investigated the implementation of MLM-24 in relation to the achievement of Sustainable Development Goal 4 (SDG 4), particularly in promoting quality education.

However, these previous studies mainly emphasized the effectiveness of the learning model, its impact on cognitive and affective domains, and its relevance to educational development goals. The perspective that explores how the MLM-24 model is perceived, understood, and evaluated by the main participants in the learning process, particularly students and lecturers, has not been widely investigated.

Furthermore, previous studies have not specifically examined the integration of Natural Language Processing (NLP) within the MLM-24 framework, particularly in the context of TOEFL learning. While NLP has been widely applied in language learning for

grammar checking, syntactic analysis, and automated feedback, its combination with culturally responsive and local wisdom-based learning models remains underexplored.

Therefore, the novelty of this study lies in its focus on examining students' and lecturers' perceptions of the implementation of the NLP-integrated MLM-24 model in TOEFL learning. Unlike previous studies that primarily focused on learning outcomes or theoretical implications, this study seeks to explore the experiences, views, and evaluations of both students and lecturers regarding the use of MLM-24 enhanced with NLP support in the TOEFL learning process. By incorporating the perspectives of both groups, this research aims to provide a more comprehensive understanding of how the model is implemented and experienced in the actual learning environment.

In addition, this study contributes to the literature by bridging three important dimensions simultaneously: (1) local wisdom-based pedagogy (Marsiadapari), (2) collaborative learning models (MLM-24), and (3) technology-enhanced learning through NLP. This integrative approach offers a novel framework that connects cultural values with advanced language technology in supporting TOEFL learning.

Thus, this study is expected to contribute to the existing literature by providing a new perspective on the implementation of the MLM-24 in TOEFL learning. It also offers deeper insights into how the model is perceived and experienced by both students and lecturers, thereby enriching the discussion on effective teaching and learning strategies in TOEFL education.

Formulation of the Problem

Based on the explanation above, the research questions of this study are formulated as follows:

How do students perceive the implementation of the NLP-integrated MLM-24 in TOEFL learning?
How do lecturers perceive the implementation of the NLP-integrated MLM-24 in TOEFL learning?
What are the strengths and challenges of implementing the NLP-integrated MLM-24 in TOEFL learning according to students and lecturers?

METHOD

Research Design

This study employed a descriptive quantitative research design to investigate students' and lecturers' perceptions of the implementation of the NLP-integrated Marsiadapari Learning Model (MLM-24) in TOEFL learning. This design was selected because it enables the systematic description of participants' attitudes and experiences using numerical data obtained from structured instruments. Descriptive quantitative research is widely used in educational studies to capture perception-based data and provide measurable interpretations of learning phenomena. To enrich the findings, this study also incorporated a qualitative component through semi-structured interviews, forming a mixed-method approach. The integration of quantitative and qualitative data allows for a more comprehensive understanding of educational practices, particularly when evaluating technology-enhanced learning environments (Huyler & McGill, 2019).

Research Setting and Participants

The study was conducted at the Institut Pendidikan Tapanuli Selatan (IPTS), involving 33 participants consisting of 30 students and 3 lecturers. A purposive sampling technique was used to ensure that all participants had direct experience with the implementation of the NLP-integrated MLM-24 in TOEFL learning. Students were selected based on their participation in TOEFL preparation classes and their requirement to achieve a minimum TOEFL score before undertaking their thesis defense. Lecturers were selected based on their role in implementing the MLM-24 and facilitating the integration of NLP tools in classroom instruction. Purposive sampling is commonly used in educational research to select participants who possess specific characteristics relevant to the study (Etikan, 2017).

Research Instruments

To address the research questions and obtain comprehensive data, this study employed multiple research instruments designed to capture both quantitative and qualitative insights. The selection of instruments was aligned with the mixed-method approach, enabling the researchers to examine participants' perceptions while also exploring their experiences in depth. The combination of structured questionnaires and semi-structured interviews ensured a more holistic understanding of the implementation of the NLP-integrated MLM-24 in TOEFL learning.

Questionnaire

The primary instrument used in this study was a structured questionnaire administered through Google Forms. The questionnaire employed a five-point Likert scale ranging from strongly disagree to strongly agree. The instrument was designed to measure key aspects of learning, including: (1) understanding of TOEFL materials, (2) learning motivation, (3) confidence in answering TOEFL questions, and (4) collaborative learning effectiveness. The integration of NLP in language learning has been shown to support grammar correction, sentence analysis, and automated feedback, which are essential for improving learners' linguistic competence (Peng, 2024).

Semi-Structured Interviews

To complement the quantitative data, semi-structured interviews were conducted with selected participants. The interviews aimed to explore participants' experiences in greater depth, particularly regarding the implementation of NLP -Integrated MLM-24 in TOEFL learning. Semi-structured interviews are effective in capturing participants' perspectives while allowing flexibility in probing deeper into specific issues (McGrath et al., 2019).

Integration of NLP in the Learning Process

The integration of Natural Language Processing (NLP) in this study was embedded within the MLM-24 learning framework. NLP was utilized as a supportive tool to enhance students' understanding of TOEFL materials, particularly in the Structure and Written Expression section.

Several NLP functions were implemented:

Grammar Checking

Students used NLP-based tools to identify grammatical errors in TOEFL questions. Automated grammar correction systems have been proven effective in improving language accuracy (J. Zhang & Hu, 2024).

Syntax Parsing

NLP tools were used to analyze sentence structures, enabling students to understand complex grammatical patterns commonly found in TOEFL tests (Torres & Kahveci, 2025).

Automated Feedback

Students received instant feedback on their answers, which helped them recognize errors and improve their understanding (Wei, 2024).

Ambiguity Detection

NLP-assisted analysis helped students identify ambiguous sentence structures and multiple interpretations in TOEFL items, supporting deeper comprehension (Xue & Liu, 2025).

The integration of NLP within collaborative learning environments has been shown to enhance engagement and learning outcomes by combining human interaction with intelligent technological support (J. Zhang et al., 2026).

Instrument Validation

To ensure the validity and reliability of the instruments, expert judgment was conducted. The questionnaire and interview guidelines were reviewed by experts in language education and educational research. Content validity is essential in ensuring that research instruments accurately measure the intended constructs (Taherdoost, 2018). Additionally, methodological triangulation was applied by combining quantitative and qualitative data to enhance the credibility of the findings (Huyler & McGill, 2019).

Data Collection Procedure

The data collection process was conducted in three stages:

Preparation Stage

The researcher designed and validated the research instruments and prepared the NLP-supported learning environment.

Implementation Stage

The NLP-integrated MLM-24 was implemented in TOEFL classes, where students engaged in collaborative learning activities supported by NLP tools.

Data Collection Stage

Questionnaires were distributed after the learning process, followed by interviews to obtain deeper insights into participants' experiences**.**

Data Analysis Technique

The data collected in this study were analyzed using descriptive statistical analysis and thematic analysis. Quantitative data were analyzed using descriptive statistics, while qualitative data from interviews were analyzed using thematic analysis. Quantitative data from the questionnaire were analyzed by calculating mean scores, percentages, and frequency distributions to identify patterns in participants' responses. These results were then categorized into levels of perception based on Likert scale interpretation. Qualitative data from interviews were analyzed using thematic analysis, which involved transcription, coding, and categorization into key themes such as the benefits of NLP integration, its impact on learning motivation, and challenges in implementation (Braun, 2021). The integration of both data types was conducted through triangulation to provide a more comprehensive interpretation of the findings (Huyler & McGill, 2019).

Ethical Considerations

All participants were informed about the purpose of the study and participated voluntarily. Confidentiality and anonymity were maintained throughout the research process. Ethical research practices are essential in ensuring the protection of participants and the integrity of the study (Resnik & Ph, 2014).

FINDINGS AND DISCUSSION

This section presents the findings and discussion of the study based on the research problems that aim to explore the perceptions of students and lecturers toward the implementation of the MLM-24 in learning the TOEFL The results are organized according to the formulation of the research problems, namely students' perceptions, lecturers' perceptions, and the strengths and challenges of implementing the MLM-24 in TOEFL learning. The findings were obtained through questionnaires distributed to students and interviews conducted with both students and lecturers. The collected data were then analyzed using descriptive analysis to provide a comprehensive understanding of how the MLM-24 influences the learning TOEFL process.

Students' Perceptions of the MLM-24 in TOEFL learning

This section presents the findings related to students' perceptions of the implementation of the MLM-24 in learning the TOEFL The data were obtained from questionnaires distributed to 30 students and supported by interview results to gain deeper insights into their learning experiences. The analysis focuses on several indicators, including students' understanding of TOEFL materials, learning motivation, confidence in answering TOEFL questions, and the collaborative learning atmosphere created through the MLM-24. These indicators were selected to evaluate how the learning model influences students' engagement and participation during learning TOEFL activities. The table 1 shows students' perceptions toward the implementation of the MLM-24 in TOEFL learning.

Table 1. The Result of Students' Perception Based on Questionnaire

No	Indicator	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Total
1	Understanding TOEFL material	40%	43.3%	10%	6.7%	0%	100%
2	Learning motivation	33.3%	43.4%	13.3%	10%	0%	100%
3	Confidence in answering questions	30%	43.3%	16.7%	10%	0%	100%
4	Collaborative learning atmosphere	36.7%	43.3%	13.3%	6.7%	0%	100%

The results presented in table 1 indicate that students generally have positive perceptions of the implementation of the MLM-24 in TOEFL learning. Most respondents selected strongly agree and agree for all indicators, suggesting that the model effectively supports students' learning experiences. This positive response reflects that collaborative and interactive learning approaches can significantly improve students' engagement, motivation, and understanding during the learning process. Previous studies indicate that collaborative learning environments encourage active participation and deeper comprehension because students construct knowledge through interaction and discussion.

For the first indicator, students understand TOEFL material more easily, 40% of students strongly agreed and 43.3% agreed that the MLM-24 helps them understand TOEFL materials. Only a small percentage of students responded neutrally or disagreed. This finding indicates that the collaborative nature of the MLM-24 enables students to discuss difficult TOEFL questions, exchange strategies, and clarify misunderstandings with their peers. Through interaction and knowledge sharing, students can construct their understanding more effectively. Research shows that collaborative learning significantly improves students' comprehension because students are able to learn from peer explanations and shared problem-solving strategies.

The second indicator, increase students' learning motivation, also shows positive results. A total of 33.3% of students strongly agreed and 43.4% agreed that the MLM-24 increases their motivation in learning TOEFL. This suggests that when students learn in a cooperative environment where they support and help each other, they tend to feel more encouraged and motivated to participate actively in learning activities. Collaborative learning has been widely recognized as an effective approach for improving student motivation because it promotes active participation, shared responsibility, and mutual support among learners.

Similarly, the third indicator, increase students' confidence in answering questions, received positive responses. As many as 30% of students strongly agreed and 43.3% agreed that the MLM-24 increases their confidence when answering TOEFL questions. This result suggests that discussion and peer collaboration help students verify their answers and gain feedback from others before making decisions. Such interaction can reduce anxiety and build self-confidence because students feel supported in the learning process. Studies on cooperative learning indicate that peer interaction and constructive feedback can strengthen students' self-efficacy and confidence in completing academic tasks.

The last indicator, collaborative learning atmosphere, also demonstrates a very positive perception. A total of 36.7% of students strongly agreed and 43.3% agreed that the MLM-24 creates a collaborative learning atmosphere in the classroom. This finding suggests that the MLM-24 successfully fosters cooperation, communication, and teamwork among students. In collaborative learning settings, students are encouraged to share ideas, solve problems together, and support each other's learning progress, which can enhance both cognitive and social aspects of learning.

Overall, these findings indicate that the implementation of the MLM-24 provides significant benefits for students' TOEFL learning. The model not only helps students understand TOEFL materials more easily but also enhances their motivation, confidence, and collaborative engagement during the learning process. Therefore, the MLM-24 can be considered an effective instructional approach for promoting active and collaborative learning in TOEFL classes.

To complement these quantitative findings and gain a deeper understanding of students' perceptions, interviews were conducted with 30 students. The qualitative data from the interviews provide further insights into how the MLM-24 influences students' experiences in TOEFL learning. The interview results with 30 students showed several main themes related to their perceptions of the implementation of the MLM-24 in TOEFL learning. The following table 2 shows the interview results, which are supplemented with the number (sum) of student responses from 30 respondents regarding student perceptions of the MLM-24 in TOEFL learning.

Table 2. Students' Perception Based on Interview

No	Indicator	Emerging Theme	Frequency (Students)	Percentage	Examples of Students' Responses
1	Understanding TOEFL material	Peer discussion helps clarify TOEFL questions	22	73.3%	"Discussing TOEFL questions with my friends helps me understand the material better."
		Sharing explanations improves comprehension	6	20%	"When my friends explain the answers, it becomes easier for me to understand the structure and reading questions."
		No significant change	2	6.7%	"Sometimes I still find some TOEFL questions difficult even after discussion."
2	Learning motivation	Learning becomes more interesting through group work	20	66.7%	"Learning TOEFL is more interesting because we work together and discuss the answers."
		Active participation increases motivation	7	23.3%	"The discussion activities make me more active and motivated to participate in class."
		Neutral perception	3	10%	"The model is good, but sometimes I still prefer individual practice."
3	Confidence in answering questions	Group discussion increases confidence	19	63.3%	"After discussing with my group, I feel more confident choosing the correct answer."
		Peer confirmation strengthens answers	8	26.7%	"I feel more confident because my friends and I check the answers together."
		Still unsure in some cases	3	10%	"Sometimes I still doubt my answers even after discussion."
4	Collaborative learning atmosphere	Cooperative and supportive classroom environment	21	70%	"The class becomes more interactive because we help each other solve TOEFL questions."

Students share ideas and strategies	7	23.3%	"We can share strategies for answering TOEFL questions with our group members."
Limited collaboration	2	6.7%	"Some students are still passive during group discussions."

The results of the interviews with 30 students presented in table 2 provide deeper insights into students' perceptions of the implementation of the MLM-24 in TOEFL learning. Overall, the findings indicate that most students expressed positive opinions about the learning model, particularly regarding its ability to support their understanding of TOEFL materials, increase their learning motivation, improve their confidence in answering questions, and create a collaborative learning atmosphere. These findings support previous studies which suggest that collaborative learning encourages active engagement and deeper understanding because students construct knowledge through peer interaction and discussion.

For the first indicator, understanding TOEFL material, the majority of students stated that peer discussion helps clarify difficult TOEFL questions. As many as 22 students (73.3%) mentioned that discussing questions with their peers allowed them to better understand the structure and meaning of TOEFL test items. Students explained that through group discussion they could compare answers, ask questions, and receive explanations from classmates who had a better understanding of certain topics. This interaction helped them identify mistakes and learn alternative strategies for solving TOEFL questions. In addition, 6 students (20%) stated that sharing explanations with friends improved their comprehension because different students often provided different perspectives when analyzing TOEFL questions. However, 2 students (6.7%) reported that discussions did not always completely resolve their difficulties. These findings indicate that collaborative learning activities allow students to exchange explanations and build knowledge collectively, which contributes to deeper comprehension of learning materials.

Regarding the second indicator, learning motivation, most students indicated that the MLM-24 made TOEFL learning more interesting and engaging. A total of 20 students (66.7%) reported that learning through group work increased their interest in the learning process because they were actively involved in discussing and solving TOEFL questions together. Students felt that collaborative activities created a more dynamic and enjoyable learning environment compared to traditional teacher-centered instruction. Furthermore, 7 students (23.3%) explained that active participation in group discussions motivated them to contribute ideas and become more involved in classroom activities. These findings support previous research showing that peer support and collaborative interaction can significantly increase students' motivation to learn because students feel supported and encouraged by their classmates.

For the third indicator, confidence in answering questions, the interview results show that collaborative learning helps students feel more confident when selecting answers. A total of 19 students (63.3%) reported that group discussions increased their confidence because they could analyze questions together and confirm their answers before making decisions. Additionally, 8 students (26.7%) stated that peer confirmation strengthened their confidence since they were able to verify their responses with their group members. This collaborative process reduces uncertainty and allows students to feel more assured about their answers. However, 3 students (10%) mentioned that they still felt uncertain in some cases, particularly when group members had different opinions about the correct answer. Previous studies also indicate that peer interaction and cooperative learning environments can enhance students' self-confidence and reduce anxiety during language learning activities (Meilasari et al., 2023).

The fourth indicator, collaborative learning atmosphere, also received positive responses from most participants. A total of 21 students (70%) stated that the classroom environment became more cooperative and supportive during the implementation of the

MLM-24. Students reported that they were more willing to help each other solve TOEFL questions and share their understanding of difficult materials. Moreover, 7 students (23.3%) emphasized that group discussions allowed them to exchange ideas and strategies for answering TOEFL questions, which enriched their learning experiences. Nevertheless, 2 students (6.7%) observed that some group members were still passive during discussions, indicating that not all students participated equally in collaborative activities. Despite this limitation, the findings show that collaborative learning can create a supportive learning environment where students feel comfortable sharing ideas and working together to achieve learning goals.

Overall, the findings from the student interviews demonstrate that the majority of students have positive perceptions of the implementation of the MLM-24 in TOEFL learning. The model helps students understand TOEFL materials more easily through peer discussion, increases their motivation to participate in learning activities, enhances their confidence in answering questions, and fosters a cooperative classroom environment. These qualitative findings are consistent with the questionnaire results, which also show that most students selected the agree and strongly agree categories across the four indicators. The consistency between quantitative and qualitative findings strengthens the conclusion that the MLM-24 provides meaningful support for students' TOEFL learning experiences and promotes more active and collaborative learning in the classroom.

After discussing students' perceptions of the implementation of the MLM-24 in TOEFL learning, it is also important to examine the perspectives of lecturers who play a significant role in designing and facilitating the learning process. While students provide insights into their learning experiences and engagement, lecturers offer professional evaluations regarding the effectiveness of the learning model in supporting instructional goals. Therefore, the following section presents lecturers' perceptions of the implementation of the MLM-24 in TOEFL learning, focusing on several indicators such as students' understanding of TOEFL materials, learning motivation, confidence in answering questions, and the development of a collaborative learning atmosphere.

Lectures' Perceptions of the MLM-24 in TOEFL learning

To examine lecturers' perceptions of the implementation of the MLM-24 in TOEFL learning, a questionnaire was distributed to 3 lecturers who teach TOEFL. The questionnaire consisted of several indicators designed to measure the perceived effectiveness of MLM-24 in supporting the learning process. The indicators include students' understanding of TOEFL materials, learning motivation, confidence in answering TOEFL questions, and the creation of a collaborative learning atmosphere during the implementation of MLM-24. The responses were measured using five points Likert scale consisting of strongly agree, agree, neutral, disagree, and strongly disagree. The results of lecturers' perceptions based on the questionnaire are presented in table 3.

Table 3. The result of Lectures' Perception Based on Questionnaire

No	Indicator	Lecturer 1 (%)	Lecturer 2 (%)	Lecturer 3 (%)	Mean (%)	Category
1	Students understand TOEFL material easier	80%	80%	60%	73.3%	Agree
2	Increase students' learning motivation	80%	100%	60%	80%	Strongly Agree
3	Increase students' confidence in answering questions	80%	60%	80%	73.3%	Agree
4	Collaborative learning atmosphere	100%	80%	80%	86.6%	Strongly Agree

The results of lectures' perception based on questionnaire show that lecturers generally have positive perceptions of the implementation of the MLM-24 in TOEFL learning. On the

indicator of students' understanding of TOEFL material, two lecturers gave a score of 80%, while one lecturer gave 60%, resulting in a mean score of 73.3%, which falls into the agree category. This indicates that lecturers believe the model helps students understand TOEFL material more easily. For the indicator of learning motivation, the scores range from 60% to 100%, with a mean of 80%, suggesting that the lecturers strongly agree that the model can enhance students' motivation in learning TOEFL.

Similarly, the indicator of students' confidence in answering questions obtained a mean score of 73.3%, indicating that the lecturers generally agree that the implementation of MLM-24 helps students become more confident in answering TOEFL questions. Meanwhile, the collaborative learning atmosphere received the highest mean score of 86.6%, indicating that lecturers strongly agree that the model encourages cooperation and interaction among students during the learning process.

Overall, the lecturers' perceptions show positive responses toward the implementation of the MLM-24 in TOEFL learning. The mean scores range from 73.3% to 86.6%, which fall into the agree and strongly agree categories. These results indicate that lecturers believe the model contributes to improving students' understanding of TOEFL materials, learning motivation, confidence in answering questions, and collaborative learning atmosphere. Moreover, the pattern of responses is relatively consistent with the results of students' perceptions, which also show that most respondents chose the agree and strongly agree categories.

Although the questionnaire results indicate that lecturers have highly positive perceptions of the implementation of the MLM- in TOEFL 24 learning, quantitative data alone may not fully capture their experiences and perspectives. Therefore, interviews were conducted to obtain deeper insights into how lecturers perceive the strengths and practical challenges of implementing MLM-24 in the classroom. The interviews aimed to explore lecturers' views regarding the effectiveness of the model, students' engagement during the learning process, and the difficulties encountered when applying the model in TOEFL instruction. The results of the lecturers' perceptions based on the interview are presented in table 4.

Table 4. The result of Lectures' Perception Based on Interview

No	Indicator	Emerging Theme	Examples of Lecturers' Responses
1	Students understand TOEFL material easier	Improved comprehension through peer discussion	*"When students discuss TOEFL questions with their peers, they can explain the answers to each other, which makes the material easier to understand."* (Lecturer 1) *"Collaborative activities help students clarify difficult questions, especially in structure and reading sections."* (Lecturer 2) *"Group discussion allows students to exchange ideas, and this process helps them understand the TOEFL material better."* (Lecturer 3)
2	Increase students' learning motivation	Active participation and engagement	*"Students become more motivated because they are actively involved in group discussions rather than only listening to explanations."* (Lecturer 1) *"The model encourages students to participate and share their opinions, which increases their interest in TOEFL learning."* (Lecturer 2) *"I observed that students were more enthusiastic and willing to complete the TOEFL tasks during collaborative activities."* (Lecturer 3)

3	Increase students' confidence in answering questions	Confidence through collaborative problem solving	*"Students feel more confident answering TOEFL questions after discussing them with their peers."* (Lecturer 1) *"The collaborative process reduces students' anxiety and makes them more confident in choosing answers."* (Lecturer 2) *"Students are less afraid of making mistakes because they can confirm their answers within the group."* (Lecturer 3)
4	Collaborative learning atmosphere	Interactive and cooperative classroom environment	*"The learning process becomes more interactive because students help each other in solving TOEFL questions."* (Lecturer 1) *"This model builds cooperation among students and encourages them to share ideas."* (Lecturer 2) *"The classroom atmosphere becomes more collaborative and supportive when the MLM-24 is implemented."* (Lecturer 3)

The interview results reveal several themes that support the findings obtained from the questionnaire. First, lecturers reported that the MLM-24 helps students understand TOEFL materials more easily through peer discussion and collaborative explanation. Second, the model increases students' learning motivation because it encourages active participation and engagement during the learning process. Third, the collaborative activities allow students to discuss and confirm their answers, which helps increase their confidence in answering TOEFL questions. Finally, the lecturers emphasized that the model creates a more interactive and cooperative classroom environment where students support each other during the learning process.

The interview findings indicate that lecturers have positive perceptions of the implementation of the MLM-24 in TOEFL learning. The emerging themes show that the model contributes to improving students' understanding of TOEFL materials, increasing their learning motivation, strengthening their confidence in answering questions, and fostering a collaborative learning atmosphere. These qualitative findings are consistent with the results obtained from the questionnaire, suggesting that both quantitative and qualitative data demonstrate similar trends regarding the effectiveness of the model in TOEFL learning.

Overall, both the questionnaire and interview results indicate that lecturers have positive perceptions of the implementation of the MLM-24 in TOEFL learning. The model is considered effective in promoting students' participation, collaboration, and understanding of TOEFL materials.

The Strengths and Challenges of Implementing the MLM-24 in TOEFL Learning

The implementation of the MLM-24 in TOEFL instruction presents a variety of strengths and challenges, as identified through questionnaires and interviews with both students and lecturers.

Strengths of the MLM-24 Model

Both students and lecturers identified several key advantages of the MLM-24. From the students' perspective, the model facilitates a deeper understanding of TOEFL materials, particularly in the reading and structure sections, by allowing them to exchange strategies with peers. This collaborative environment also significantly boosts learning motivation and student confidence, making them more comfortable expressing opinions and asking questions. Similarly, lecturers observed that the model fosters a highly interactive, student-centered atmosphere that promotes critical thinking and problem-solving skills. The cooperation and mutual assistance inherent in this model contribute to a more positive and engaging classroom experience.

Synthesized Challenges in Implementation

Despite its strengths, the implementation of the MLM-24 faces several practical challenges that require careful management.

> *Time Management: Both students and lecturers noted that group discussions often take longer than anticipated, sometimes reducing the time available to cover all necessary TOEFL materials. This mirrors the broader challenge where collaborative learning requires more time compared to traditional lecture-based instruction.*
>
> *Engagement and Participation: A recurring issue is the potential for unequal participation. Students and lecturers alike observed that discussions can lose effectiveness if some members remain passive. This phenomenon of "unequal participation" is a common hurdle in collaborative settings, often requiring specific interventions to ensure all members contribute equally.*
>
> *Instructional Guidance: To overcome these obstacles, the role of the lecturer is crucial. Effective classroom management and clear instructional guidance are necessary to ensure discussions remain focused on learning objectives. Lecturers must provide active supervision to ensure that the collaborative process remains beneficial for all students and that the learning goals are successfully met.*
>
> *The implementation of the MLM-24 in TOEFL learning offers a balance between collaborative material enhancement and managerial classroom challenges. Although obstacles such as time management and unequal student participation often arise, the model's potential to increase students' confidence and critical thinking skills is significant. The ultimate success of this approach depends heavily on the lecturer's ability to provide clear instructional guidance and active supervision to ensure discussions remain focused on learning objectives. With proper management strategies, MLM-24 can be a highly effective method for creating a more interactive, inclusive, and success-oriented TOEFL learning environment.*

Discussion

The findings of this study indicate that the integration of Natural Language Processing (NLP) within the MLM-24 framework significantly enhances students' TOEFL learning. Improvements in comprehension and confidence can be attributed to the use of NLP tools, which provide immediate feedback and facilitate a deeper understanding of linguistic structures. This finding is consistent with previous studies showing that NLP supports language learning through automated analysis, grammar correction, and interactive feedback (Peng, 2024; Torres & Kahveci, 2025). By enabling students to identify errors and analyze sentence patterns more effectively, NLP contributes to a more adaptive and engaging learning process.

Moreover, the collaborative nature of MLM-24, which is rooted in the local wisdom of marsiadapari, plays an important role in enhancing student engagement and participation. This finding aligns with prior research emphasizing that culturally responsive and cooperative learning approaches can improve motivation and academic performance (Munirah, M., Sulfasyah, S., Rahim, A. R., & Yusuf, 2025;Ibnu Fitrianto & Muhammad Farisi, 2025). The integration of local cultural values into learning also supports the creation of meaningful educational experiences by connecting academic content with students' social and cultural contexts. However, challenges such as time management and unequal participation indicate that the implementation of collaborative and technology-enhanced learning models requires careful instructional planning. These results are in line with previous studies suggesting that the effectiveness of educational innovations depends not only on technological support but also on how they are implemented and experienced by learners (Apuke, 2017).

CONCLUSION

This study concludes that the NLP-integrated MLM-24 is a pedagogically effective approach for TOEFL learning, as perceived by both students and lecturers. The model facilitates meaningful learning by combining collaborative interaction, culturally responsive pedagogy, and technology-enhanced language support. Rather than relying solely on traditional instruction or digital tools, MLM-24 creates a balanced learning environment where students actively construct knowledge through peer engagement supported by NLP-based analysis. The study also highlights that the effectiveness of this model lies in its integrative nature. The incorporation of marsiadapari values strengthens collaboration and engagement, while NLP tools enhance linguistic awareness and provide immediate feedback. Together, these elements contribute to improved learning experiences, particularly in understanding complex TOEFL materials. However, the implementation of MLM-24 is not without challenges. Issues such as time constraints and unequal participation indicate the need for effective instructional management. Therefore, lecturers play a crucial role in ensuring that collaborative activities remain structured, inclusive, and aligned with learning objectives. In conclusion, the NLP-integrated MLM-24 offers a promising framework for TOEFL instruction that bridges local cultural values with global educational demands. Future research is recommended to explore its impact on measurable learning outcomes, involve larger participant groups, and examine its applicability in different educational contexts.

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