

## **Empowering Migrant Communities through Machine Translation Literacy: A Pathway to Socio-Economic Inclusion**

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**Abstract:** This article presents the results of a pilot study aimed at designing an effective training program to teach migrant workers how to use machine translation (MT) tools (specifically Google Translate) by themselves. Employing a reflection and observation approach, the research team documented both participant experiences and their insights throughout the pilot. The training sessions were designed to improve practical skills and to raise participants' awareness of privacy issues. The article shows how we designed and reflected on participants' varying levels of familiarity and proficiency with translation technologies, examining key features such as image-based translation and identifying usability challenges. Drawing on the pilot study, we identified some potential challenges in applying MT literacy concepts to train migrant workers. These allowed us to revise the training plan and design activities and materials for the full-scale training programs that meet specific needs and linguistic backgrounds of Myanmar migrant workers. Key takeaways to ensure participants' gain of practical skills for everyday use of MT include clearer instructions on tool functions, particularly voice input and camera mode (Google Lens), for optimal results.

**Keywords:** Machine translation, migrant worker, humanitarian, inclusion, MT literacy

Migrant workers in Thailand often face language barriers that limit access to services, legal protection, and social inclusion (Kunpeuk et al., 2022; Suphanchaimat et al., 2015). These linguistic challenges can isolate individuals and prevent them from fully integrating into society (Nawyn et al., 2012; Uekusa, 2019). Machine translation (MT) tools offer a potential solution to these challenges by facilitating communication and enabling migrant workers to better understand their rights, access healthcare, navigate administrative processes, and connect with the host communities. That said, to effectively leverage the benefits of MT, users must possess a foundational understanding of how these systems work and develop critical evaluation skills to assess the accuracy and reliability of the translations (Doherty & Kenny, 2014). This article

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thus reports our pilot examination of how targeted training on MT literacy can empower migrants to enhance their MT use and inform them of the risks of uncritical reliance. It is part of the aim of the larger project: to raise awareness of the socio-economic and historical factors shaping the marginalization of minority workers in Thailand and highlight the intersection of class and ethnicity.

Previous studies have shown that providing the underprivileged with the necessary training to operate MT tools has the potential to enhance their socio-economic inclusion (Brown, 2015; Federici, 2022; Piróth & Baker, 2020). With such goals, migrant workers can more effectively navigate the labor market, recognize their rights and obligations, and engage more actively in the local societies. MT literacy can also help users to avoid uncritical employment of MT in high-risk use cases (Vieira et al., 2021, 2023; Zappatore & Ruggieri, 2024). By promoting MT literacy, which covers basic knowledge of MT systems and the ability to critically utilize MT tools, users can effectively improve the output for purposes (Bowker & Buitrago-Ciro, 2019).

MT technology has been the subject of extensive research; however, its usage among migrants, particularly in a country-specific context like Thailand, has been relatively underexplored, with a few exceptions, such as Castilho et al.'s (under review) study on MT use among workers and Valdez et al.'s (2023) research conducted in the Netherlands. This article further addresses a critical gap by offering insights into the influence of MT literacy on the lives of migrants in Thailand. It could help to shape a focused training program, provide accessible translating tool know-how, and create guidelines that promote migrant workers' inclusion and well-being. Without adequate MT training, migrant workers may struggle to differentiate between reliable and unreliable translations, increasing the risk of miscommunication in crucial contexts such as healthcare, labor rights, and legal proceedings (Bronstein, 2020). By fostering MT literacy, this project supports broader efforts in digital inclusion, aligns with the Sustainable Development Goals, and underscores the necessity of inclusive technological access. It also contributes to scholarly discussion on how class and ethnicity influence migrant workers' experiences, especially through the lens of socio-cultural dynamics, communication, and economic marginalization in Asia (Fresnoza-Flot & Shinozaki, 2017; Tunon & Baruah, 2012).

With that in mind, we designed a pilot to examine the following research questions: (i) what factors should be considered in designing an MT literacy training program for migrant workers, and (ii) which challenges identified in the pilot training can be addressed to improve future training? The pilot had two objectives: (a) to equip migrant workers with the necessary skills to critically and effectively use MT tools, and (b) to inform the development of the subsequent full-scale training session and the reflections of the research team.

## **Related Work**

### ***Machine Translation Literacy***

MT tools are becoming more common since they allow people to quickly access content in different languages, usually for free. For example, back in 2018, Google Translate (GT) was already translating more than 1 trillion words in more than 100 languages per year (Sheets, 2025), a number that is likely even higher today. Today's MT systems are based on the combination of neural machine translation (NMT) and Large Language Models (LLMs), which use machine learning to generate output that often sounds natural and idiomatic but may be inaccurate, with errors hard to detect (Castilho et al., 2017; Koehn & Knowles, 2017). As MT becomes more widely used, both experts and everyday users need to know how to use it properly and effectively. Particularly important is to develop literacy around what MT can and cannot reliably do, since human translators are not always available to lay users. Even with these concerns, there is a lack of research on the larger effects of widespread, often uninformed,

MT usage. Recent research investigates MT's role in everyday communication (Nurminen, 2018), its fair access (Nurminen & Koponen, 2020) and community interpreting (Angelelli, 2020), especially regarding accessing medical and legal services. MT effectiveness as a communicative tool depends heavily on the context and user understanding. The main risk lies not only in the technology itself but in the lack of user awareness of its limitations. Misunderstandings caused by uninformed use of these tools and their ensuing repercussions underscore how important it is for all stakeholders to work together to improve MT literacy (Ehrensberger-Dow et al., 2023; Vieira et al., 2021). Thus, MT literacy means not only being able to use translation tools but also knowing what they cannot accomplish and what mistakes they might make (Bowker, 2021). It is even more crucial for marginalized groups, especially migrant workers who need MT literacy to effectively navigate and engage with their host communities. Without this, workers are restricted from accessing essential information in the local language, such as regulations or guidelines for medical treatment when falling ill and have to rely solely on their employers.

In this respect, Vieira et al. (2021) propose two key interventions: first, integrating MT literacy into various domains, including healthcare and legal settings; second, establishing clear guidelines to determine appropriate contexts for MT use. Bowker and Buitrago-Ciro (2019) were among the first to describe the main components of MT literacy, with clear examples that are useful for both professional translators and lay users. According to these two scholars, MT literacy includes understanding the basic principles of the ways MT systems work, knowing how MT systems can be used to produce texts, recognizing the broader implications of MT use, evaluating how MT-friendly a text is, creating or adapting texts for optimal translation, and modifying MT output to enhance its accuracy and readability.

MT literacy also includes knowing about the risks of its use to one's own safety and well-being (Pięta & Valdez, 2024; Taira et al., 2021). Guerberof-Arenas and Moorkens (2023) identify key user reactions to unedited MT in low-risk settings. One reaction is that improved MT often goes unnoticed unless it is flagged, while biased or unclear output can confuse or mislead users, thereby reducing their satisfaction and engagement. Another is that the translation mode can impact consumers, especially those who are unfamiliar with the source language or context. These factors potentially lead to misunderstanding and limit effective content use. Similarly, Bowker (2024a) also warns that the uncritical use of MT in high-stakes situations presents significant risks to well-being, such as health and safety in the workplace. The translation community, being uniquely positioned to guide informed MT use, must champion efforts to improve MT literacy. In our role as translation academics, we aspire to act as a catalyst to empower laypeople like migrants with a clear understanding of everyday MT use, enabling them to enhance their personal well-being.

### ***Humanitarian MT Training for Daily Use***

Meylaerts (2018) highlights the crucial role of translation in promoting equal access, arguing that language becomes essential when it acts as a barrier to opportunity. For migrant workers, ensuring equitable access requires not only translation but also targeted training in the safe and effective use of MT. Building on this, Vieira (2024) points out that while the reliability of MT varies, combining it with other communicative strategies can help reduce misunderstandings. However, migrants may lack the specialized vocabulary needed for accurate MT usage, and their existing power dynamics with the host country may prevent them from seeking clarification. Hence, empowering users through raising their awareness of linguistic and social constraints is equally vital for achieving genuine communicative equity.

If training is the solution, then a comprehensive knowledge of migrant workers' specific demands and the cultural and technological barriers they face is essential for designing an

efficient MT literacy training program. This will ensure that they are able to access critical services and communicate more effectively in their daily lives. Also, ensuring that everyone has equal opportunities means encouraging MT tool developers to reduce the digital gap and produce technology that everyone can use (Harness, 2016). In addition to the technical challenges, it is essential to consider cultural and linguistic factors. Culturally specific words used by migrant workers (Tripura, 2022), such as expressions of politeness or honorifics, could be a challenge for MT tools. It is also crucial to explore linguistic issues such as dialect differences or informal speech, as MT tools may encounter difficulty in effectively processing them (Rothwell et al., 2023). It is equally important to recognize social norms, such as concerns about job loss, data privacy, or limited technology access in rural areas, as they can impact the readiness and ability of workers to use MT tools (Alabdali et al., 2023; Safarov, 2021).

Consequently, an MT literacy training program should be tailored to the existing MT literacy levels of migrant workers and facilitate adaptation to their varying levels of language proficiency, beginning with basic MT functions and progressing to more advanced topics like error handling and tool customization, including language-appropriate materials, incorporating visuals, local language support, and simplified technical terms to ensure comprehension, especially in high-stakes situations such as legal or medical contexts (Vieira et al., 2021). The implementation of a migrant-friendly training program can begin with a pilot phase, launched in collaboration with a small group of migrant workers, to test the effectiveness of the curriculum and training methods (Morando & Brullo, 2022).

Overall, we believe that MT literacy training with an appropriate design can be helpful for migrant workers in many aspects of their lives. First, it can help those working in dangerous jobs communicate better by enabling them to understand such documents as contracts, legal rights, and safety rules in their own language. Second, MT tools can help migrants to access public services such as housing, education, and healthcare, as the translation outcomes can provide migrants with more understanding of the available services in the host communities.

## **Methodology**

### ***Research Procedure***

Our pilot study is intended to determine the feasibility of implementing a full-scale training plan. The procedure thus includes the design of the training content, pre-testing (to assess participants' baseline understanding of MT), and evaluative instruments. The initial phase involved a review of existing literature and practices concerning MT, which reveals that most MT literacy training focus mainly on university students, both those training to become professional translators (Schumacher, 2023) and those enrolled in non-translation programs (Bowker 2022, 2024b; Dorst et al., 2022). Significantly, there appears to be a marked absence of MT literacy education for the public, particularly for vulnerable groups who arguably stand to benefit most from MT even when using it by themselves.

After that, the research team convened a series of group meetings to collaboratively design the pilot course, which allowed for iterative reflection on what would be most appropriate at each stage of the process. (Details of the design outcomes are presented in the subsequent section.) The meetings were held multiple times, each yielding insights that informed the next stage of development, with continuous attention to the needs of the target participants.

The preparation phase extended from March 2025 to June 2025. Responsibilities were divided accordingly: two Thailand-based researchers were tasked with local participant recruitment, contextual assessment, content preparation, and the logistical arrangements of the pilot training site. The site was in the Pratunam area, a central urban zone close to participants' workplaces, in Bangkok, a city that is a major employment hub for migrants (Barber &

Sciortino, 2024). The training room accommodated ten people and provided an atmosphere conducive to focused learning. To recruit participants, a snowball sampling method was used. The process began by contacting a few workers in the area to ask for their voluntary participation. From there, it became word-of-mouth until the required number of participants for this pilot project was reached. Meanwhile, two researchers based abroad contributed to the development of the pre-test and the instructional design of the training program, with particular attention to the appropriateness of each training section. On the day of the pilot session, a research assistant with strong familiarity with translation/interpreting issues provided support throughout the session.

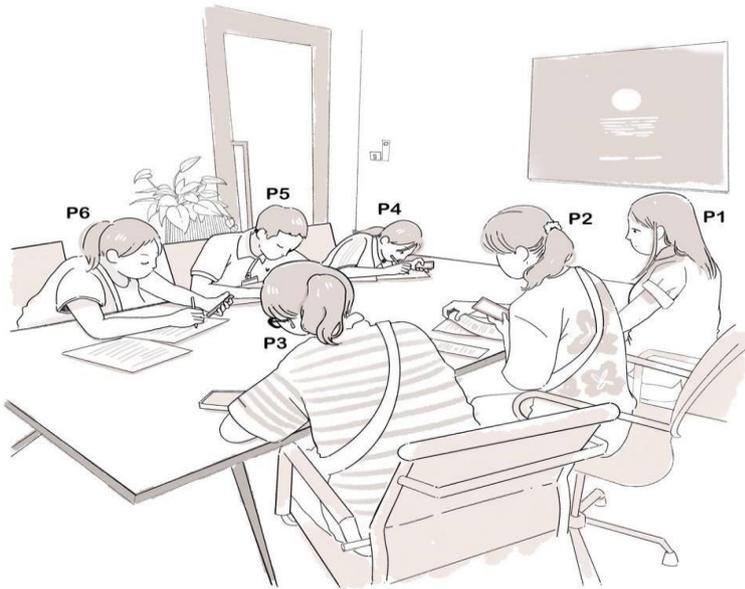
Regarding target participants, the pilot focused exclusively on migrant workers from Myanmar, who represent a significant share of Thailand's migrant workforce (Harkins, 2019). Participants who were recruited through snowballing came from varied occupational backgrounds to ensure diversity within the six-person sample, allowing for detailed individual analysis. Nearly all participants, except for P1, had prior experience with or exposure to MT, typically in accessing healthcare, communicating with employers, or using public services. Training was conducted in Thai, a language which participants could speak but could not read. This condition was particularly ideal for demonstrating the use of MT, for it highlights that those who can speak Thai but cannot read it may be vulnerable to practical difficulties in daily life.

### ***Ethical Considerations***

Since our pilot study involved migrant workers as a marginalized group, we adhered strictly to international ethical standards to protect participants' rights, dignity, and privacy (Mahidol University Central Institutional Review Board, COA No. MU-CIRB 2025/190.0606). For this project, personally identifiable information was not collected, and informed, voluntary consent was obtained under full anonymity. Data collection was minimal, securely stored, and accessible only to authorized personnel. Recruitment was culturally and legally sensitive, avoiding any form of coercion. All data transmission and storage used secure systems. Findings were reported responsibly to ensure community accountability and avoid stigmatization. The use of images or audio also required prior participant consent.

### ***Participant Profile and Context***

We conducted the pilot from 4 PM to 7 PM on June 26th, 2025, in a meeting room at a commercial Pratunam building. This time slot and venue were selected with consideration of participants' availability and proximity to their workplaces. A total of six participants took part in the pilot study. The participants were identified by assigned numbers for anonymity and observational consistency (P1 – P6) (Figure 1). We had five female participants. P1 is the oldest member of the group, a mother, and notably unfamiliar with the digital tools introduced during the session, while P5 is the only male participant.

**Figure 1***Position of All Six Participants in the Training Room (Own Work)*

The pilot study provided a controlled setting in which user interaction with the tools could be observed in situ. This specific group of migrant workers reveals a heterogeneous occupational profile: two hotel employees, one massage parlor worker, one domestic helper, and two clothing shop assistants. These roles demand various interpersonal communication skills with local Thai people.

All participants had been living in Thailand for a minimum of one year, with a certain degree of social and cultural acclimatization within the Thai context. While all participants demonstrated the ability to communicate effectively in Thai at a communicative level, certain words were still pronounced indistinctly.

Ethnically, all participants identified as Mon, an ethnic group whose traditional homeland lies in the southern region of Myanmar, in close geographical proximity to Kanchanaburi province in Thailand. This geographical adjacency has historically facilitated cross-border movement, allowing Mon migrants relatively easy access to the Thai labor market, particularly in metropolitan areas like Bangkok. Over time, this has led to the formation of sizeable Mon-speaking communities, suggesting not only physical but also socio-cultural embeddedness within the urban landscape.

The following section discusses two main components of the pilot study: (1) the design of the training program, including pre-training assessment; and (2) the administration of the pilot training session, along with reflections from both the researchers and the research assistant.

## **Designing the MT Training Program**

### ***Core Concepts***

As most research on MT literacy has been conducted with university students, it becomes necessary to adapt and simplify these frameworks to suit lay people, specifically migrant workers who may have no prior exposure to translation theory or practice. In designing an MT training program for migrant workers, we thus derived five core concepts based

primarily on the works of Bowker (2024a), Bowker and Buitrago-Ciro (2019), Moorkens (2022), Sánchez-Gijón and Kenny (2022), Vieira (2024), and Vieira et al. (2021).

***Understanding of Adequacy and Fluency.*** This component is designed to train participants to consciously decide, based on their language proficiency, whether the meaning is conveyed properly and the output reads naturally in the target language. Derived from prior academic recommendations (Sánchez-Gijón & Kenny, 2022), this aspect aims to enable participants to assess the system's capacity to render complex and domain-specific terminology—particularly within fields such as medicine—with high precision and minimal error. It reflects the participants' grasp of both source and target languages and their ability to discern whether the machine output achieves communicative equivalence. Given the pilot study's specific demographic, the migrant worker participants were reminded that their understanding of adequacy and fluency depends largely on their language competencies and, therefore, should be considered provisional. This, in turn, led us to advise participants against relying solely on MT tools (as explicitly discussed in the presentation 'Understanding MT and its appropriate use' detailed below).

***Efficiency in MT Use.*** The focus here shifts to the participant's functional interaction with the MT interface. The concept considers not only prompt and smooth responses but also appropriate employment of MT across its various input/output modalities (Bowker & Buitrago-Ciro, 2019; Vieira et al., 2021). Given that MT systems are often complex and unintuitive to use effectively, especially for marginalized migrant users, this dimension also reflects the user's ease of operation and confidence in navigating such systems.

***Awareness of Accuracy.*** This component refers to the participant's ability to detect errors within the machine-generated output, understand the potential impact of those errors, and suggest viable revisions or verification strategies (Bowker & Buitrago-Ciro, 2019). Crucially, this involves critical literacy: recognizing when the output is misleading or inappropriate and being able to articulate why it is so, thus fostering both linguistic and ethical engagement with the technology. As with their understanding of adequacy and fluency, participants were reminded that their awareness of accuracy is influenced by their language competency.

***Awareness of Privacy.*** This concerns users' understanding of data security and personal privacy in the context of MT tools (Moorkens, 2022; Vieira, 2024). Participants must be made aware that inputting information into MT platforms could result in the unauthorized use or dissemination of sensitive data. Awareness here aligns not only with digital literacy but also with an ethical stance toward data ownership and control.

***Contextual Adaptability.*** This component is to show the participants how to select the most contextually appropriate translation input/output modality when faced with ambiguity or multiple possible meanings. Effective strategies include the use of supplementary resources such as online dictionaries or asking friends at work. Moreover, participants are expected to provide a rationale for their choices, thus demonstrating reflective practice and contextual sensitivity. Due to time constraints in the pilot study, the scenarios selected for this component were relatively low-stakes, using mostly sentences to experiment, whereas higher-stakes use cases with full texts are planned to be explored in the full training sessions.

Based on the five concepts outlined above, we proceeded to design a set of instruments and training materials. In the initial stage of the process, it was essential to establish the baseline knowledge of the participants. To this end, a pre-test was administered. The tasks assigned to participants included translating short texts and daily signs from Thai to Myanmar, responding to inquiries from healthcare professionals, and spotting inaccuracies in MT output. The test and scoring rubrics (rated from 1 to 5 for each task) were reviewed for content validity and language clarity by two external examiners: a Myanmar language expert and a translation lecturer who specializes in AI in education.

Next, the five key concepts informed the thematic structure of the training modules. The program adopted a task-based approach to MT literacy, consolidated into four scenarios, where the themes of accuracy and privacy dimensions were integrated into a single task. This decision was motivated by the pedagogical aim to foster participants' awareness of both translation precision and the ethical considerations surrounding data confidentiality. To design activities that met objectives and were appropriate for migrant workers, who are not linguistic specialists by training, we developed tasks that simulate typical situations in which participants would need to use MT.

To ensure the most effective pilot study, we focused the content on low-stakes, everyday communication contexts (such as signs in various places and online messages from employers). Acknowledging the importance of high-stakes contexts (such as legal and regulatory scenarios), we plan to incorporate high-stakes domains into future training iterations to provide a more comprehensive program.

### ***Scaffolding Pilot Training***

Our structure of the pilot training program reflects a functional approach, balancing communicative effectiveness with context-sensitive translation practices. The plan of our program is organized into seven sections, as follows.

**1) Pre-training Session (30 minutes).** To ensure that participants can operate necessary technology, this session begins with a basic digital literacy check, including camera use, Wi-Fi connectivity, and how to activate Google Lens in GT. Participants then complete a paper-based registration and a diagnostic pre-test, which help the research team establish a baseline of their translation competence.

Drawing on the literature on MT literacy (Bowker, 2022; Bowker & Buitrago-Ciro, 2019; Looek & Léchauguet, 2021), four task-based scenarios are developed to evaluate various components of participants' MT literacy. Adequacy and fluency in MT use are evaluated through a Thai-to-Myanmar prescription translation task. In the second task, designed to evaluate speed in MT use, participants role-play as patients and use the voice function on their GT mobile app to translate real-time conversations with a research team member acting as a doctor. The third task evaluates the participants' awareness of privacy issues. Participants are presented with privacy challenges and asked whether they would use MT to translate others' personal medical information. The final task aims to evaluate contextual adaptation. Participants are assigned to translate public announcements and everyday signs. As with the pre-test, task-based scenarios and assessment rubrics (rated from 1 to 5 for each task) have been reviewed by two examiners to ensure language clarity and content validity.

**2) Understanding MT and Its Appropriate Use (30 minutes).** This session provides participants with basic knowledge of MT and how to use the tool critically, with a focus on its practical applications. The presentation underscores the limitations of MT and encourages participants not to use it alone or without seeking verification, particularly in risky scenarios. Emphasis is placed on this session, as it constitutes the core of the training process. It serves as the initial point from which participants begin to develop a better understanding of MT. While it is recognized that levels of comprehension of MT may vary among participants, this component aims to provide a shared foundation, ensuring that all learners acquire a comparable baseline of knowledge.

Following the introduction and familiarization with the use of MT (specifically GT), we proceed to activities resembling the pre-test, but emphasizing practical, hands-on knowledge.

**3) Activity 1 Understanding Adequacy and Fluency (15 minutes).** Here, participants are asked to translate a short, context-specific text (i.e. a prescription) from Thai to Myanmar. The session aims to build basic awareness of MT outputs and their potential risks in everyday communication. Participants are expected to develop an understanding of adequacy and fluency

based on the feedback from the native Thai-speaking language experts regarding their MT translation. Participants are reminded that output from MT which sounds natural might not always be accurate, and that it is good practice to consult other resources (e.g. online bilingual dictionaries) or other people when dealing with high-stakes texts. Given participants' level of Thai, we do not expect them to post-edit the translation at this stage.

**4) Activity 2 Speed and Responsiveness in MT Use (30 minutes).** Through role-play conversations between a doctor and migrant workers, participants simulate hospital-related interactions using MT voice mode. The task is expected to foster real-time communication skills and introduce performance-based MT scenarios. The session is recorded to facilitate retrospective reflection by the research team.

**5) Activity 3 Awareness of Accuracy and Privacy (30 minutes).** At this stage, participants are asked to reflect on the MT output that is misleading or inappropriate. As participants cannot read the output language (Thai), this reflection is guided with the help of a language expert. The input is content concerning data privacy. Participants will be asked to analyze privacy risks through another role-play, focusing on sensitive data (i.e. medical history). This component introduces ethical concerns surrounding MT, prompting a functional-pragmatic understanding of when MT use may be inappropriate or even harmful.

**6) Activity 4 Contextual Adaptability (30 minutes).** In this task, participants are assigned to translate public service signs and some useful information from one of the Thai government's websites. The focus is on detecting potential mistranslations resulting from literal rendering by MT, thus fostering participants' adaptive strategies and purposeful translation in context.

**7) Wrap-up (10 minutes).** The pilot training concludes with a reflective discussion, where participants can share insights and feedback. This final phase reinforces key learning points and is aligned with experiential learning models.

According to the above plan, we gathered data for analyzing the pilot results, applying both participatory observations, as well as on-the-spot and post-task interviews. We directly observed how participants interacted with MT tools, how they solved problems, and any moments when they hesitated or had trouble during the pilot training. We also interviewed them on the spot when difficulties arose. These observations were recorded in written field notes with help from our research assistant. With participants' permission, we recorded the sessions, and the video recordings were also used for later reflection on participants' actions.

## **Pilot Implementation and Participants' Behavior and Attitude Towards MT**

### ***Preparation and Pre-test Session***

The session started with participants introducing themselves, followed by an overview of the pilot training objectives. A preliminary equipment checks revealed that all participants had the GT app on their smartphones. However, two participants had not yet installed the LINE app, which was intended to be used as a communication platform during the training session.

Following these initial preparations, a pre-test was conducted to assess participants' prior knowledge and familiarity with MT tools. The pre-test sequence has already been outlined in the previous section. After implementing this part, we observed that most participants had a higher-than-expected level of digital fluency. Several participants were proficient in using mobile-based translation tools. Participants P2, P3, P5, and P6 demonstrated familiarity with the core functions of the GT app, particularly the camera feature which allows users to scan and translate text instantly. Only P4 needed help from peers, while P1 was unable to participate due to having never used GT before.

The tasks at this stage involved translating a short passage of medical advice post-consultation, including warnings against discontinuing medication independently and notes on potential side effects. Each participant copied the machine-translated output from their mobile phone onto a worksheet. However, when the translations were reviewed for accuracy in collaboration with a language expert invited by the research team, certain lexical items were found to be mistranslated. For example, the term *คันคัน* ('itchy rash') and *หายใจลำบาก* ('difficulty breathing') were mistranslated by P5 and P4 as *เวียนศีรษะ* ('dizziness'), conflating both symptoms. P3 rendered the terms as *ต่อมน้ำเหลือง* ('lymph node'), an entirely inaccurate substitution. P2's translation was incomplete and failed to render all elements of the original message.

When tested on a health-related topic with the deliberate inclusion of the GT voice input feature, all P2 through P5 were able to activate the microphone function but again P4 required assistance from peers. P1, however, was unable to operate this feature entirely. Certain critical aspects, especially those relating to user privacy, were either insufficiently considered or entirely omitted by participants during the task.

Despite these gaps, the pre-test proved effective in establishing a baseline for everyone's translation competencies. A more detailed, participant-by-participant analysis yielded further instructive observations, as discussed below.

P1 lacked experience with MT tools and was unable to use them effectively. However, the participant explained that she usually accesses medical services with translation support from her spouse and children.

P2 had prior experience using the microphone feature of MT tools for multilingual translation—both English and Thai—within her working context at a hotel, where language mediation for customers is a routine responsibility.

P3, although unfamiliar with the microphone feature, was able to explain personal medical symptoms during a role-play pre-test simulating a healthcare visit, albeit without elaborating on finer details.

P4 showed familiarity with GT, especially with the camera function. Despite limited oral fluency and difficulty with many tasks, P4 was able to understand the content presented. There were limitations for her, particularly in her ability to formulate responses for researchers.

P5 showed notable competence in MT tool usage, effortlessly engaging with features such as the microphone function without the need for further instruction. This participant also helped others in the group and mentioned frequent use of GT in real-life contexts.

P6 initially displayed confusion during the signage translation task but subsequently showed the ability to use Google Lens function in GT independently.

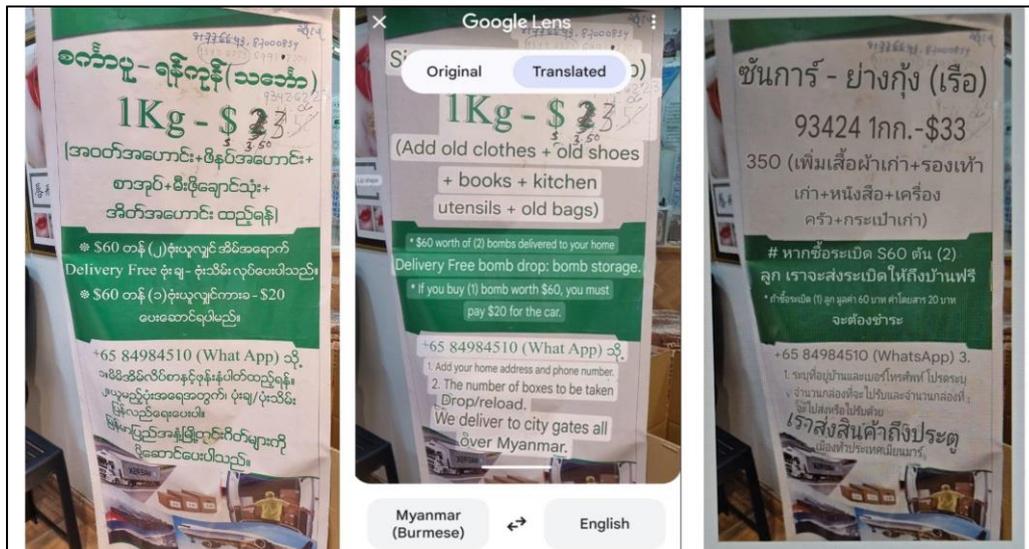
### ***Presentation on MT and Training Operation***

To help the participants develop a foundational understanding of MT, the research team delivered a concise and accessible slide presentation on MT. The three-part presentation was based loosely on the infographics available on the open resource website but adjusted to suit the participants' backgrounds and time constraints. The first section of the presentation introduced MT, specifically GT, along with various methods and contexts for its application, the benefits of such free MT systems and helpful practical tips. The second focused on ways to ensure better translation results, encouraging participants to input simple and short sentences. The final and key section addressed MT's limitations and offered guidance on effective and responsible usage, with attention to privacy issues. Examples of MT errors in authentic situations (Figure 2) were used to raise participants' awareness of the limitations of MT, particularly for low-resource languages like Myanmar. Moreover, throughout the presentation, screenshots from the GT website and results from the GT mobile app (via Google Lens), featuring Myanmar as either the source or target language, were shown to the participants.

Participants were also advised to use MT critically, including avoiding blind reliance and seeking consultations in high-risk situations. Obviously, this segment occupied a large portion of the training time—an allocation that reflects the pedagogical weight assigned to it. As the core conceptual component of the program, it served as a critical prerequisite to the hands-on activities that followed.

## Figure 2

Source Text and Results from the GT Mobile App



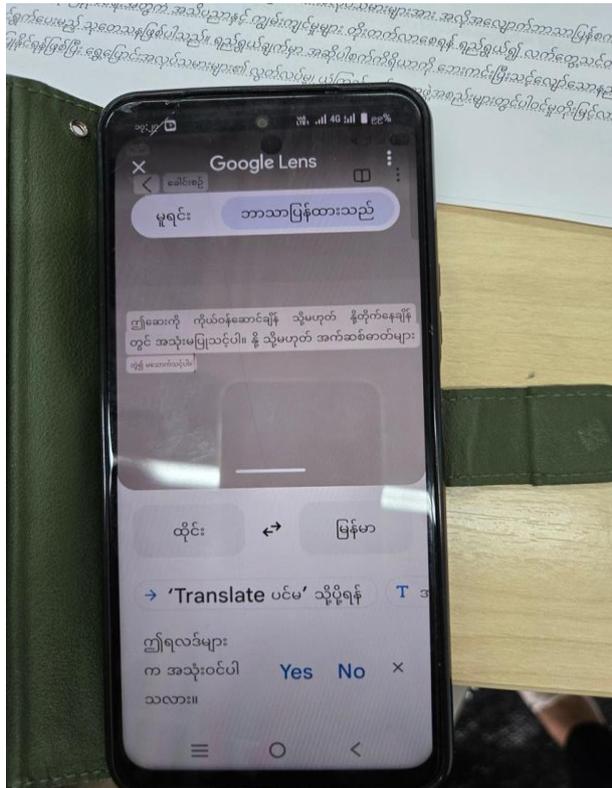
Next, we proceeded with four activities designed to assess participants' practical competence and critical awareness of MT.

**Activity 1.** This activity primarily aimed to assess participants' abilities in terms of adequacy and fluency, that is, the degree to which a machine-translated output conveys the intended meaning accurately and reads naturally in the target language. For this part, the participants were instructed to use GT to translate a text from Thai to Myanmar.

In this stage, limitations emerged, as expected, as most participants were unable to type in Thai. In their real-world contexts, participants typically copied Thai messages from their employers and pasted them directly into the GT app. Thus, the activity was modified to align more closely with their usage patterns. Participants were then guided to copy and paste the text for translation, accompanied by a brief tutorial on basic app functionalities, including language selection, switching source and target languages, and explaining translation outputs.

The instructional content was made accessible through QR codes linking to short medical-related sentences in Thai, such as "Take one tablet after breakfast once a day" or "If symptoms improve, the medication can be discontinued. Use caution in patients allergic to Sulfa." These sentences were intentionally chosen to reflect semi-technical but commonly encountered healthcare language (Figure 3).

**Figure 3**  
*Results from the GT Mobile App*



The activity yielded mixed outcomes. Some participants were able to complete the tasks smoothly, while others encountered technical barriers from the outset. For instance, P1 and P4 were unable to scan the QR codes due to device limitations; that is, the QR codes rendered only as static images. Compounding this issue was the fact that neither participant had the LINE app—the most widely used instant messaging application in Thailand (Walderich, 2025)—installed, which prevented them from directly joining this activity or submitting their responses through the assigned platform.

Another significant issue is lexical comprehension. Certain words containing qualifiers or medical collocations, such as “chronic cough”, proved unintelligible to some participants. In the cases of P1 and P3, post-task interviews revealed that they did not understand the meaning of such terms. This suggests that even if the vocabulary was not strictly technical, it may have still exceeded the participants’ current linguistic range. A likely explanation, according to the language expert in the research team, is the lower level of their vocabulary size and exposure to the general terms.

Admittedly, the activity proved time-consuming and arguably too complex, particularly due to the technical limitations related to QR code scanning and inconsistent access to mobile applications. For example, P4, who had neither LINE nor the ability to scan QR codes, had to resort to an alternative method: photographing the original text and using GT camera function. Notably, participants with higher digital literacy, such as P5, completed the task with greater ease. This participant, who had LINE installed and could scan QR codes to access the source text without difficulty, copied the translated output and immediately pasted it into the LINE application without editing or post-editing the translation.

This activity imposed higher cognitive and technological demands, with some participants struggling or unable to complete it. It is evident that future sessions should avoid using QR codes and pre-selected sentences. Participants should instead use their own phones

to Google a relevant site, choose a sentence, and translate it independently. This way should help reflect their ability to assess MT output in context.

**Activity 2.** This activity was conducted as role-play. The research assistant assumed the role of a doctor, while participants acted as patients seeking medical consultation (Figure 4). The objective was to foster participants' competence in using real-time speech-to-text function, seeking to improve both the fluency and efficiency of MT tool usage while developing quick-response interactional skills.

#### Figure 4

*A Role-Play Activity with the Research Assistant (Own Work)*



We found several key points for this activity. First, accent and pronunciation patterns played a pivotal role in determining the accuracy of both voice recognition and translation output. An incident occurred when a participant, speaking in Myanmar, attempted to use the term ဆရာဝန် [sa-ya-wun] meaning “doctor”, which the MT system misinterpreted as ဆရာမ [sa-ya-ma] meaning ‘teacher’. This mistranslation led to initial confusion and underscored GT’s inability at that time to disambiguate contextually similar lexical items. None of the six participants showed an awareness of this lexical nuance. A likely explanation is that although the participants communicated in Myanmar, all of them were Mon speakers, with distinctive phonetic variations compared to standard Myanmar pronunciation. The second point is the participants’ speech behavior while using GT. Rather than producing keyword-focused utterances (e.g. ‘headache’), they tended to speak complete sentences such as, “Today I have a bad headache and would like to see the doctor.” This may reflect a desire to be polite and appropriate; however, in real-world MT usage, particularly for these languages, brevity and clarity are often more effective. We see this point as the tension between politeness and efficiency, as it highlights a challenge in machine-mediated communication that involves sociolinguistic convention and limitations of technology’s design.

Further training with the role-play scenario should consider providing prompts to all participants simultaneously, followed by inviting individuals to respond one by one. This could

enhance the authenticity of simulated interactions. The questions during role-play might include: “What symptoms did you visit the doctor for?”, “Where does it hurt?”, or “How did you pay for today’s treatment?” All these questions mirror realistic communicative situations in a healthcare setting.

**Activity 3.** This segment was designed to raise participants’ awareness regarding the protection of personal data to foster critical reflection on the ethical implications of handling sensitive personal information when using MT.

To facilitate experiential learning, we created a simulated scenario in which a highly sensitive document was found on the floor. Participants were asked to reflect on and enact what they would do if they were to return such a document to its owner. This document was a mock medical record, chosen to prompt awareness of both linguistic and ethical considerations. Upon receiving the document, many participants immediately began using their mobile phones to translate its content. However, when realizing the document contained another person’s medical information, nearly all participants discontinued their actions. During this activity, P1, the oldest in the group, expressed a firm decision not to engage with the document at all from the outset. In contrast, P2 and P4 neither acted on the document nor voiced any opinions but remained silent. Nevertheless, the overall atmosphere suggested a shared understanding that accessing or using MT tools to translate another person’s private medical information was inappropriate.

Despite this generally positive outcome, the activity also revealed challenges in training participants on the subtleties of data privacy, especially when users put personal or sensitive information into automatic translation platforms, which may store and process user data. This is generally unknown to the average user (Bowker, 2022). Interestingly, older participants tended to respond more promptly and decisively, while younger participants showed slower or less overt reactions, pointing to differences in confidence, experience, or social dynamics within the group.

Interestingly, during the follow-up discussion, some participants freely shared personal information—such as past medical visits—despite being aware that the scenario was fictional. This willingness to disclose sensitive details, we observed, was often motivated by politeness toward the researchers, so it is difficult to gauge participants’ level of awareness of the topic. It also highlights the power dynamics and perceived authority in data-sharing contexts between the researchers and participants.

**Activity 4.** This last activity was designed to simulate real-life situations in which participants needed to use GT to translate written texts. The aim was to enhance participants’ competence in applying appropriate MT modalities based on scenarios, including using the camera function when dealing with image-based or printed content.

For this part, the research team introduced participants to the official website of Thailand’s Ministry of Labour and its social media platforms, like Facebook.<sup>2</sup> The site contains content relevant to labor regulations, procedures for legal registration, work permit applications, and other formalities for foreign workers. However, most of the content is presented exclusively in Thai, with limited sections available in English, and notably absent are Myanmar translations. Several participants noted that, in real-life situations, they typically access such information through verbal relay from employers, although this often depends on the employer’s attentiveness. Beyond the official website, the research team created mock signage replicating real public notices in Thai. These simulated materials were used to provide

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<sup>2</sup> The official website of the Foreign Workers Administration Office, Department of Employment, Ministry of Labour (<https://doe.go.th/prd/alien/knowledge/param/site/152/cat/19/sub/0/pull/category/view/cover-view>) and its Facebook page ([https://www.facebook.com/aliensdoe/?locale=th\\_TH](https://www.facebook.com/aliensdoe/?locale=th_TH))

participants with hands-on translation practice of texts typically found in their respective communities (Figure 5).

### Figure 5

*A Participant Using Google Lens to Scan the Mock Signs (Own Work)*



By this point in the training, we observed that participants had achieved a higher degree of adaptability in using MT tools, resulting in smoother implementation of the activity and a dynamic learning atmosphere. Participants interacted with the training materials actively, with the Ministry of Labour website in particular prompting meaningful in-group discussions. For example, some of the training texts included official Thai abbreviations (e.g. สจก. or สจจ.) whose meanings were ambiguous even to native Thai speakers. Yet these moments became opportunities for collective learning and knowledge construction. Also, we found that participants showed increased autonomy and motivation in their use of MT tools. One striking example was P6, who impulsively began scanning a sign with her phone without waiting for the complete instructions. It was an act that showed initiative and the emergence of self-directed learning behavior.

### Discussion: Lessons Learned for Enhancing the Effectiveness of Full-scale Training

What we learned in the pilot study certainly allows for improved training programs aimed at fostering MT literacy among Myanmar workers in an effective and accessible manner. After we designed and implemented the pilot, it was obvious that among the six participants, there existed varying levels of GT proficiency. Several participants demonstrated adeptness in utilizing GT, which in turn contributed significantly to their acquisition of MT literacy, both in terms of technical competence and in the domain of personal data security. However, a critical reflection on the outcomes of the pilot training revealed several key areas in need of clarification and refinement, particularly for scaling the training to accommodate larger participant groups

The first point is participant profiles and digital readiness. Although the participants in the pilot were diverse in background, one notable feature was the narrow age range within the group of six. A significant proportion were in their late teens or early twenties, which partially explains their relatively proficient use of mobile applications such as GT. This learner readiness deserves more attention, as Guerberof-Arenas and Moorkens (2023) have observed: the mode of translation frequently influences end users, especially those possessing limited familiarity with either the source language or the context of the translated material. A lack of such awareness may give rise to misunderstandings and a perceived decline in translation quality, which would ultimately hinder the core concept of promoting the awareness of adequate and accurate MT for efficient use. For future training, we may need to recruit a more diverse age group, and scenarios should be created according to the likelihood that they could actively use mobile-based translation tools and communication platforms like the LINE app. This ensures that the training activities are both relevant to the participants' lived experiences and real-life usage. This aspect echoes Molin-Karakoç's (2025) recommendation that incorporating refugees' informal digital practices (i.e. those taking place outside the classroom) into formal educational settings can promote positive learning experiences and enhance lesson effectiveness.

Also, as Koehn and Knowles (2017, p. 33) warn, NMT can silently fail by producing translations that read smoothly and appear correct but misrepresent the meaning of the input. We acknowledge this potential and recognize that it could pose a serious risk for non-expert users who do not understand the target language. Migrants relying on MT for daily communication may unknowingly act on misleading information. Thus, it highlights the need to incorporate the deep reflection session in future training focusing on critical awareness and further verification strategies – an element that could only be briefly addressed in the pilot.

The second point relates to the awareness of privacy, particularly the tension between regulatory compliance and informed, conscious consent. This issue was deliberately incorporated into the design to promote understanding of the principles of privacy and confidentiality among users of MT (Taira et al., 2021). However, it was observed that only one of the six participants showed an awareness of the potential risks to their safety and well-being, while the remaining participants did not. Such a lack of awareness is unfortunate and could influence their future use of MT. This seems to be in line with Vieira's (2024) observation in that users who are unaware of these risks may engage with publicly accessible MT tools without due caution; personal devices may lack encryption, and sensitive data can inadvertently be exposed to third parties via browser histories. Thus, we see that future training should incorporate explicit instruction in privacy literacy, such as clarification of participants' right to withhold responses. This is especially important during the scenario designed to elicit sensitive information from participants. It should be improved by directly informing them of this right rather than using subtle scenarios, which can lead to wasted time as participants must learn through experience.

A related issue arises concerning the positionality of the trainers themselves. Precisely, when designing questions related to personal information and medical history, an effort was made to categorize these items under a unified thematic framework. Nevertheless, during the debriefing sessions, it became evident that some participants may have provided quick responses to sensitive questions due to a perceived obligation to comply with the researchers' expectations. Such a response dynamic, suggestive of a power asymmetry, highlights ethical concern on the extent to which participants are aware of their rights – especially the right to decline disclosure of personal data. Regarding the researchers' positionalities (whether as insiders, outsiders, or those in-between), Park (2025) recommends that researchers engage in continuous reflection on how their perspectives are shaped by interactions with the host community, the dominant culture, and with participants themselves. We believe that this form of critical self-reflection is essential, as it functions to mitigate bias and contributes to the

overall integrity and rigor of the research process. Accordingly, in the next stage of the project, we could also focus on critical reading of the researcher's involvement per se, particularly in relation to how researchers' identities and subjectivities may influence various stages of the research process (Kerstetter, 2012; Phanthaphoommee et al., in press).

The third point concerns the content of the training design and pedagogical flow. While the pre-test and introduction sessions were viewed as highly effective and crucial for participants' understanding of the tools, several of the scenarios created might not reflect the breadth of public services that migrant workers may encounter in real-life contexts. As Vieira et al. (2021) opine, it is important that MT literacy is taught across diverse and high-stakes domains, such as doctor-patient interactions, court proceedings, and similar settings. These scenarios must be integrated with greater care, especially given the marginalized status of the target audience. For the full-scale training, the training flow should be extended to ensure more comprehensive coverage, and consequently, additional time should be allocated to this segment due to its central role within the session. This also means practice-based components should be delivered at a measured pace; each newly introduced function or feature of GT ought to be followed by a short pause, allowing participants sufficient opportunity to interact with the interface before moving to the next step.

The fourth point pertains to the functional affordances of the tools, particularly those related to voice input (especially pronunciation and pacing). Clearly, several participants lacked awareness of the extent to which articulation and speech tempo bear upon the accuracy of machine-generated translations. Consequently, the system sometimes yielded erroneous outputs. This was clearly illustrated by the variable rendering of the Myanmar term for "doctor", which differed depending on whether the input was delivered as isolated lexical items or within the context of complete sentences. This phenomenon aligns with the findings of Reichel et al. (2023), who note that MT continues to perform more reliably in high-resource languages, such as English and those of Western Europe. In contrast, low-resource languages remain disadvantaged by the limited availability of linguistic data, which constrains the training of robust models. Findings from our pilot suggest the need to incorporate targeted instructions on speech clarity and pacing into the design of training interventions. Therefore, as guidance, the participants should be encouraged to speak slowly and use short, clear phrases or even keywords to ensure the effectiveness of communication during role-plays.

Another noteworthy function is the visual translation mode (i.e. Google Lens). Participants seemed enthusiastic about using the image-based translation feature, especially in scenarios involving the navigation of the Thai government's official websites. However, it was found that the orientation of the device's camera (i.e. vertical vs horizontal mode) significantly influenced the quality of the translations produced. Future training should include explicit guidance on optimal camera positioning and ambient lighting, to enhance the reliability of optical character recognition outputs.

Lastly, this pilot study has yet to address three key areas of MT literacy as outlined by Bowker and Buitrago-Ciro (2019): evaluating how MT-friendly a text is, creating or adapting texts to optimize them for MT systems, and post-editing MT output to improve its accuracy and readability. The absence of these elements in our training is relevant to the nature of the migrant participants. Unlike professional translators, they are not trained to become language professionals, but rather to apply MT tools in everyday, practical contexts. Consequently, the pilot training aligns more appropriately with the four core concepts initially proposed, which serve as a practical framework for this context.

## Conclusion

This article has presented the design and administration of the pilot MT literacy training program for migrant workers in Thailand, aimed at promoting appropriate and effective use of MT tools. It also offers a reflexive account by the researchers, grounded in participants' engagement with the pilot study activities. After the pilot, we answered the research questions on what factors should be considered when designing an MT literacy training program and what challenges should be addressed for future training. Our framework was structured around five core concepts, which informed both the pre-test instruments and the training content: understanding of adequacy and fluency, efficiency in MT use, awareness of accuracy, awareness of privacy, and contextual adaptability.

Meylaerts (2018) contends that when linguistic barriers obstruct equal opportunities, translation plays a pivotal role, enabling more effective communication and ensuring equitable access to information. As such, future iterations of the training should come with a comprehensive roll-out for a full day or ideally a day and a half, to address both theoretical underpinnings and practical applications in sufficient depth. Also, to maximize accessibility, the training should ensure that all participants are equipped to engage with materials via GT. Furthermore, an expansion of participant numbers to between ten and fifteen would entail a corresponding increase in staffing, particularly to facilitate group-based tasks and to provide targeted support where necessary. We also see that post-activity debriefings should be structured and pre-planned rather than delivered ad hoc, as this would support more coherent reflection and consolidate learning outcomes.

Another limitation lies in the absence of a post-test to assess participants' MT adaptation following the training. We are aware that such an assessment would undoubtedly inform improvements to the training program in its full-scale implementation; unfortunately, time constraints prevented any follow-up after the training. Nonetheless, we believe that the behaviors, reactions, and feedback from those involved in this pilot have offered valuable insights that could be drawn upon in refining the training for future iterations.

Logistics-wise, gathering participant information in advance would greatly facilitate planning. Also, administrative issues such as name legibility (from handwritten entries) and mismatches with passport names created avoidable confusion. To resolve this, participants should be asked to introduce themselves at the beginning of the session. For those who cannot write their names in English, alternative supportive strategies should be considered to ensure accurate identification and inclusion.

At this pilot stage, we have not yet involved the stakeholders like local government service providers; however, their future involvement could serve to expand the scope of the program. As Tangi et al. (2021) suggest, integrating MT training with public services—such as legal assistance and broader social support—could enhance communicative effectiveness. In a nutshell, our pilot study hopes to provide a foundational model for the development of a more comprehensive MT training framework, which future projects could adapt to meet the needs of different groups.

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The authors confirm that there are no known conflicts of interest associated with this article.

## Authors Contributions

N.P. conceptualized the study, led the design of the training program, and recruited participants. All authors contributed to the design of the research instruments and the training program. N.P. and W.P. conducted the pilot study with participants, performed the data analysis, and drafted the manuscript. W.P. coordinated the research team and managed all correspondence with the journal. S.C. and J.M. reviewed and edited the manuscript. All authors read and approved the final version of the manuscript.

## Institutional Review Board Statement

This research project was approved by the Mahidol University Institutional Review Board (COA. No. MU-CIRB 2025/190.0606).

## Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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