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Enhancing Metacognitive Awareness Through Flipped Classrooms: A Mixed-Methods Study in Translator Education

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Objective: This study examined the effect of a flipped classroom model on the development of metacognitive awareness among translation students—an area that has received limited attention in translator education.

Methods: A mixed-methods, quasi-experimental design was employed with 38 undergraduate students enrolled in a journalistic translation course at Jahrom University. Participants were assigned to either an experimental group receiving flipped instruction or a control group receiving traditional instruction. Data collection combined pre- and post-intervention scores from the Metacognitive Awareness Inventory (MAI) with qualitative insights from thematic analysis of interviews and classroom observations.

Results: Quantitative analyses revealed statistically significant improvements ($p < .05$) in all MAI subcomponents for the flipped classroom group, encompassing both knowledge of cognition (declarative, procedural, conditional) and regulation of cognition (planning, monitoring, evaluation). The largest effect sizes were observed in debugging strategies ($\Delta = 0.35$) and evaluation ($\Delta = 0.32$). The control group demonstrated minimal gains. Qualitative findings supported these results, indicating that flipped instruction fostered enhanced self-regulation, strategic planning, and active engagement through pre-class preparation, peer feedback, and reflective in-class activities. While some students initially encountered time management challenges, they reported increased autonomy and cognitive control over time.

Conclusions: The flipped classroom model effectively enhanced metacognitive skills in translation training, bridging theoretical learning with practical application. These outcomes highlight its value for developing the reflective and cognitive competencies essential for professional translation. Integrating flipped instruction into translator education curricula is recommended, with further research needed to compare its impact against other active learning approaches.

Keywords: Flipped Classroom, Metacognitive Awareness, MAI, Translator Training, Mixed-Methods, Pedagogical Practices

Introduction

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In the dynamic field of translator education, integrating innovative pedagogical approaches is critical to equipping future translators with the essential skills and competencies required for professional success. The flipped classroom model inverts traditional teaching by delivering content outside class (e.g., via videos) and using in-class time for interactive activities (Nhat, 2021; Guolong Wang, 2022). Unlike traditional lectures followed by homework, this approach fosters active engagement, critical thinking, and practical application, empowering students to take ownership of their learning through self-reflection and collaboration.

In Flipped translator training, this shift from result-oriented to process-oriented teaching aligns well with the cognitive demands of translator training, where learners must engage deeply with tasks that require both linguistic accuracy and contextual understanding (Karthikeyan et al., 2023).

Metacognitive awareness—the ability to monitor and regulate cognitive processes—is vital for learning. The Metacognitive Awareness Inventory (MAI) assesses two components: knowledge of cognition (declarative, procedural, conditional knowledge) and regulation of cognition (planning, monitoring, evaluating) (Harrison & Vallin, 2018; Schraw & Dennison, 1994). In translation training, metacognitive strategies help students navigate complex linguistic and cultural tasks, improving proficiency (Mahdavi, 2014). When combined with flipped classrooms, this approach fosters active, self-regulated learning, bridging theory and practice for translator education.

By shifting the focus from passive content delivery to interactive and student-centered activities, the flipped classroom creates an environment conducive to the development of metacognitive strategies. Concurrently, the concept of metacognitive awareness has emerged as a critical component in developing self-regulated and reflective learners, capable of navigating the complexities of the translation process. It is, defined as "the ability to monitor, evaluate, and regulate one's own cognitive processes" (Mei, 2017). The intersection of flipped classrooms and metacognitive awareness in translator training provides a robust pedagogical framework that addresses both cognitive and professional development. By incorporating metacognitive strategy training within flipped classroom models, translator education can promote not only linguistic and cognitive growth but also lifelong learning skills essential for navigating a globalized and technology-driven industry. This approach encourages students to take ownership of their learning, articulate their thought processes, and apply these insights to real-world translation challenges.

Many studies have explored the relationship between various instructional methods and metacognitive awareness. Flipped classroom approaches have been shown to enhance students' metacognitive strategies. Limueco and Prudente (2019) found that flipped classrooms led to significant improvements in all aspects of metacognition compared to traditional lectures (Limueco & Prudente, 2019). Yilmaz

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and Baydas (2017) further emphasized the role of pre-class activities in flipped classrooms, demonstrating that students' metacognitive awareness was high and strongly predicted their learning performance (Yilmaz & Baydas, 2017).

In the field of translator training, research has investigated how metacognitive awareness impacts translation quality. Metacognitive awareness is crucial for translators, encompassing both knowledge of cognitive processes and the ability to regulate them. Specifically, this involves translators knowing about translation strategies (declarative knowledge), knowing how to implement them (procedural knowledge), and knowing when to use them effectively (conditional knowledge). Furthermore, metacognition in translation involves actively planning, monitoring, and evaluating the translation process. These skills enable translators to anticipate and manage challenges, ensuring accuracy, consistency, and appropriateness across diverse text types and translation scenarios. This level of self-awareness allows translators to adapt their approaches to technical, literary, or journalistic texts, understand potential difficulties, and prepare solutions.

Moreover, metacognitive skills are essential for quality control and problem-solving within the translation process. Continuous self-assessment and error monitoring help translators refine their work and adhere to specific textual requirements. Furthermore, debugging strategies enable them to overcome challenges like ambiguous meanings and incoherence. Research indicates that incorporating metacognitive training through reflective exercises and strategy training enhances student performance and their ability to navigate real-world complexities in translation projects. Ultimately, metacognition prepares translators to be more independent, adaptable, and effective throughout their careers.

Hu et al. (2020) explored the use of a metacognitive self-regulation inventory for translator self-training. Their study revealed that repeated use of the inventory significantly increased students' metacognitive awareness and translation quality, particularly in areas like clarity, vocabulary use, and adherence to genre conventions (Hu et al., 2020). Pietrzak (2019) also highlighted the importance of structured self-reflection in translator training, demonstrating that such activities aided students in regulating their translation processes and improving their metacognitive awareness (Pietrzak, 2019).

Various tools and methods have been developed to assess metacognitive awareness. The Metacognitive Awareness Inventory (MAI) by Schraw and Dennison (1994) is a widely used and validated instrument for measuring metacognitive awareness in studies on reading comprehension and learning performance (Schraw & Dennison, 1994). The MAI has been validated and adapted in various contexts. For instance, studies on its Turkish version demonstrated high reliability and internal consistency, with strong correlations between the original and translated versions (Akin et al., 2007). Additionally, the inventory has been modified for specific groups, such as teachers, providing a reliable measure of metacognitive

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awareness in educational settings (Balçıkanlı, 2011). Anderson et al. (2012) explored the use of adaptive neural network models for classifying students' metacognitive strategy awareness. This method proved to be an effective tool for assessing metacognitive awareness in large student populations (Anderson et al., 2012).

This study aims to explore the intersection of flipped translator training classrooms and metacognitive awareness, investigating the potential synergies between these two domains. Specifically, it seeks to assess the impact of flipped classroom approaches on the development of metacognitive awareness among translation students. By examining the interaction of two elements, this research endeavors to contribute to the ongoing discourse on innovative pedagogical practices in translator education and provide insights into improving the effectiveness of translator training programs.

While the flipped classroom model has gained recognition across various educational fields, its specific application in fostering metacognitive awareness within translator training remains underexplored. As Cevikbas and Kaiser (2021) observe, “existing research has primarily focused on the general benefits of flipped learning, such as increased student engagement and improved academic performance.” Empirical studies investigating the distinct impact of flipped classrooms on developing metacognitive awareness among translation students are notably lacking.

To address this gap, the present study employs a rigorous mixed-methods approach within a quasi-experimental framework. While flipped classroom methodologies have been extensively studied in broader educational contexts, their potential in translator training—particularly in fostering metacognitive strategies—remains underexplored. Prior research has predominantly focused on general outcomes like engagement or performance (Limueco & Prudente, 2019; Yilmaz & Baydas, 2017), leaving a critical gap in understanding how flipped classrooms specifically enhance metacognitive awareness, a cornerstone of professional translation competence. This study fills this gap by explicitly connecting flipped pedagogy to metacognitive development, offering a novel contribution to translator education.

The innovation of this research lies in its dual focus:

1. It empirically validates the flipped classroom’s role in cultivating metacognitive skills (e.g., planning, monitoring, evaluation) essential for translators, who must navigate complex textual and cultural nuances.
2. It identifies actionable instructional practices (e.g., pre-class preparation, peer feedback loops) that drive metacognitive growth, providing a replicable model for curriculum design.

The necessity of this study is underscored by the evolving demands of the translation profession, where self-regulation and adaptive problem-solving are paramount. Traditional teacher-centered approaches

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often fail to develop these competencies, leaving graduates unprepared for real-world challenges. By demonstrating how flipped classrooms bridge this gap, our findings address a pressing pedagogical problem: equipping students with lifelong learning skills for a dynamic, technology-driven industry.

We implemented a flipped classroom model in a translation program and measured students' metacognitive awareness using the Metacognitive Awareness Inventory (MAI) before and after the intervention. Additionally, to gain a richer understanding, we conducted semi-structured interviews and classroom observations. This comprehensive approach not only quantifies improvements but also uncovers the "how" and "why" behind metacognitive gains, offering deeper insights than prior studies.

The study answers three pivotal questions:

1. To what extent does the flipped classroom approach lead to an improvement in translation students' metacognitive awareness, as measured by the MAI?
2. How do translation students perceive the impact of the flipped classroom model on their use of metacognitive strategies and self-regulation during the translation process?
3. What are the key factors or instructional practices within the flipped classroom environment that contribute to the development of metacognitive awareness in translator training?

Unlike previous studies, which treated metacognition as a secondary outcome, this research positions it as the central focus, revealing its transformative potential in translator education. The findings advocate for a paradigm shift from passive learning to active, reflective practices—a change critical for preparing translators to thrive in a globalized workforce.

Material and Methods

Design

This study employed a mixed-methods approach, combining quantitative and qualitative data collection techniques, to investigate the impact of flipped classroom approaches on the development of metacognitive awareness among translation students. A quasi-experimental design with a control group was employed in this study to assess the impact of a flipped classroom model on the development of metacognitive awareness among translation students. The design involved pre- and post-intervention assessments of metacognitive awareness using validated instruments, as well as the collection of qualitative data through semi-structured interviews and classroom observations.

Participants

The participants in this study were students enrolled in the Department of Translation Studies at Jahrom University during the second semester of 2023 (n. 38). All participants (22 females, 16 males) were enrolled in the '*Translating Journalistic Texts*' course of study, a 16-week curriculum with biweekly lectures. Participants were selected based on their enrollment in this course and their completion of

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prerequisite courses, such as '*Principles and Methods of Translation'* and '*Translation of Simple Texts*.' This ensured a relatively homogeneous level of translation proficiency across the sample, allowing for a more controlled examination of the flipped classroom's impact.

The study was conducted with the full knowledge and oversight of Jahrom University's Research Committee and Educational Department. Informed verbal consent was obtained from all participants, following the institution's guidelines. Participants were thoroughly informed about the purpose, procedures, and potential risks of the study. They were also made aware that their participation was voluntary and that they could withdraw from the study at any time without consequence. The study adhered fully to ethical standards, ensuring transparency and the protection of participants' rights throughout the research process.

The study employed a two-group design, utilizing convenience sampling to assign participants based on student preferences and scheduling considerations. The experimental group (n = 22) participated in a flipped classroom model, while the control group (n = 16) received traditional, instructor-centered instruction. Although random assignment was not feasible, steps were taken to ensure comparability between the groups, particularly regarding gender distribution, resulting in balanced representation (experimental group: 13 females, 9 males; control group: 9 females, 7 males). Both groups were instructed by the same lecturer to maintain consistency in teaching quality and delivery, thereby mitigating potential biases associated with the sampling method.

Additionally, while gender was not a primary variable of interest, the balanced representation was achieved by forming groups based on student preferences, ensuring fairness in gender distribution. This approach helped control for potential gender bias despite the non-randomized sampling design.

Procedure

Prior to the intervention, all participants completed the Metacognitive Awareness Inventory (MAI), a validated instrument used to measure metacognitive awareness. Following the pre-assessment, the intervention phase began for the experimental group. This structured implementation of the flipped classroom model aimed to create an interactive and student-centered learning environment.

Out-class Preparation: The teacher recorded videos on translation strategies and provided supplementary learning materials, such as articles, slides, and multimedia resources. These materials covered essential concepts and techniques in translating journalistic texts. Students were required to watch these videos at home and review the materials independently before attending face-to-face classes. This self-paced study allowed students to grasp the fundamental content at their own pace and come prepared to engage in interactive activities during class.

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In-class Active Learning: In the first three class sessions, students worked on translation exercises based on the pre-recorded lectures. During these sessions, the teacher acted as a facilitator, monitoring the flow of classroom activities and guiding students to ensure every process ran smoothly. In subsequent class sessions, the teacher instructed each student group to conduct dynamic searches for the text features of the assigned text type. Students reported their findings to the class, generating discussions that could be helpful for their translations. Each group analyzed the translations of all their peers and presented their findings in class. The 1-hour-long group presentations covered:

- Analysis of the source text
- Typology and features of the text in question
- Suggested translation strategies
- Difficulties in translation as observed from their peer translations
- Common errors found in the translations
- Preferred translations

Following the group presentations, students engaged in peer revisions, where they were asked to evaluate the translations using a rubric adapted from Khanmohammad and Osanloo (2009). This rubric is designed to assess various dimensions of translation quality, offering a comprehensive and systematic approach to evaluation. It is based on objective criteria, including aspects such as accuracy (30%), finding equivalents (25%), sensitivity to register and cultural nuances (20%), grammar and style (15%), and shifts, omissions, and additions (10%). Each criterion is scored on a scale, typically ranging from 1 to 5, with detailed descriptors for each level to ensure consistency and minimize subjectivity in the assessment process Feedback provided during the peer evaluations included specific suggestions for improvement, fostering reflective learning. The rubric helps to reduce rater bias by clearly defining the factors to be considered in translation evaluation. The detailed scale with level descriptors offers clear examples of what constitutes each performance level, guiding evaluators in making more objective judgments. Reviewers also rated the overall translation quality and provided recommendations or comments. The review process was not anonymous; students knew who reviewed their translations. Using the "Track Changes" function in Microsoft Word, students edited and commented on the translations, first reading the translation before comparing it with the source text to check the language. After-Class Reinforcement: Students carefully review the feedback received from their peers during the in-class peer revision process. This involves analyzing the comments and suggestions made using the 'Track Changes' function in Microsoft Word. They are encouraged to assess their own translations in light of the feedback and reflect on the strengths and weaknesses identified by

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their peers and consider how to address any issues raised. Based on the feedback and self-assessment, students revise their translations. The teacher assigns additional translation exercises or projects that reinforce the concepts and strategies discussed in class. These assignments help students practice and apply their learning to new texts. The teacher also may provide further resources or optional readings to deepen students' understanding of journalistic translation. Students can also be encouraged to engage in discussions or forums outside of class to share insights and support each other's learning.

In contrast, the control group received traditional, teacher-oriented instruction where the instructor delivered lectures in class, and students engaged in individual translation exercises without the use of pre-recorded materials or active learning strategies.

Throughout the intervention phase, classroom observations were conducted by researchers to gather qualitative data on students' experiences and perceptions of both the flipped classroom and traditional teaching approaches. These observations involved attending class sessions and taking detailed notes on student engagement, participation, and interactions during the activities. After completing the intervention phase, all participants were again administered the MAI as a post-assessment measure of metacognitive awareness. The post-assessment scores were compared with the baseline scores to determine the impact of the flipped classroom intervention relative to the traditional teaching method. Additionally, semi-structured interviews were conducted with a subset of participants from both the experimental and control groups to gain further insights into their experiences and perceptions of their respective teaching approaches. The interviews were audio-recorded and transcribed verbatim for analysis.

Data Collection & Analysis

Data collection involved both quantitative and qualitative methods: Pre-and post-intervention administrations of the Metacognitive Awareness Inventory (MAI). The MAI is a validated 52-item instrument measuring knowledge of cognition (declarative, procedural, and conditional) and regulation of cognition (planning, information management, comprehension monitoring, debugging strategies, and evaluation) using a 4-point Likert scale (Always False, Sometimes False, Sometimes True, Always True). Mean scores were calculated for each subcomponent. Scoring interpretation followed established criteria (low: 1.0-1.5, moderately low: 1.6-2.5, moderately high: 2.6-3.5, high: 3.6-4.0). This instrument was administered before and after the implementation of the Flipped Classroom model in the experimental group and traditional teaching method in the control group. The instrument is confirmed to be valid with a coefficient alpha of 0.95 (Schraw & Dennison, 1994). In this study, the calculated Cronbach’s Alpha is 0.935 for 35 students, implying high reliability and consistency of the instrument.

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The quantitative data obtained from the pre- and post-intervention MAI assessments were analyzed using appropriate statistical techniques, such as paired t-tests or repeated measures ANOVA, to determine if there were significant differences in students' metacognitive awareness scores before and after the implementation of the flipped classroom model in the experimental group, as well as to compare these changes with the control group who received traditional, teacher-oriented instruction.

To gain deeper insights into students' experiences and perceptions of both teaching approaches, qualitative data were collected through two complementary methods: classroom observations and semi-structured interviews. Classroom observations were conducted by the course instructor, who is also one of the authors of this study, throughout all class sessions during the semester. These observations provided firsthand data on student engagement, participation, and interaction patterns across various activities. Detailed field notes were recorded, capturing students' verbal and non-verbal behaviors, levels of focus and collaboration, and overall participation in both the flipped and traditional classroom environments. This observational data offered valuable contextual insights to complement the quantitative findings and provided a more nuanced understanding of how students interacted with each instructional model.

Following the intervention, semi-structured interviews were conducted with 12 participants—8 from the experimental group and 4 from the control group—selected to represent diverse performance levels and engagement patterns. The interviews aimed to capture a broad range of perspectives on the flipped and traditional classroom experiences. The interviews were conducted by the course instructor during the final class session, ensuring familiarity and comfort for the participants. All interviews were audio-recorded with participant consent and transcribed verbatim for thematic analysis. This comprehensive approach facilitated an in-depth exploration of students' subjective experiences and their evolving understanding of metacognitive strategies. The following table outlines the key interview questions:

Interview Question	**Focus Area**
1. How do you typically approach a translation task? What steps do you take before, during, and after completing a translation?	This question addresses participants' ability to plan, monitor, and evaluate their translation strategies, which are core components of metacognitive awareness.
2. Can you describe a time when you faced a challenge during a translation task? How did you address it, and what strategies did you use to overcome it?	This question probes participants' self-regulation skills, specifically their ability to identify challenges, apply strategies to overcome them, and reflect on their problem-solving processes.
3. Do you think you were able to track your progress in translating over the course of the study? If so, how did you do that, and how did it influence your approach to the tasks?	This question assesses participants' ability to monitor their own learning progress, a critical element of

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	metacognitive awareness that influences the effectiveness of their strategies.
4. When working on group translation tasks, how do you ensure that your ideas or translations align with those of your peers? How do you manage disagreements or differences in translation approaches within your group?	This question explores metacognitive regulation in collaborative settings, examining how participants manage cognitive conflicts and ensure alignment with peers' ideas and strategies.
5. How do you decide which translation strategy to use in different situations? Are there specific techniques you find more effective, and how do you evaluate their success in each translation task?	This question examines participants' metacognitive knowledge, focusing on their ability to evaluate, choose, and adapt translation strategies based on the task at hand.

Each interview question is designed to probe different aspects of metacognitive awareness, including knowledge of cognitive strategies, regulation of those strategies, and the ability to reflect on and monitor one's learning progress. These questions helped uncover how participants understand and manage their cognitive processes in translation tasks, providing a nuanced view of their metacognitive development.

The qualitative data collected from semi-structured interviews and classroom observations were analyzed using thematic analysis to identify key patterns and themes related to students' metacognitive awareness. This analysis followed established qualitative research methods to ensure rigor and depth in interpreting participants' experiences.

The process began with familiarization, where researchers thoroughly reviewed interview transcripts and observational notes multiple times to identify recurring patterns. Initial observations included students' descriptions of planning strategies (e.g., "I started by analyzing the structure of the source text"), self-monitoring techniques (e.g., "I revised my translation three times to correct inconsistencies"), and collaborative interactions (e.g., "My group debated the best way to handle cultural references"). The next step involved coding, where the data was broken down into meaningful segments. Six core themes emerged: self-regulation, planning, monitoring, collaborative engagement, strategy adaptation, and perceived challenges. These themes were iteratively refined to capture the dynamic relationship between students' cognitive processes and the pedagogical structure of the flipped classroom.

The data sources included interview transcripts from 12 participants (8 from the flipped classroom group, 4 from the traditional group) and observational notes recorded by the instructor, which documented classroom interactions and participation patterns throughout the semester. To enhance reliability, two researchers independently analyzed the data twice, cross-checking codes and themes. Keywords and phrases related to metacognition (e.g., "planned," "evaluated," "adapted") were systematically tracked, and themes were prioritized based on their frequency and relevance.

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Discrepancies in coding were resolved through collaborative discussions, ensuring consistency in the interpretations. This dual-layered approach—combining inductive theme development with frequency analysis—provided a nuanced understanding of how metacognitive awareness developed differently across instructional models.

Result

This section presents the findings of our study, employing a mixed-methods approach to investigate the impact of flipped classroom instruction on the metacognitive awareness of translation students. The quantitative results, derived from pre- and post-intervention administrations of the Metacognitive Awareness Inventory (MAI), are presented alongside the qualitative data gleaned from semi-structured interviews and classroom observations. This integrated approach offers a comprehensive understanding of the relationship between instructional method and metacognitive development. The analysis of the MAI data will be presented first, followed by a presentation of the main themes of the qualitative data. MAI was administered as pretest and posttest in both groups. The change in the level of metacognitive awareness in each group was analyzed.

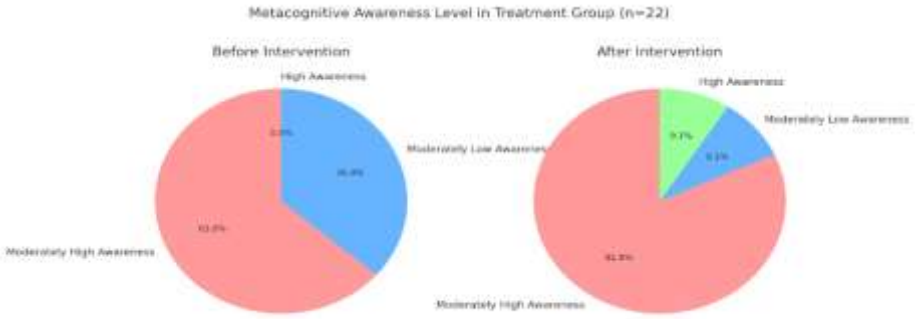

Figure 3. Metacognitive Awareness in the Treatment Group, Before and After Instruction

The experimental group received flipped instruction, figure 3 shows the percentage of students in the treatment group at different levels of metacognitive awareness before and after implementation of such instruction. Number of participants are 22. Before the intervention, 63.6% (14 students) exhibited moderately high metacognitive awareness, while the remaining 36.4% (8 students) demonstrated moderately low awareness. Following the intervention, the number of students with moderately low awareness dropped significantly. Only 9.1% (2 students) remained in this category. Conversely, the number of students with moderately high awareness rose to 81.8% (18 students). Additionally, a small group, 9.1% (2 students), achieved a high level of metacognitive awareness.

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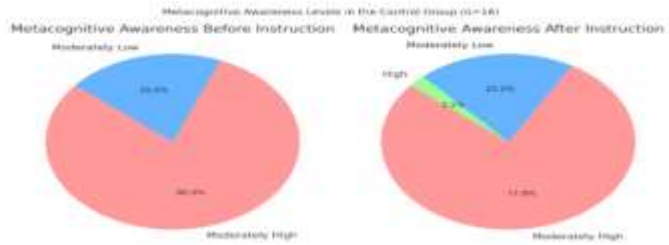


Figure 4. Metacognitive Awareness in the Control Group, Before and After Instruction

The control group received traditional, teacher-oriented instruction figure 4, shows the percentage of students in the control group at different levels of metacognitive awareness before and after implementation of such instruction. The total number of participants in this group was 16. Before instruction, 80% (13 students) were at a moderately high level while 20% (3 students) had moderately low metacognitive awareness. After instruction, 18% (3 students) remained moderately low and 77.8% (11 students) remained moderately high. Only 2.2% (0.3 students) achieved high metacognitive awareness.

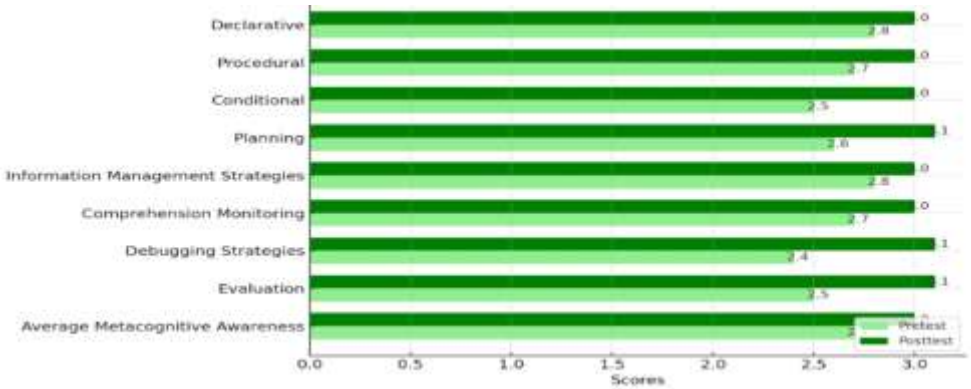
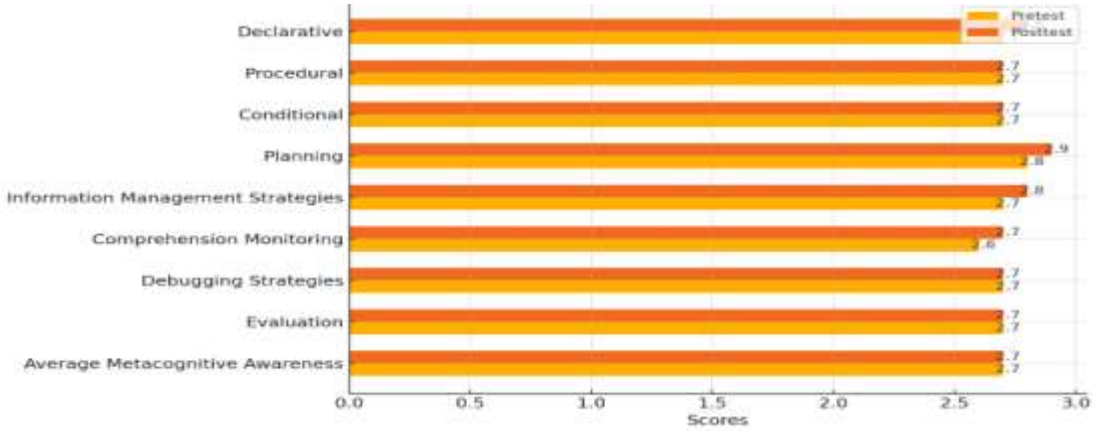


Figure 5. MAI pretest and Posttest Scores of the Treatment Group

The chart (Figure 5) depicts the pre- and post-test scores on the Metacognitive Awareness Inventory (MAI) for 22 participants in the treatment group. The scores assess various aspects of metacognitive awareness, including declarative, procedural, and conditional knowledge, as well as planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation.



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Overall, the findings demonstrate an increase in metacognitive awareness, with the average score rising from 2.7 (moderately high) to 3.0 (moderately high). Notably, improvements were observed in all categories, with the greatest gains in evaluation, debugging strategies, and planning. These results suggest that the treatment intervention was successful in enhancing participants' metacognitive awareness.

Figure 6. MAI pretest and Posttest Scores of the Control Group

The chart (Figure 6) depicts the pre- and post-test scores on the Metacognitive Awareness Inventory (MAI) for 16 participants in the control group. The scores assess various aspects of metacognitive awareness, including declarative, procedural, and conditional knowledge, as well as planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation. There were slight improvements in Comprehension Monitoring, Information Management Strategies, Planning, and Declarative Knowledge (each increasing by 0.1 points). Other components, including Average Metacognitive Awareness, Evaluation, Debugging Strategies, Conditional Knowledge, and Procedural Knowledge, remained unchanged. Overall, the intervention had minimal impact on the control group's metacognitive awareness, with only minor improvements in a few areas.

To determine whether the increase in the level of metacognitive awareness of the students in the treatment and control group is significant, data were analyzed using paired t-test.

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Dimensions	Group	Mean	SD	t	df	p
Declarative Knowledge	Flipped	.392	.612	4.526	21	.000
	Control	.051	.499	.715	15	.478
Procedural Knowledge	Flipped	.472	.702	4.757	21	.000
	Control	.090	.666	.944	15	.350
Conditional Knowledge	Flipped	.372	.638	4.125	21	.000
	Control	.008	.532	.107	15	.915
Planning	Flipped	.368	.549	4.743	21	.000
	Control	.110	.539	1.431	15	.159
Information Management Strategies	Flipped	.402	.536	5.301	21	.000
	Control	.092	.603	1.065	15	.292
Comprehension Monitoring	Flipped	.418	.630	4.691	21	.000
	Control	.141	.500	1.972	15	.054
Debugging Strategies	Flipped	.304	.666	3.224	21	.002
	Control	-.049	.728	-.471	15	.640
Evaluation	Flipped	.446	.673	4.685	21	.000
	Control	.010	.619	.115	15	.909

Table 1. Paired group t-test Results for MAI

The paired t-test results indicate significant improvements in metacognitive awareness across all dimensions for the flipped group (22 participants), with p-values less than .05 in all cases. In contrast, the control group (16 participants) did not exhibit significant changes in most dimensions, except for a marginal improvement in Comprehension Monitoring ($p = .054$). These findings suggest that the flipped group intervention effectively enhanced metacognitive awareness, whereas the control group showed negligible changes (Table 1).

The qualitative data gathered through semi-structured interviews and classroom observations were analyzed using thematic analysis to explore how the flipped classroom model influenced the metacognitive awareness of translation students. Six primary themes emerged from the data: self-regulation, planning, monitoring, collaborative engagement, strategy adaptation, and perceived challenges. These themes reflect students' cognitive strategies, their ability to manage learning, and how they regulated their approach to translation tasks, comparing insights from both the flipped classroom (experimental) and traditional (control) classroom settings.

Self-Regulation and Monitoring

In the flipped classroom, students consistently reported greater self-regulation and monitoring of their translation processes. They attributed this development to the structured nature of the flipped model, which encouraged independent preparation before class. As one flipped classroom student mentioned,

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"*I felt more in control of my learning because I could review materials at my own pace and then focus on improving in class*." These students demonstrated higher levels of metacognitive awareness by regularly checking their progress, self-assessing their translations, and using classroom activities to identify areas for improvement.

In contrast, students from the traditional classroom model expressed less frequent self-monitoring. They reported that their learning experience was more passive, with fewer opportunities for reflection or self-regulation. One control group participant shared, "*I mostly relied on the teacher's feedback, and it wasn't until later that I realized I needed to keep track of my own progress*."

Planning and Preparation

Planning was a major theme identified in both groups, though the flipped classroom students were more deliberate in their approach. Students in the flipped classroom emphasized the importance of pre-task preparation as a key element of their learning. "*Watching the videos beforehand gave me a plan for the session. I knew what to focus on and what translation strategies to apply*," explained a flipped classroom participant. This planning facilitated more active engagement during in-class activities and promoted greater awareness of their cognitive strategies.

On the other hand, students in the traditional classroom, while acknowledging the importance of planning, reported less structured preparation. One traditional classroom student stated, "*I didn't have time to prepare in the same way because most of the content was covered during class. I sometimes struggled to follow along without prior preparation*."

Collaborative Engagement and Peer Learning

Another prominent theme was collaborative engagement, which was significantly enhanced in the flipped classroom. The collaborative nature of group work, coupled with peer feedback, encouraged students to actively share their thoughts and strategies. "*In the flipped classroom, working with peers helped me realize different ways of approaching a translation. It improved how I planned and evaluated my work*," said one participant from the experimental group. These students were able to evaluate each other's work critically and apply shared insights to improve their own strategies.

In contrast, students in the traditional classroom reported less interaction and collaboration. While some group work occurred, it lacked the depth and metacognitive focus observed in the flipped classroom.

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"*In the traditional classroom, we mostly worked on individual tasks. I didn't have as much time to discuss or share my ideas with others*," reflected a student from the control group.

Strategy Adaptation and Reflection

Flipped classroom students exhibited a greater ability to adapt their translation strategies based on the feedback and self-reflection processes. They described using the videos and in-class activities to refine their strategies for different types of texts. A flipped classroom participant remarked, "*I could test out different strategies, reflect on the results, and then adjust my approach based on what worked best*."

Control group participants reported a more rigid approach to translation, with fewer opportunities for reflection or adjustment. One student mentioned, "*I would follow the instructions as given, but there was less room to try different methods or learn from my mistakes*."

Perceived Challenges

While students in the flipped classroom expressed significant growth in metacognitive awareness, they also noted initial challenges related to the self-directed nature of the model. Several students mentioned struggling with managing their time to review the pre-recorded materials before class. However, over time, they found that this challenge led to improved time management skills and greater independence in their learning. "*At first, it was difficult to keep up with the videos, but eventually, I became more disciplined. It really helped me learn to manage my time better," noted one participant*.

In the traditional classroom, students reported fewer challenges in terms of self-directed learning but recognized the limitation of relying on instructor-led teaching for cognitive development. "*There wasn't much to challenge me in the traditional classroom. I didn't have to think for myself as much*," said a student from the control group.

Table 2 presents the frequency and distribution of the six core themes—self-regulation, planning, monitoring, collaborative engagement, strategy adaptation, and perceived challenges—alongside their alignment with key components of metacognitive awareness (knowledge and regulation of cognition). The table also highlights representative quotes taken from interview and class observation notes to contextualize how these themes manifested in students' experiences.

Theme	Flipped Classroom	Traditional Classroom	Metacognitive Component	Flipped Classroom Example	Traditional Classroom Example
Self-Regulation	86%	25%	Regulation of Cognition	*"I revised my draft three times to fix inconsistencies."*	*"I mostly relied on the teacher's feedback to track progress."*

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Planning	82%	31%	Regulation of Cognition	*"Watching videos beforehand gave me a clear plan."*	*"I didn't prepare beforehand; class time was my only guide."*
Monitoring	77%	19%	Regulation of Cognition	*"I checked my work against the rubric after peer feedback."*	*"I didn't realize my mistakes until the teacher pointed them out."*
Collaborative Engagement	91%	38%	Knowledge & Regulation of Cognition	*"Group debates helped me rethink my approach."*	*"We rarely discussed ideas; everyone worked alone."*
Strategy Adaptation	73%	12%	Knowledge of Cognition (Conditional)	*"I adjusted strategies based on the text type."*	*"I followed the instructions exactly—no room to experiment."*
Perceived Challenges	48%	16%	Knowledge & Regulation of Cognition	*"Time management was tough initially, but I adapted."*	*"The class didn't push me to think independently."*

The analysis highlights pronounced differences in metacognitive engagement between the flipped and traditional classrooms. Flipped classroom students demonstrated substantially higher engagement across all themes, notably in self-regulation (86% vs. 25%) and collaborative engagement (91% vs. 38%). These students articulated proactive strategies, such as iterative revisions (*"checked my work against the rubric"*) and adaptive decision-making (*"adjusted strategies based on text type"*), reflecting enhanced conditional and procedural knowledge. In contrast, traditional classroom participants relied heavily on instructor guidance, with limited self-monitoring (*"teacher pointed out mistakes"*) or peer collaboration (*"rarely discussed ideas"*).

While flipped students transformed challenges like time management (48% vs. 16%) into opportunities for skill development, traditional learners reported passive, teacher-dependent experiences. These findings underscore the flipped model's efficacy in fostering metacognitive skills—strategic planning, reflective practice, and adaptive problem-solving—critical for translation competence, while traditional methods lag in cultivating such self-regulated learning behaviors.

Conclusion

This study aimed to explore the effect of the Flipped Classroom Model on the metacognitive awareness of translation students. The findings indicate that students in the flipped classroom demonstrated a significant increase in their metacognitive awareness compared to those in traditional, teacher-centered instruction. The active learning and use of educational technology inherent in the flipped classroom model appear to have enhanced students' knowledge and control of their own cognition, aligning with previous research that supports the benefits of flipped pedagogy on metacognition (Limueco & Prudente, 2019). Quantitative analysis of the Metacognitive Awareness Inventory (MAI) scores revealed a

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statistically significant enhancement in metacognitive awareness among students in the flipped classroom group. Improvements were observed across all subcomponents of metacognitive awareness, encompassing both *knowledge of cognition*—comprising declarative, procedural, and conditional knowledge—and *regulation of cognition*, including planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation. Paired-samples *t*-tests confirmed the statistical significance of these gains ($p < .05$ for all subcomponents), with the most substantial effect sizes in debugging strategies ($\Delta = 0.35$) and evaluation ($\Delta = 0.32$).

In contrast, the control group, which followed a traditional lecture-based instructional approach, exhibited minimal progress across most MAI dimensions, highlighting the limitations of passive teaching methods in promoting metacognitive development. These findings reinforce the advantages of the flipped classroom model, which aligns with prior research demonstrating the effectiveness of active learning frameworks in enhancing self-regulation.

The qualitative findings from classroom observations and semi-structured interviews reinforce the quantitative results, highlighting significant differences in metacognitive engagement between the flipped and traditional instructional models. Students in the flipped classroom reported notably higher levels of engagement and more frequent application of metacognitive strategies, such as systematic self-questioning, real-time monitoring of comprehension, and adaptive revision of translation approaches. They emphasized the value of interactive, student-driven activities—including peer feedback sessions and collaborative problem-solving tasks—which fostered deeper conceptual understanding and strategic flexibility. In contrast, students in the traditional classroom exhibited lower engagement and a more superficial approach to metacognitive practices, often relying on instructor-led directives rather than independent reflection.

Further analysis provided insights into the pedagogical mechanisms underlying these differences. Students in the flipped classroom attributed their enhanced self-regulation to the structured nature of the flipped model, which combined pre-class preparation—such as video lectures on translation theory—with in-class opportunities for practical application in socially mediated contexts. This iterative cycle of planning, peer critique, and reflective revision enabled students to critically evaluate their cognitive processes, mirroring the recursive, problem-solving nature of professional translation workflows. The transition from passive content reception to active knowledge co-construction empowered participants to diagnose errors, justify strategic decisions, and refine their approaches in response to diverse textual and cultural challenges.

While this study focused on comparing the flipped model to traditional instruction, it is important to acknowledge that the flipped classroom represents one of many active learning frameworks. Other

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student-centered approaches, such as problem-based learning, project-based learning, or collaborative workshops, may also hold potential for fostering metacognitive awareness. However, the flipped model's unique integration of asynchronous content delivery and structured in-class collaboration appears particularly suited to translation education, where balancing theoretical knowledge with real-time application is critical. The pre-class preparation phase allows students to internalize foundational concepts independently, while in-class activities prioritize higher-order cognitive tasks—such as peer critique, strategy negotiation, and contextual adaptation—that are less feasible in purely lecture-based or even some other active learning models.

The study also identified key instructional practices within the flipped model that contribute to metacognitive development. Pre-class video lectures and supplementary materials provided foundational knowledge, freeing in-class time for higher-order cognitive tasks such as collaborative analysis, peer evaluation, and real-time problem-solving. These activities not only reinforced declarative and procedural knowledge but also cultivated conditional knowledge by requiring students to justify strategy choices in diverse textual and cultural contexts. Furthermore, the integration of metacognitive reflection through structured rubrics and iterative feedback cycles enabled learners to internalize quality control mechanisms, mirroring the self-regulatory practices of professional translators.

This study, while providing valuable insights into the effectiveness of flipped classrooms for developing metacognitive skills in translator training, has several limitations that should be acknowledged. First, the reliance on self-reported MAI scores, despite the instrument's validation, may not fully capture behavioral manifestations of metacognition. To address this, we incorporated methodological triangulation through classroom observations and peer evaluations, strengthening the validity of our findings. Second, the quasi-experimental design, though practical for educational settings, lacks random assignment, potentially introducing selection bias. While we controlled for key variables like prior coursework and demographics, future research would benefit from randomized controlled trials. Finally, the single-institution, 16-week implementation limits both the generalizability of results and our ability to assess long-term metacognitive development. These constraints highlight the need for multi-institutional, longitudinal studies to validate and expand upon our findings.

Building on this study, several promising research directions emerge. Comparative studies examining flipped classrooms alongside other active learning approaches (e.g., problem-based or project-based learning) would help identify the most effective pedagogical strategies for metacognitive development in translator education. Additionally, future work should incorporate direct measures of translation performance to complement metacognitive assessments, providing a more comprehensive understanding of how instructional methods influence both cognitive processes and practical outcomes.

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Longitudinal designs tracking students across multiple semesters could also yield valuable insights into the sustainability of metacognitive gains and their transfer to professional contexts. Such research would not only address the limitations of the current study but also offer more robust evidence to guide curricular decisions in translator training programs.

Despite its limitations, this study has important implications for translator education and beyond. The success of the flipped classroom model in enhancing metacognitive awareness suggests its potential as a valuable tool for developing the self-regulatory skills essential to professional translation practice. Educators seeking to implement similar approaches should focus on designing structured reflective activities and peer feedback mechanisms, which proved particularly effective in our study. As the translation profession continues to evolve in response to technological and global changes, fostering metacognitive skills through active learning models may become increasingly critical. Our findings contribute to a growing body of evidence supporting pedagogical innovations that prioritize process awareness and adaptive learning, better preparing students for the complex demands of their future careers.

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