

Metacognitive Awareness Pattern of Post-Editing: Google Translate Used among EFL Students

Aike Pita Sevira¹, Sukma Nur Ardini^{2*}, Theresia Cicik Sophia Budiman³

¹Universitas Persatuan Guru Republik Indonesia Semarang, Semarang, Indonesia

²Universitas Persatuan Guru Republik Indonesia Semarang, Semarang, Indonesia

³Universitas Persatuan Guru Republik Indonesia Semarang, Semarang, Indonesia

aikepitasevira@gmail.com¹, sukmanurardini@upgris.ac.id^{2*}, ciciksophia@upgris.ac.id³

Article History:

Submission
May 4th, 2026

Accepted
July 15th, 2026

Published
July 30th, 2026

ABSTRACT

This study aims to map the patterns of metacognitive awareness among EFL students in post-editing Google Translate through descriptive statistical analysis of the planning, monitoring, and evaluating phases. This study addresses the lack of mapping of metacognitive regulation to provide a comprehensive picture of how students manage thinking strategies and overcome the use of translation technology, which tends to be passive and lacks strategic awareness. This descriptive quantitative study involved 35 English language education students selected through purposive sampling. Data were collected using an expository text post-editing task and the Metacognitive Awareness Inventory (MAI) questionnaire with a four-point Likert scale. Data analysis employed descriptive statistics via SPSS to identify the distribution, mean, and dominant patterns of students' metacognitive regulation phases. The results indicated that all metacognitive phases were categorized as high, with monitoring as the dominant pattern, achieving a mean of 24.29 (76%). The planning phase achieved an average of 23.54 (74%) and the evaluation phase 23.03 (74%). These findings confirm a monitoring-dominant pattern, where students were more actively controlling their thinking processes and regulating machine translation outcomes compared to the planning or evaluating stages. The results indicate a dominant monitoring phase in post-editing activities, while the planning and evaluating phases are still less than optimal. These findings underscore the importance of balancing metacognitive strategies in technology-based EFL learning. Instructors are advised to provide comprehensive scaffolding to develop technical skills while strengthening students' strategic awareness in the translation process.

Keywords: EFL students; google translate; metacognitive awareness; post-editing; regulation of cognition

INTRODUCTION

Machine Translation (MT) technology, which functions to automatically translate written text from one language to another, has significantly changed its paradigm in recent decades (Stahlberg, 2020). One of the most widely used MT platforms for language learning is Google Translate (GT). It helps pupils comprehends input in foreign languages and provides instant access to translation results (Ducar & Schocket, 2018). Among those platforms, GT is one of the MT technologies which has become one of the most popular translation applications in the world with over 500 million active users every day after its release in 2006 (Turovsky, 2016). Its extraordinary popularity in language learning and cross-cultural communication is

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license



demonstrated by the number of users spread across the globe. According to Kok Wei (2021), this is one of the most popular language learning applications among students in Malaysia, thus demonstrating the importance of this application as a language learning tool for learners of English as a foreign language (EFL). In line with this, Orfan (2023) states that students often use GT to translate general, technical, and idiomatic terms. He also considers this application to be a practical and easily accessible tool, which also helps them understand complex English language material. Conversely, MT technologies such as GT continue to evolve, but their translations are not yet fully comparable to human translations.

Post-editing (PE) skills are necessary to produce accurate results because semantics, syntax, and style often contain errors (Harto et al., 2022). During the PE stage, careful evaluation and revision are an essential part of the text revision process. PE is not merely a linguistic task, but also a cognitive and reflective activity that develops higher-order thinking skills and metacognitive awareness. According to Indarti (2024), this linguistic ability, referred to as Post-Editing Machine Translation (PEMT), is used in the academic context through analyzing mistakes discovered in MT outputs. Focuses on assessing and modifying MT outcomes to make sure they adhere to the source message's and the target language's rules (Harto et al., 2022). This ability allows individuals to consciously plan, evaluate, and control their thinking strategies in order to improve the effectiveness of learning (Gutierrez de Blume et al., 2024; Stanton et al., 2021). Therefore, PE can be understood as an activity that is not only linguistic in nature. It also includes the process of awareness and control of thinking strategies, which is in line with the idea of metacognitive learning.

Metacognition refers to learners' capacity to manage cognitive processes through metacognitive knowledge, which involves understanding of how thinking processes and learning strategy's function, as well as metacognitive regulation, which includes the ability to planning, monitoring, and evaluating learning activities (Teng, 2020). Based on this framework, metacognitive awareness in this study was explored through metacognitive regulation. These dimensions are also understood as cyclical and interactive regulatory processes in the self-regulation model (Zimmerman, 2000). In this context, the "pattern" of metacognitive awareness refers to the relative configuration and dominance of regulatory phases during post-editing activities. In contemporary metacognitive studies, the integration of these two abilities is conceptually defined as metacognitive awareness, which enables learners to reflect on their thinking processes, evaluate the effectiveness of strategies, and adaptively adjust their learning approaches, particularly in the context of language learning (Kallio et al., 2018). In line with these findings, Pratiwi et al. (2025) state that metacognitive awareness helps students monitor their understanding, evaluate the language strategies used, and revise interpretations when errors occur. Therefore, these findings suggest that metacognitive regulation has an important role in language-based activities, which is also conceptually relevant in the context of post-editing. In translation studies, metacognitive awareness is also important in the PE process, which involves editing, modifying, and improving MT output, while helping learners consciously monitor and control their thinking strategies to identify and correct semantic and syntactic errors generated by MT systems (Li & Lu, 2021; Shin & Chon, 2023). Thus, the PE process requires metacognitive awareness, which means that students are aware of their own thought processes when considering MT results.

Metacognitive awareness is manifested through metacognitive strategies, which describe how individuals operationalize their thinking awareness in concrete actions. Instead of functioning as separate components, these strategies operate as interconnected cyclical processes that regulate learning behavior. According to Yilmaz & Baydas (2017), metacognitive strategies consist of three main stages: planning, monitoring, and evaluating. The planning phase involves setting goals and selecting appropriate strategies, the monitoring phase refers to the ongoing control of cognitive processes during task execution, while the

evaluation phase focuses on assessing the effectiveness of the strategies and outcomes. These stages are not linear but dynamically interact as part of the self-directed learning cycle, where monitoring often becomes the most direct and dominant process during task execution.

In the context of post-editing (PE), metacognitive awareness plays an important role in shaping how learners interact with machine translation output. Lo (2024) emphasizes that reflective awareness and technological literacy are important competencies in the digital era, as both enable learners to critically evaluate and adjust technological outputs. This shows that PE is not merely a linguistic correction activity, but also a process that demands cognition involving reflection and strategic decision-making. Supporting this view, (Kapusta et al., 2021) demonstrate that revisions in PE follow systematic lexical and syntactic patterns, indicating that editing decisions are not random but guided by structured cognitive processes.

However, previous studies on PE and metacognition have mostly concentrated on identifying strategies rather than examining their distribution and dominance. For example, Indarti (2024) revealed that EFL students use planning, monitoring, and evaluation strategies during post-editing through the analysis of Think-Aloud Protocols (TAP). Although this study confirms the existence of metacognitive processes, it does not quantitatively map how these phases are distributed or which phase tends to dominate. Therefore, a more integrative approach is needed to understand not only the existence of metacognitive strategies but also their relative patterns in the post-editing process.

Furthermore, Indarti (2024) uses a qualitative case study approach with thematic analysis to identify metacognitive strategies, which limits the ability to systematically map the distribution and dominance of metacognitive awareness throughout the post-editing machine translation (PEMT) process. This indicates a significant research gap, especially in the EFL context, where existing studies tend to emphasize the qualitative identification of strategies rather than the quantitative analysis of their patterns and relative dominance. Considering that many students rely on translation technology like Google Translate without engaging in strategic reflection, understanding how metacognitive awareness is distributed across various regulatory phases becomes important. Such understanding can provide a stronger empirical basis for developing pedagogical interventions that promote more conscious and structured learning strategies.

Therefore, this study aims to identify patterns of metacognitive awareness reflected in post-editing activities by examining the distribution and relative dominance of the three phases of metacognitive regulation: planning, monitoring, and evaluation. Specifically, this study focuses on the following research question: (1) How are the phases of metacognitive regulation (planning, monitoring, and evaluation) distributed among EFL learners during postediting activities using GT? (2) What metacognitive awareness patterns can be identified based on the relative dominance of these regulatory phases? This study presents a novelty by examining the quantitative mapping of patterns of metacognitive awareness of EFL students in PE activities. These findings also enhance theoretical understanding of the role of metacognitive awareness in optimizing the use of translation technology in modern EFL (Siregar & Stroupe, 2025). Therefore, this study provides an empirical basis for a broader understanding of students' thinking strategy tendencies.

METHODOLOGY

RESEARCH DESIGN

This study uses a quantitative approach with a descriptive survey design to describe trends and patterns of EFL students' metacognitive awareness during post-editing, using numerical data

collected through a standardized instrument. According to Creswell (2018), quantitative research aims to describe phenomena by measuring variables with standardized instruments and analyzing the resulting numerical data statistically. This method is in line with the research objectives, which focus on mapping the patterns of students' metacognitive awareness in the context of technology-assisted translation learning. This survey design was chosen to enable researchers to collect data from many respondents in a short period of time and identify common patterns of behavior or cognitive awareness (Ponto, 2015). Furthermore, this study is cross-sectional, as data were collected at a single point in time to capture students' metacognitive awareness during PE (Pourfeiz, 2016). Therefore, this research design allows for systematic mapping of students' metacognitive awareness patterns using survey data collected over a specific period of time.

PARTICIPANT

The participant of this study involved students of the fourth semester of English Education Study Program at Universitas Persatuan Guru Republik Indonesia Semarang. From this participant the 64% sample was selected using purposive sampling technique, resulting in 35 students out of a total of 55 fourth-semester students. Purposive sampling allows researchers to select participants who are most relevant to the objectives and focus of the study, thus increasing the relevance and accuracy of the data obtained (Campbell et al., 2020). The selection of students for this semester was based on the consideration that they possess sufficient academic experience in writing in English, particularly in drafting and revising texts, and tend to make use of translation technologies such as GT in the writing process due to the relatively demanding nature of their academic assignments. These conditions make this group relevant for observing students' metacognitive awareness in the context of PEMT results. Nevertheless, this study has limitations, namely the relatively small sample size, the research context originating from only one institution, and the potential bias in sample selection thru purposive sampling. Therefore, the results of this study need to be interpreted with caution and not widely generalized.

INSTRUMENT

The instruments in this study included a PE task and a metacognitive awareness questionnaire. The PE task uses a expository text entitled "*The Development of Information and Communication Technology in Indonesia*," which is chosen because expository texts focus on delivering factual information in an objective and logic. This type of text requires accurate sentence structure, lexical clarity, and precise language use in systematically explaining a topic. Therefore, this text is relevant for examining how students plan, monitor and evaluate the outcomes of MT during the PE process in the context of academic writing. In addition, the metacognitive awareness questionnaire was adapted and modified from the Metacognitive Awareness Inventory (MAI) developed by Schraw & Dennison (1994), which is still widely used in metacognitive research, with a focus on the regulation of cognition component. This instrument comprises 24 items divided into three phases of metacognitive regulation, namely planning, monitoring, and evaluation, which are adapted to the context of post-editing activities using GT. The scale used is a four-point Likert scale (strongly disagree–disagree–agree–strongly agree). The purpose of using an even scale is to improve the clarity of data interpretation and to encourage more decisive responses (Chyung et al., 2017). The content validity of the instrument was examined through expert judgement, while reliability was tested using Cronbach's Alpha coefficient through SPSS to ensure the internal consistency of the instrument.

DATA COLLECTION

Data was collected sequentially and chronologically. First, students were instructed to translate the text using GT. After that, they were asked to PEMT results. After completing the PE task, students filled out a metacognitive awareness survey. In addition to the main quantitative data, semi-structured interviews were also conducted with several participants as supplementary data. This interview data is used to provide additional explanations and strengthen the interpretation of the quantitative results, rather than being the primary data source in the research analysis.

DATA ANALYSIS

The quantitative data obtained from the questionnaire was analyzed using descriptive statistics through SPSS software. This analysis included calculating frequencies, percentages, mean scores, and standard deviations to describe the level of students' responses in each metacognitive phase. The analysis aimed to identify trends in student responses and to examine the distribution of metacognitive awareness levels in each phase of metacognitive regulation during post-editing activities using GT. The pattern of metacognitive awareness is then determined based on the average scores and percentage trends in each phase of metacognitive regulation, thereby indicating the most dominant phase of regulation in the postediting process carried out by EFL students

RESULT AND DISCUSSION

This section presents the results of a comprehensive data analysis based on all SPSS output obtained. This analysis includes descriptive statistics for the metacognitive awareness variable, which consists of three main phases: preparation, monitoring, and evaluation. Additionally, frequency statistics, simple bar charts, and interview results with selected students are presented to provide a more comprehensive overview of the research data.

TABLE 1.1 Descriptive Statistics

Descriptive Statistics						
	N	Maximum	Mean	Std. Deviation	Percentage	Category
PLANNING	35	32	23.54	3.988	74%	High
MONITORING	35	32	24.29	4.541	76%	Very High
EVALUATING	35	31	23.03	4.308	74%	High
Valid N (listwise)	35					

Table 1.1 shows the achievement levels of each research variable, namely Planning, Monitoring, and Evaluating. This study involved 35 respondents (N=35) with valid data. In general, the three variables show results that fall into the high category based on the average scores. However, the Monitoring variable has the highest average score (mean = 24.29) with a percentage of 76%, followed by Planning (mean = 23.54; 74%) and Evaluating (mean = 23.03; 74%). Although Monitoring has the highest average score and is categorized as "very high," the frequency distribution shows that most students are still at a moderate level. This indicates

that the dominance of Monitoring should be understood as a relative tendency compared to other variables, not as an indicator that all students have reached a very high level of metacognition. Meanwhile, the Planning and Evaluating variables show relatively balanced values with a small percentage difference. These findings indicate that the three aspects of metacognition have been utilized by the students, although with various levels of intensity, where monitoring activities tend to be performed more frequently during the post-editing process. Thus, the results of this study reflect the pattern of students' metacognitive awareness in the cognitive regulation process during post-editing activities.

TABLE 1.2 Level of Planning

Level	Frequency	Percent (%)
Low	1	3%
Moderate	19	54%
Higher	15	43%
Total	35	100%

Table 1.2 shows the most significant distribution. Here, there is a tight competition between the moderate level (54%) and the high level (43%). Only one person (3%) falls into the low category, indicating that almost all participants (97%) have adequate to excellent planning abilities.

TABLE 1.3 Level of Monitoring

Level	Frequency	Percent (%)
low	4	11%
moderate	24	69%
higher	7	20%
Total	35	100%

Table 1.3 shows significant changes among other groups. The moderate category remains dominant at 69%. In terms of task supervision, respondents tend to have a more positive (high) performance than negative (low), with the percentage of respondents in the high category reaching 20%, nearly double the percentage of respondents in the low category, which is only 11%.

TABLE 1.4 Level of Evaluating

Level	Frequency	Percent (%)
Low	3	9%
Moderate	28	80%
Higher	4	11%
Total	35	100%

Table 1.4 shows that almost all subjects have stable evaluation abilities with a score of 80% at the moderate level. Neither too low (9%) nor very high (11%), this group tends to be moderate. This indicates that the respondents' profiles are quite competent, but there is still a lot of opportunity for improvement to a higher level.

Based on the overall frequency distribution results for the three variables, it shows that the majority of students fall into the moderate to high category. The planning variable shows the most prominent achievement in the high category, indicating that more students achieve high levels of ability in this aspect compared to other variables. Meanwhile, the monitoring and evaluation variable tends to be dominated by the moderate category. It should be understood that the frequency table shows the distribution of the number of students in each ability level category, providing more detailed information about the distribution of student achievement.

FIGURE 1. Simple Bar Mean of Metacognitive Variables

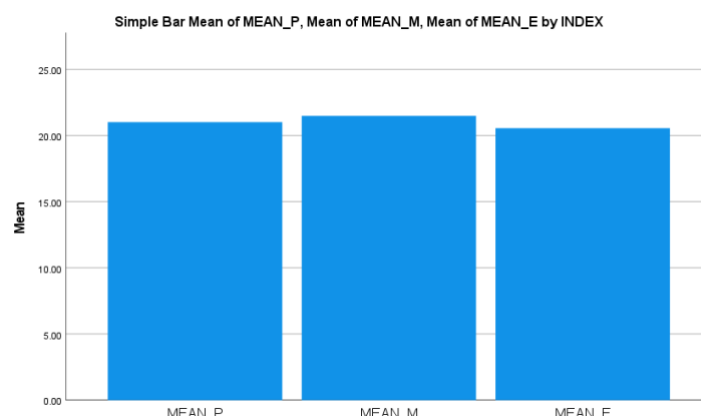


Figure 1.5 shows a comparison of the mean values for the variables Planning, Monitoring, and Evaluation. It can be seen that Monitoring has the highest mean value, followed by Planning and Evaluation. Although the difference is not significant, these results indicate that the monitoring aspect is the most dominant dimension. This finding confirms that students are more active in monitoring during the post-editing process, so that the metacognitive awareness pattern that forms tend to lead to a monitoring-dominant pattern.

The interview results were used to gain a better understanding of students' strategies in the translation process, particularly in terms of planning, monitoring, and evaluation. The following are interview excerpts organized according to students' levels of metacognitive awareness: high, moderate, and low.

TABLE 1.5 Interview Excerpts – High Metacognitive Level

Researcher	<i>When you want to translate text using Google Translate, do you just copy the results as is, or do you take the time to prepare and double-check them? Why?</i>
Student (R-1)	<i>I copied it directly but double-checked it against the original, I knew there would be grammar mistakes from Google Translate, so I double-checked it</i>
Researcher	<i>How do you ensure that the results from Google Translate are grammatically correct and make sense? What do you usually check most carefully?</i>
Student (R-1)	<i>I reread and compared the meaning of a paragraph side by side, from Indonesian to English. I checked to see if the meaning had changed, and then replaced any unfamiliar vocabulary with familiar terms. Then I checked the flow of the sentences to make sure the meaning still flowed naturally after I translated it.</i>
Researcher	<i>Once you've finished editing, are you confident in the results? What kind of support or training do you think you need most to use translation tools more effectively?</i>
Student (R-1)	<i>Sometimes I'm still unsure about the results, because it depends on how careful I am when proofreading. I also have experience from taking a basic translation class, where I was taught that translation has its own "methods" and "styles." So, in my opinion, that can help us learn as translators, so perhaps we need training like that.</i>

TABLE 1.6 Interview Excerpts – Moderate Metacognitive Level

Researcher	<i>When you want to translate text using Google Translate, do you just copy the results as is, or do you take the time to prepare and double-check them? Why?</i>
Student (R-2)	<i>I usually double-check to make sure the grammar is correct, and if the word choice isn't quite right, I'll look it up on a website like GPT.</i>
Researcher	<i>How do you ensure that the results from Google Translate are grammatically correct and make sense? What do you usually check most carefully?</i>
Student (R-2)	<i>I reread the translated text, and if there are any unfamiliar words, I look up their meanings first that's how I determine whether the text is accurate or not. I check long paragraphs most carefully.</i>
Researcher	<i>Once you've finished editing, are you confident in the results? What kind of support or training do you think you need most to use translation tools more effectively?</i>
Student (R-2)	<i>I'm sure that since I've already done the post-editing, I think the training involves double-checking. For example, if something has been translated using Google Translate, it's checked again or rephrased, and then the grammar is checked as well.</i>

TABLE 1.7 Interview Excerpts – Low Metacognitive Level

Researcher	<i>When you want to translate text using Google Translate, do you just copy the results as is, or do you take the time to prepare and double-check them? Why?</i>
Student (R-3)	<i>I'll take a quick look to see how much text there is and how long it is; if it's really long, I usually just copy it all right away.</i>
Researcher	<i>How do you ensure that the results from Google Translate are grammatically correct and make sense? What do you usually check most carefully?</i>
Student (R-3)	<i>It's probably more about when I come across difficult vocabulary I've never seen before, and if I'm unsure of the meaning, I look it up to make sure I've got it right</i>
Researcher	<i>Once you've finished editing, are you confident in the results? What kind of support or training do you think you need most to use translation tools more effectively?</i>
Student (R-3)	<i>"Sometimes I'm still unsure. I think that if it's just a matter of translating, you don't need training. But maybe if it's about understanding language structure, you might need it.</i>

The interview results indicate that students with high levels of metacognitive awareness engage in more in-depth monitoring, students with moderate levels focus on grammar and vocabulary, while students with low levels have not yet demonstrated consistent strategies. In general, monitoring is the most dominant strategy.

The findings of this study show that students' metacognitive awareness during post-editing is more strongly reflected in the monitoring phase than in the planning or evaluation phases. The dominance of the monitoring variable suggests that students tend to actively regulate, verify, and adjust machine translation outputs while completing post-editing tasks. On the other hand, although Planning and Evaluation also showed high results, both have not yet surpassed the achievements of Monitoring. This suggests that good planning will not provide maximum results without the support of effective monitoring. Evaluation will be more meaningful if based on a well-controlled implementation process.

This study is in line with Indarti (2024) research, which indicated that EFL students used procedures for planning, monitoring, and evaluation during the post-editing process. The similarity is reflected in the consistency of students' metacognitive awareness patterns, particularly in the Planning variable, which achieved a mean score of 23.54. This result indicates that students tend to demonstrate adequate awareness in planning their post-editing process before evaluating and revising GT outputs. However, this study provides a different perspective by identifying variations among respondents, as reflected in the presence of low-score outliers across all metacognitive awareness dimensions. These findings suggest that although most students demonstrated awareness of post-editing strategies, a small proportion may still require further support in developing planning, monitoring, and evaluation skills. Although some differences were found among students, the results indicate that most students

were aware of the strategies needed during the post-editing process. Overall, this study confirms that consistent monitoring is an important aspect of students' metacognitive awareness during the post-editing process. The dominance of the Monitoring variable further indicates that EFL students tend to be more active in monitoring their thinking process than in planning or evaluating their post-editing activities. In the practice of using GT, this is reflected in students' behavior, as they do not simply accept translation results directly but instead recheck, revise sentence structures, and adjust meanings to better align with academic contexts.

In other words, monitoring activities represent a concrete manifestation of metacognitive awareness, where students are able to control and regulate their thinking processes during the post-editing phase. This phenomenon indicates that the use of GT does not necessarily diminish the quality of students' cognitive processes but rather fosters the emergence of metacognitive strategies, particularly in the aspect of monitoring. Students indirectly perform self-checking, comparing machine translation results with their own language knowledge, and identifying lexical and grammatical errors. This is consistent with the findings of Alfarina & Hartono (2025), who reported that EFL students experienced grammatical difficulties, particularly in sentence structure and punctuation, compared with professional translators. These findings suggest that careful monitoring during post-editing helps learners identify and correct grammatical inaccuracies, thereby improving translation quality.

CONCLUSION AND RECOMMENDATION

This study aims to identify patterns of metacognitive awareness among students during the post-editing stage of translation. The results show the existence of a monitoring-dominant pattern, in which monitoring activities serve as the dominant strategy compared to planning and evaluation. These findings contribute to previous research by emphasizing that focusing on a single aspect of metacognition alone is insufficient for achieving optimal learning, thus, a balance between planning, monitoring, and evaluation is necessary. This indicates that learning in technology-based EFL contexts, such as the use of GT, should be directed not only toward technical skills but also toward the comprehensive development of metacognitive strategies.

Therefore, it is highly recommended that instructors provide scaffolding in the form of planning exercises before translation, guidance during the monitoring process, and evaluative reflection after the editing process so that these three elements can develop in a balanced manner. For future research, the focus can be directed toward developing learning interventions that strengthen the planning and evaluation aspects, as well as testing the effectiveness of these interventions in improving the quality of students' translations and metacognitive skills.

REFERENCES

- Alfarina, L., & Hartono, R. (2025). Grammatical accuracy in translating direct speech: A Comparison between Professionals and EFL Students. *Allure Journal*, 5(2), 201–209. <https://doi.org/10.26877/allure.v5i2.23528>
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: complex or simple? Research case examples. *Journal of Research in Nursing*, 25(8), 652–661. <https://doi.org/10.1177/1744987120927206>
- Chyung, S. Y. Y., Roberts, K., Swanson, I., & Hankinson, A. (2017). Evidence-Based Survey Design: The use of a Midpoint on the Likert Scale. *Performance Improvement*, 56(10), 15–23. <https://doi.org/10.1002/pfi.21727>

- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Ducar, C., & Schocket, D. H. (2018). Machine translation and the L2 classroom: Pedagogical solutions for making peace with Google translate. *Foreign Language Annals*, 51(4), 779–795. <https://doi.org/10.1111/flan.12366>
- Gutierrez de Blume, A. P., Montoya Londoño, D. M., Jiménez Rodríguez, V., Morán Núñez, O., Cuadro, A., Daset, L., Molina Delgado, M., García de la Cadena, C., Beltrán Navarro, M. B., Puente Ferreras, A., Urquijo, S., & Arias, W. L. (2024). Psychometric properties of the Metacognitive Awareness Inventory (MAI): standardization to an international spanish with 12 countries. *Metacognition and Learning*, 19(3), 793–825. <https://doi.org/10.1007/s11409-024-09388-9>
- Harto, S., Hamied, F. A., Musthafa, B., & Setyarini, S. (2022). Exploring undergraduate students' experiences in dealing with post-editing of machine translation. *Indonesian Journal of Applied Linguistics*, 11(3), 696–707. <https://doi.org/10.17509/ijal.v11i3.42825>
- Indarti, D. (2024). Investigating the metacognitive strategies during post-editing translation process: An Application of Think-Aloud Protocols (TAP). *JOLLT Journal of Languages and Language Teaching*, 12(2), 765–778. <https://doi.org/10.33394/jollt.v%vi%vi.10297>
- Kallio, H., Virta, K., & Kallio, M. (2018). Modelling the components of metacognitive awareness. *International Journal of Educational Psychology*, 7(2), 94–122. <https://doi.org/10.17583/ijep.2018.2789>
- Kapusta, J., Benko, E., Munkova, D., & Munk, M. (2021). Analysis of Edit Operations for Post-editing Systems. *International Journal of Computational Intelligence Systems*, 14(1). <https://doi.org/10.1007/s44196-021-00048-3>
- Kok Wei, L. (2021). The use of google translate in english language learning: How students view it. In *International Journal of Advanced Research in Education and Society* (Vol. 3, Number 1). <http://myjms.mohe.gov.my/index.php/ijares>
- Li, Y., & Lu, X. (2021). Study on post-editing for machine translation of railway engineering texts. *SHS Web of Conferences*, 96, 05001. <https://doi.org/10.1051/shsconf/20219605001>
- Lo, N. P.-K. (2024). The Confluence of Digital Literacy and Eco-Consciousness: Harmonizing Digital Skills with Sustainable Practices in Education. *Platforms*, 2(1), 15–32. <https://doi.org/10.3390/platforms2010002>
- Orfan, S. N. (2023). Undergraduate english students' use of google translate in Afghanistan: A Case Study. *International Journal of Web-Based Learning and Teaching Technologies*, 18(1). <https://doi.org/10.4018/IJWLTT.332398>
- Ponto, J. (2015). *Understanding and evaluating survey research*. *Journal of the Advanced Practitioner in Oncology*, 6(2), 168–171.
- Pourfeiz, J. (2016). A Cross-sectional Study of Relationship between Attitudes toward Foreign Language Learning and Academic Motivation. *Procedia - Social and Behavioral Sciences*, 232, 668–676. <https://doi.org/10.1016/j.sbspro.2016.10.091>
- Pratiwi, T. L., Zaki, L. B., & Darsono, E. R. F. (2025). EFL learners' metacognitive awareness in listening strategies: A study in Indonesian higher education. *Celtic: A Journal of Culture, English Language Teaching, Literature and Linguistics*, 12(2), 1121–1138. <https://doi.org/10.22219/celtic.v12i2.42061>
- Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*, 19(4), 460–475. <https://doi.org/10.1006/ceps.1994.1033>
- Shin & Chon. (2023). *Second language learners' post-editing strategies for machine translation errors*. <https://doi.org/10.64152/10125/73523>
- Siregar, M., & Stroupe, R. (2025). Theoretically informed students' worksheet based on metacognitive strategies for a translation course. *Indonesian Journal of Applied Linguistics*, 15(1), 198–208. <https://doi.org/10.17509/ijal.v15i1.76549>
- Stahlberg, F. (2020). Neural machine translation: A Review. *Journal of Artificial Intelligence Research* (Vol. 69). 343–418 <https://doi.org/10.1613/jair.1.12007>
- Stanton, J. D., Sebesta, A. J., & Dunlosky, J. (2021). Fostering metacognition to support student learning and performance. *CBE Life Sciences Education*, 20(2). <https://doi.org/10.1187/cbe.20-12-0289>
- Teng, F. (2020). The role of metacognitive knowledge and regulation in mediating university EFL learners' writing performance. *Innovation in Language Learning and Teaching*, 14(5), 436–450. <https://doi.org/10.1080/17501229.2019.1615493>
- Turovsky, B. (2016, April 28). *Ten years of Google Translate*. Google. <https://Blog.Google/Products-and-Platforms/Products/Translate/Ten-Years-of-Google-Translate/>.
- Yilmaz, R. M., & Baydas, O. (2017). An examination of undergraduates' metacognitive strategies in pre-class asynchronous activity in a flipped classroom. *Educational Technology Research and Development*, 65(6), 1547–1567. <https://doi.org/10.1007/s11423-017-9534-1>

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). Academic Press.