International Journal of Social Science Research and Review

http://ijssrr.com
editor@ijssrr.com
Volume 7, Issue 7
July, 2024
Pages: 119-132

The Identification of Cognitive and Metacognitive in Post-Editing Process of English-Indonesian and Indonesian-English Text Using Thinking-Aloud Protocols

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http://dx.doi.org/10.47814/ijssrr.v7i7.2183

Abstract

This article explores the post-editing process in machine-translated texts, focusing on the cognitive and metacognitive strategies employed by translators. The study employed the think-aloud protocol (TAP) to examine the cognitive and metacognitive strategies used by translators during post-editing tasks. The qualitative case study method reveals the cognitive intricacies involved in generating ideas, revising, elaborating, clarifying, retrieving, rehearsing, and summarizing text content. The metacognitive processes of planning, monitoring, and evaluating are also examined, revealing the translator's vigilant oversight of the post-editing endeavor. The findings highlight the dynamic interplay between cognitive and metacognitive faculties, underscoring the translator's role in refining machine-generated translations. The study also highlights the pedagogical implications of cultivating cognitive and metacognitive competencies in translation education, advocating for an integrated approach that fosters critical thinking and linguistic proficiency. The study contributes to the advancement of translation studies, offering insights to optimize the efficacy and quality of translation endeavors in the ever-evolving landscape of linguistic technologies and intercultural communication.

Keywords: *Cognitive Process; Metacognitive Strategies; Post Editing; Think-aloud Protocol; Translation*

Introduction

Translation is one of the most important parts of communication. It can be a way to spread knowledge or information which is written or spoken in specific language to another new language. Translation will help someone to learn new languages or cultures. Translation involves more than simply changing vocabulary; it also involves conveying as much cultural equivalency with the target language and the culture of the source language as is feasible (Fitria, 2018).

As global contact and cross-cultural exchange change quickly, of course translation makes it easier for ideas and information to be conveyed across languages without any barriers. Eftekhary (cited in Matiini, 2023) stated that translation is the act of conveying the sense and meaning of a text from one language to another. Hatim and Munday (cited in Amaliah, 2023) added translation focuses on the process of transforming the Source Text (ST) into the Target Text (TT) in another language. Catford (1965) (cited in Widiastuti & Rahayuni, 2022) defined translation as the substitution of textual content in one language with textual content of equal value in another language. Poibeau (2017) mention a similar definition stated that translation is the process of translating a text from the source language to the target language.

Thus, learning a language requires translation—either from English to another language or from the first language to English or another language. The language learners can choose many platforms to translate one language into another language (Saraswati et al., 2021). However, during the process of translation, differences might occur at some level such as vocabulary or the structure of the syntax between the source-text and target-text (Fitria, 2020). But nowadays, translating any kind of text is easier because of the rapid development of machine translation (MT).

Machine Translation (MT) is an automated translation system that takes a text in one language as input and generates an equivalent text in a different language as output. EAMT (European Association of Machine Translation) defines machine translation as a computer application software that is designed to translate documents from one language to another. However, LISA (Localization Industry Standard Association in 2010 defines machine translation as an automated way of translating text from one language to another, without the need for human involvement (Anggrina et al., 2017). It is supported by the definition of machine translation defined by Cheragui (2012) who stated that machine translation is translation, either with or without human aid, from one natural language (source language, or SL) to another (target language, or TL), utilizing computerized systems. Tabsharani (2023) mentioned that machine translation is the process of translating one text or language into another by using dictionaries and linguistic rules.

There are four types of machine translations that are rule-based machine translation (RBMT), statistical machine translation (SMT), hybrid machine translation (HMT), and neural machine translation (NMT) (Anne, 2021). Translations in RBMT incorporate syntactic, morphological, and semantic knowledge by using linguistic rules and dictionaries created by human experts. This method can produce accurate translations, particularly for lacking in resources languages. However, it takes money and effort to create and maintain the rule sets (StudySmarter, 2023). In contrast, the method that is currently most often used in MT research is SMT. The algorithm searches through large multilingual corpora to find the target sentence with the highest match probability (Banitz, 2020).

SMT and RBMT are combined in HMT. RBMT is well known for its excellent accuracy due to its thorough analysis at the syntactic and semantic levels, but because it necessitates a large number of linguistic rules, it is quite costly. However, SMT is less expensive since it does not require large corpora, which are unavailable for low-resource languages, and instead employs the mathematical reasoning issue. Therefore, to achieve a high efficiency in hybrid machine translation, the drawbacks of both systems were eliminated (Khenglawt & Lalṭanpuia, 2018).

The most recent method is called Neural Machine Translation (NMT), which models the whole translation process inside a neural network using deep learning techniques. This approach uses hidden layers and continuous embeddings to record different linguistic abstraction levels. When compared to earlier methods, the recurrent, deep structures of NMT models frequently produce translations that are more precise and fluent (StudySmarter, 2023).

The development of machine translation is very massive. There are so many kinds of machine translation to help humans change the language of any kind of document only in seconds. Some examples of machine translations are Google Translate, DeepL Translator, Microsoft Translator, SDL Trados, Collin Translator, Bing Translator, Yandex Translator, Systran Translator and many more. Of course, it enhances the cost-effectiveness of the process of translation. However, human translators are still needed to edit the results of machine translators to achieve high-quality results (Alves et al., 2016). The term post-editing itself was first used in 1950s which is closely related to MT (Perez, 2022). To achieve the required levels of quality, post-editing is typically required for the output of machine translation systems (Vieira, 2019).

Post-editing is a component of the translation process that includes the transfer of sense and meaning to produce an accurate target language (Matiini, 2023). According to House (cited in Amaliah, 2023), the word "process" refers to a collection of procedures, a complex process of decision-making and problem-solving. As a result, it could take some time for someone to translate and post-edit a text to produce an appropriate target text. Post-editing is also defined as the intervention after doing translation using MT which is done to the target text to find any mistakes and correct them. In general, post-editing is done by correcting or editing the text that was translated from the source text to the target text (Alves et al., 2016).

Post-editing can be broadly classified into two categories: light post-editing and full post-editing. Spelling and grammar mistakes are less important when it comes to light post-editing because the main goal is to make sure the target text accurately conveys the idea of the original. Even style is frequently disregarded until the mistakes significantly alter the source's meaning. Whether the translation gives the reader enough information is the most crucial factor to take into account. Full post-editing, on the other hand, results in translations that are just as good as those produced by humans (Bebler, 2021).

Two categories of post-editing are distinguished by Laurean in 1984, which were conventional and rapid. Conventional post editing incorporates content that is identical to the source, while rapid post editing concentrates on language. Rapid post-editing saves time and does not permanently store output, making it appropriate for brief emails or messages to small groups. For full post-editing to provide high-quality results, human translators and editors are needed. This method improves accuracy while cutting down on translation time. The intended text can be saved to memory for usage or reference in the future (Almaaytah, 2022).

Post-editing is an important step in translation. Why? Because not all text types suit themselves to the use of machine translation. When MT is inappropriate for texts with "emotional weight," idioms, puns, humor, or sophisticated material, a post-editor has to fix everything. MT can translate words and word groups across different languages, but they are not capable of handling all the nuances and complexity of human language. Furthermore, machines lack the judgment necessary to recognize faults or ambiguities in the source content and yet produce an accurate translation (Bebler, 2021).

A post-editing usually provides text-processing strategies known as metalinguistic or metacognitive strategies to support the identification of the cognitive process during post-editing. Some aspects of problem-solving are affected by and during the editing and revising of translated texts as a result of their use of metacognitive methods (Matiini, 2023). Krings (cited in Lacruz et al., 2014) mentioned that the three efforts that should be made in post-editing are temporal (time spent during the process), technical (mechanical operation), and cognitive (mental process carried out during post-editing). The metacognitive strategies of the cognitive processes—especially in translation activity—have been categorized by many scholars.

Cognitive is the belief of the translator about their knowledge and understanding (Kurniarizki & Prasetyarini, 2023). Thus, in translation, cognitive is related to the mental process of the translator (Alves et al., 2016). Cognitive behaviors include memorizing, learning, problem-solving, evaluating, and making decisions. These activities can help the translator develop ways to translate difficult words from the source language to the target language (Nufus, 2022). It also facilitates understanding and explaining the activities and strategies of translators by identifying the process by which they generate meaning (Rustandi, 2023).

Siregar (2023) also mentions a similar definition that cognition is the study of mental processes like learning, memory, attention, evaluation, reasoning, and decision-making. Through mental processes, cognition contributes in the development of new knowledge as well as the application of previously acquired knowledge in everyday life.

When we are talking about cognitive, of course it is closely related to the metacognitive process. Metacognition is concerned with a person's higher-order cognitive processes, in which he has active control over his cognition. Thinking about thinking is a common definition of metacognition. Metacognition enables us to perform a task successfully by planning, monitoring, evaluating, and comprehending (Zhang & Liu, 2008). This indicates that, while cognitive processes allow humans to function normally, metacognition takes it a step further by making a person more aware of his or her cognitive processes. Consider a child who is answering a mathematical question. The child would be able to accomplish the activity thanks to the cognitive process. However, metacognition would double-check the response by observing and evaluating it. In this regard, metacognition aids in the verification and development of the child's confidence. This is why metacognition can be said to aid in successful learning (Siregar, 2023b).

Siregar (2023) also mentioned that "metacognition" refers to second-order cognitions, such as reflections on actions, knowledge regarding actions, and thoughts regarding thoughts; in simple terms, it signifies cognition about cognition. Metacognition entails reflecting on one's perceptions, comprehensions, recollections, and so forth, whereas cognition covers the act of perceiving, understanding, and remembering. The previously mentioned cognition about cognition can be designated as "meta-perception," "meta-memory," and "meta-comprehension," with "metacognition" continuing to be the superordinate term.

Metacognition is a combination of two primary elements: cognition knowledge and cognition regulation. Declarative, procedural, and conditional knowledge are the three distinct types of metacognitive awareness that create knowledge of cognition. In contrast, cognition regulation covers the processes of planning, monitoring, and evaluation (Siregar, 2023b). Metacognitive knowledge encompasses an understanding of cognitive strategies, including their various types, procedures, and usage conditions. Metacognitive awareness typically comprises three discrete categories: conditional knowledge, declarative knowledge, and procedural knowledge.

Declarative knowledge pertains to the cognizance of one's learning capabilities and the variables that influence one's academic achievement (Schraw & Moshman, 1995; Schraw, Crippen, & Hartley, 2006 in (Siregar, 2023b). Additionally, it pertains to the cognizance of individuals regarding their affective states, such as self-efficacy and motivation, and how this impacts the execution of tasks (Harris et al., 2009, p. 133). Taken more generally, this knowledge pertains to an individual, a specific objective, and practical approaches to achieving that objective. Procedural, conversely, pertains to knowing or being cognizant of how to implement strategies. It consists of monitoring, regulation, and additional cognitive processes. It pertains to an individual's understanding of learning strategies and procedural abilities. Potential strategies include the following: "note-taking, self-testing on a periodic basis, skimming

unimportant information, utilizing mnemonics, summarizing main ideas," and "note-taking for important information." (Siregar, 2023b).

Conditional knowledge is the understanding of how to employ a technique, skill, or strategy appropriately; why a procedure works and under what conditions; and why one procedure is more effective than another. In other words, it is concerned with one's understanding of when, when, and why to employ specific cognitive acts or techniques.

Schraw & Moshman (1995) (cited in Siregar, 2023) mentioned metacognitive activities that help control one's thinking or learning are frequently used to characterize metacognitive regulation. Metacognition experiences are seen as a monitoring phenomenon capable of managing cognitive processes and ensuring that a cognitive goal has been met (Livingston, 1997 cited in (Siregar, 2023b)). Individuals can govern and control their learning through this process. The three main components of cognition regulation are planning, monitoring, and assessing, which let learners regulate and oversee their learning process by planning and monitoring cognitive activity. Metacognitive regulation is the control of cognitive activities and learning activities by a set of actions.

There are some activities in metacognition. The first one is planning. Planning entails two essential tasks: identifying what has to be post-edited and then deciding how to do it. The next is monitoring. Monitoring necessitates asking yourself, "How am I doing with post-editing this MT output?" Monitoring involves continually keeping track of what you've post-edited, what you don't yet know, and whether your translation tactics are assisting you in doing so efficiently. The last is evaluating. Evaluation is thinking back on how well, after finishing a line or several, you achieved your aims.

Mu (2005) summarized the theories from several expertise in ESL Writing Strategies and arrived in a conclusion of cognitive and metacognitive strategies. Those strategies are mentioned in the following table:

Table 1: Categories of Cognitive and Metacognitive Strategies

Strategies	Sub-strategies	Definition
Cognitive	Generating ideas (CG)	Repeating, lead-in, inferencing, etc.
	Revising (CRev)	Making changes in plan, written text
	Elaborating (CE)	Extending the contents of writing
	Clarification (CC)	Disposing of confusions
	Retrieval (CRet)	Getting information from memory
	Rehearsing (CReh)	Trying out ideas or language
	Summarising (CS)	Synthesising what has read
Metacognitive	Planning (MP)	Finding focus
	Monitoring (MM)	Checking and identifying problems
	Evaluating (ME)	Reconsidering written text, goals

Related to the editing process, it is both a cognitive and metacognitive process.

Think Aloud Protocols (TAP) are extensively utilized in applied linguistics to uncover the cognitive processes and thought patterns that language learners employ while carrying out various language-related tasks. During the TAP process, translators are required to express their thoughts freely as they carry out the translation work (Siregar, 2023a).

Oster (cited in Trapsilo, 2016) mentioned that think-aloud protocols utilized the verbalization of one’s thoughts during activities such as reading, problem-solving, or other cognitive assignments.

Participants may express opinions, questions, theories, and conclusions verbally. "Thinking aloud" is a type of data collection technique that has been brought into translation research from the cognitive sciences.

Think-aloud procedures are frequently used to highlight learners' strategic judgments when learning and doing activities in a second language. Concurrent and retrospective think-aloud approaches have been utilized most commonly. The participant typically either voices aloud thoughts, feelings, and reasoning while the primary learning activity is taking place, or stops the primary task from time to time, usually at the prompt of a visual, acoustic, or semantic reminder, to tell the researcher what has been going on in his/her mind. Retrospective think-aloud occurs after a learning task and is intended to capture the participant's thinking and reasoning processes while they are still in the learner's short-term memory (Trapsilo, 2016).

This paper will examine the utilization of think aloud protocol in understanding the cognitive and metacognitive process of a translator in doing post-editing, especially in texts that are translated using MT. Thus, the objectives of this paper are: To examine the cognitive process during post-editing of English-Indonesian and Indonesian-English text and to recognize the metacognitive process during post-editing of English-Indonesian and Indonesian-English text.

Method

Research Design

The research employed a qualitative approach with a case study method. A qualitative research method investigates and comprehends individual or group objectives in social or human contexts (Creswell, 2009). According to this concept, qualitative research is used to identify and interpret the intended meanings of participants. More specifically, qualitative research can be defined as an investigative inquiry technique based mostly on excellent technical customs of investigation that examine the community or people's difficulties (Amaliah, 2023). The research method includes developing study questions, collecting data in the participants' natural contexts, doing inductive data analysis, and interpreting the meaning of the data (Patty & Bilung, 2023).

Participant

The participant of this study is an English lecturer in Yogyakarta who is a coordinator in the translation unit. The task assigned to the participants was post-editing using the Think Aloud Protocol (TAP) technique.

Data Source

The source of data of qualitative study can be directed from printed papers, question-answer, inspection, and audio-visual transcriptions as well (Creswell, 2009). In this research, the data of this research was the transcription of the Zoom video during the think-aloud practices during post-editing.

Data Collection

Kabir (2016) stated that data collection is the process of collecting and measuring data on variables of interest in a predetermined method that allows one to respond to specified research questions, test hypotheses, and analyze results. The researcher should conduct 4 different strategies to obtain information such as examination, analysis, categorization, and assessment (Arikunto, 2002). Examination in this research was done by watching the recording and noting some specific sentences that concerned

cognitive and metacognitive processes. After that, the researcher analyzes the data using the theory. The next one, the researcher conducted categorizing the cognitive and metacognitive strategies. The last one, the researcher assessed whether the data was analyzed correctly based on the category (cognitive and metacognitive).

Data Analysis

The researcher and participant watched the recorded video together (stimulated recall interview). The participant was asked to reflect on her action at a specific time during the post-editing. The researcher also turned the video into a written transcript. After that, the researcher conducted data subtraction by identifying, categorizing, and concentrating related information and events. The data was displayed based on record instructions, and the final phase involved making decisions and confirming the results of the study.

Findings

Based on the theoretical framework written above and the objective of the study as well, the cognitive processes are generating ideas, revising, elaborating, clarification, retrieving, rehearsing, and summarizing, while the metacognitive processes are planning, monitoring, and evaluating. Thus, the findings of the research are shown in the table below:

Table 2: Findings

Strategies	Sub-strategies	Definition	Frequency
Cognitive	Generating ideas (CG)	Repeating, lead-in, inferencing, etc.	5
	Revising (CRev)	Making changes in plan, written text	20
	Elaborating (CE)	Extending the contents of writing	10
	Clarification (CC)	Disposing of confusions	5
	Retrieval (CRet)	Getting information from memory	1
	Rehearsing (CReh)	Trying out ideas or language	4
	Summarizing (CS)	Synthesizing what has read	3
Metacognitive	Planning (MP)	Finding focus	8
	Monitoring (MM)	Checking and identifying problems	16
	Evaluating (ME)	Reconsidering written text, goals	5

From the findings, it can be seen that the participant did more revising in the category of cognitive strategies and monitoring in the category of metacognitive strategies.

1. Cognitive Strategies

There are 7 sub-categories in the cognitive strategies, that are generating ideas, revising, elaborating, clarification, retrieval, rehearsing, and summarizing. Here are the discussions related to the findings of each category.

- Generating ideas

Extract minutes

[01:46 - 01:55] bagi saya foundational figure is not for, bukan untuk figures ***copy and paste some of the text***

[01:56 - 02:04] tapi it's going to be better if we fundamental

The utterances in the extract minutes [01:46 – 01:55] and [01:56 - 02:04] show that the participant activity during post-editing. In this process, the translator is expressing her thought and generating her ideas about the concept of "foundational figure".

- Revising

Extract minutes
[08:55 - 09:01] tolong bung. Bung sekarang sudah tidak begitu familiar ***editing, deleting the word "Bung", short pause***

The utterances in the extract time [08:55 - 09:01] shows that the participant revising the text. She was making a decision by deleting the word "*Bung*" and changing it to "Pak". She stated that the term "Bung" is no longer common or appropriate in the target text. The short pause indicates the moment of the participant's consideration before doing the revision.

- Elaborating

Extract minutes
[07:57 - 08:31] seorang ibu babi, ketiga babi kecil nya. ***reading the text translated*** hmmm… dia mengirim mereka keluar untuk mencari peruntungan. Dia menyuruh mereka ***editing the text, no speech for 29s***, mengirim? It's not a letter.

The utterances in the extract time [07:57 - 08:31] shows the process of elaborating during post-editing. The participant elaborated on the original text by providing additional context and expressing her thoughts about the term "*mengirim*" which is closely related to the letter. The long pause for 29s shows her doubt about the word "*mengirim*". When she uttered "It's not a letter", she read it aloud. It can be seen as the part of elaboration process in cognitive strategies. Reading aloud helps the participants to understand more about the context and identify which word should be revised.

Related to the pause for 29s, the researcher also conducted a stimulated recall interview asking why there are many long pauses in the post-editing process. She stated that she used to work in silence, especially in doing translation. She stated she will be easily distracted if she utters her thoughts.

- Clarification

Extract minutes
[05:49 - 05:58] we claim, kenapa we make claim? We claim saja ***editing the structure of the sentence, she missed written claim into claims, then she edited the spelling***
[05:58 - 06:07] we claim about the world and asserts that the increasing interconnectedness of his time
[06:09 - 06:26] keterkaitan pada masanya, I don't think it is opened.

The utterances in the extract minutes above are categorized in the clarification category. The participant expressed her doubt by stating "I don't think it is opened". The moment when she said aloud her thought shows that she is questioning the result of GT "opened". This indicates that she was trying to find clarification about the word.

- Retrieval

Extract minutes
[12:16 - 12:28] Dan aku akan meniup rumah ***deleting the word meledakkan dan change it with the word meniup*** kata serigala. Jadi, yang ini juga dia marah, bukan terengah-engah ***deleting the word terengah-engah dan change it into marah***

The utterances in extract minutes above are included in retrieval category. As it is stated that is defined as getting information from memory, thus it is also dealt with the process when the participant referred back to the previous text that he/she has been edited to maintain consistency. In this part, she has already edited and changed the words "meledakkan" into "meniup" and "terengah-engah" into "marah". Thus, this process is falling to retrieval category of cognitive strategies.

- Rehearsing

Extract minutes:
[11:30 - 11:57] I will huff huff ***opening GT, writing I will huff huff terengah-engah*** I don't think that it will be appropriate.
[11:59 - 12:10] ***writing on the GT the word huff*** Ah, oke. I will huff huff, berarti ini aku akan marah. Ternyata terengah-engah tidak begitu appropriate.

From the extract minutes above, it can be seen that the participant is engaged in the process of writing the word "huff" on the Google Translate dan reflecting its meaning. It is included in the effort to find the best choice of words before finalizing the text that she post-edited. This is included in the rehearsing category.

- Summarizing

Extract minutes:
[10:05 - 10:15] Oke, jadinya baby kecil membangun rumah dari jerami tersebut. Lalu datang seekor serigala dan menutup pintu dan berkata, babi kecil, babi kecil.

Summarizing is defined as synthesizing what has been written. It is also related to concluding a specific section during the process. In this extract minutes, the participant uttered the utterances after she finished revising the sentence. She read the revised sentence aloud to make sure that the sentence was correctly revised. She then concluded that it was already correct.

2. Metacognitive Strategies

There are 3 categories of metacognitive studies. They are planning, monitoring, and evaluating. The explanation of the findings in each category is presented below:

- Planning

Extract minutes:
[02:51 - 03:33] yang berikutnya sudah oke, kemudian kalimat berikutnya, ***copy paste the text***

The utterance "kemudian kalimat berikutnya" was followed by copying and pasting the text into the next column. The utterance indicates that the participant planned an action to the next sentence. The action of copy and paste the text also indicating the planned step in the process of editing the content of the text.

- Monitoring

Extract minutes
[03:35 - 03:52] kalimat berikutnya only a matter of,
[03:55 - 04:22] it's only a matter of, typo, ya, sudah oke.
copy and paste the text, editing the typo

From the extract minutes above, the participant was doing an observation and examination of the text and she found out that there was an error, that is a typo. Her utterances of "only a matter of" showed that she had done the observation through the text. In this monitoring category, the participant should be aware to the content of the text so that he/she will be able to identify errors, inconsistencies or any part of the text that needs improvement.

- Evaluating

Extract minutes
[06:56 - 07:06] ini sudah betul ini adalah subjek predikat ***analysing the syntax of the sentence***

The extract minutes above are included in the evaluating category. In this process, the participant reflected on the accuracy of the text by stating "*ini sudah betul*". This indicates that she has assessed the text and thus she could make the judgement that the sentence is correct. She also identified the structure of the sentence by mentioning "*ini adalah subjek, predikat*". It shows that she was doing an evaluation on the sentence structure to make sure that the sentence was precise and correct.

Discussion

The findings of the study offer insightful information about the cognitive and metacognitive procedures translators use to post-edit texts that have been machine-translated. The study provides an understanding of the complexity of the post-editing work and the diverse methods translators use to improve machine-generated translations by analyzing several sub-strategies within the cognitive and metacognitive domains.

The participant demonstrated a wide variety of cognitive processes in the area of cognitive strategies, such as generating ideas, revising, elaborating, clarification, retrieval, rehearsing, and summarizing. Significantly, the participant revised the translated text extensively, demonstrating a significant effort to improve its accuracy and intelligibility. This emphasizes how important revision is to the post-editing process because it allows you to polish and refine the translation product. In addition, the participant showed a tendency towards elaboration, successfully expanding the text's contents to add more context and clarity. Moments of clarification occurred during the elaboration phase, during which the participant asked questions and tried to clear up any confusion in the translation. These kinds of incidents demonstrate the translator's proactive efforts to guarantee the accuracy and consistency of the translated material.

The results also provided insight into the participant's use of the metacognitive techniques of planning, monitoring, and evaluating. The participant exhibited a methodical approach to the post-editing assignment by carefully organizing and outlining the processes and actions that need be taken to maximize the editing process. The seamless execution of post-editing tasks was made possible by this strategic planning, which enhanced the overall effectiveness and efficiency of the translation project. In addition, the participant kept a close eye on the translated text, carefully examining it for mistakes, inconsistencies, and areas that needed improvement. This ongoing process of monitoring highlights the

translator's dedication to quality control and the careful attention to detail needed for post-editing assignments. The participant's ability to evaluate was further demonstrated by the critical examination of the translated text's syntax and structure, which resulted in well-informed assessments of its accuracy and precision.

Overall, the results highlight how cognitive and metacognitive processes interact dynamically during the post-editing phase of machine-translated texts. The work offers significant insights into the cognitive mechanisms behind translation tasks by clarifying the nuances of these processes. It also offers practical implications for improving the effectiveness and caliber of post-editing endeavors.

This very simple research is expected to give some contribution related to the pedagogical activities. The first one, teachers of language studies should consider to include both cognitive and metacognitive training in their courses. This means teaching students not only the technical side of post-editing, but also how to be more aware of and in charge of their own thought processes, like coming up with ideas, revising, and monitoring.

It is also possible to use think-aloud protocols (TAP) as a useful teaching tool. During translation and post-editing assignments, students can be asked to say what they are thinking. By making them more aware of how they make decisions, this activity can help them improve their metacognitive skills. Revising and monitoring are important parts of the post-editing process, so teachers should make it a point to teach students good revising techniques. As part of this, they will learn how to think critically about machine-generated translations and actively search the text for mistakes, flaws, and cultural nuances.

Next, the results of this paper show how important it is to be able to think critically when rewriting. Teachers can make activities that push students to think about the output that a computer created, spot possible problems, and make smart choices during the post-editing phase. This helps people approach translation jobs in a more thoughtful and analytical way. Specifically, Language Department Studies should give their students a wide range of texts to read, including ones with heavy themes, idioms, humor, and complex language. This will help them get ready for the difficulties of post-editing. This experience will help students understand what machine translation cannot do and when humans need to step in.

Machine translation is constantly evolving, so teachers should stay up to date on the latest tech. Students will be better prepared for the constantly changing world of translation and post-editing if they learn about the newest machine translation technologies and what their advantages and disadvantages are. Teachers can stay up to date on the latest research and trends in translation studies by taking part in workshops, seminars, and other chances for ongoing professional development. With this information, you can immediately start using it to improve the way you teach post-editing skills.

Conclusion

The purpose of this work was to investigate the cognitive and metacognitive processes associated with post-editing, specifically for texts that have been translated by machine translation (MT). The study examined the translator's cognitive methods, including generating ideas, revising, elaborating, clarification, retrieval, rehearsing and summarizing, by using the think-aloud protocol (TAP) on an English lecturer in Yogyakarta. Metacognitive techniques such as planning, monitoring and evaluating were also examined.

The results showed that the participant participated actively in the cognitive domain's revision process, highlighting the importance of fine-tuning and modifying the translations produced by the

computer. Monitoring was a key component of metacognition, as the translator actively looked for mistakes and inconsistencies in the text. Additionally, the participant showed a keen eye for detail, carefully considering each stage of the post-editing process.

The study also showed that post-editing is a complex interaction of cognitive and metacognitive processes rather than just a mechanical effort. The complexity of post-editing is demonstrated by the translator's capacity to come up with ideas, dispel uncertainties, recall details from memory, and carefully organize and oversee the editing procedure—all of which are aided by machine translation.

In summary, this study sheds light on the mental processes involved in improving machine-generated translations and provides important insights into the cognitive and metacognitive aspects of post-editing. Comprehending these procedures is imperative in enhancing the effectiveness and caliber of post-editing assignments within the framework of developing linguistic technologies and intercultural dialogue.

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