

Machine Translation on Chinese Students' L2 Academic Writing Motivation and Strategy

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Abstract. The study explored the impacts of machine translation on Chinese university students' L2 academic writing, especially on the motivation of using machine translation and the writing strategies with the aid the machine translation (MT). With the technology advances proceeding unimpeded, MT, as one of the artificial intelligence-based technology, was booming in the L2 academic writing. Although many previous studies examined the influence of using MT on the quality of L2 academic writing, few study paid attention to the students' psychological activities and writing strategy during the writing process. Therefore, viewing the academic writing as a process, this study employed the Technology Acceptance Model to explore how motivation of using MT influenced the final writing strategy selection by analyzing the factors that impacted the motivation. Semi-structural interview was applied in this study to explore the thoughts and experience of eight Chinese university students in using MT in their L2 academic writing. After collecting and analyzing the qualitative data, the study found that with the comprehensive influence of external variables, the psychological features of Chinese university students largely influenced the writing strategies with the assistance of MT in L2 academic writing. This study provided possible insights into how MT shapes the writing strategies, and thus suggested some recommendations for higher education institutions and teachers of English academic writing on how to better use MT in academic writing so that students can be delivered with relevant guidance in this respect.

Keywords: Machine translation, L2 academic writing, motivation, writing strategy.

1. Introduction

1.1 Background

Machine translation (MT), one of the AI tools in digital technology, is ubiquitously applied in classroom at different levels, ranging from primary education to mainstream tertiary education especially second language (L2) field. MT refers to the automatic process where texts are translated from one natural language to another with the help of computer software and applications. Great contribution in education sector is made by MT, mainly including nursing, science, and language. Nursing users use MT to understand different professional articles worldwide [1], and university students majoring in biology are commonly asked to learn expertise bilingually. In the language sector, MT evaluation metrics are considered effective to assess learners' translations and interpretations.

While in English language education, academic writing emerges as one of the leading challenges. Scholars point out that academic writing is a sophisticated, problematic, and integrative process, which is demanding for both native and international students. What is worth mentioning is that for English second learners (ESL), the difficulty is integrated with linguistic and educational hinderance. Previous studies show that MT is agreed as an effective supplementary learning tool for L2 academic writing since an increasing number of evidence confirms the accuracy of MT. Students also benefit from MT as writing faster and producing more fluent and accurate writing with fewer errors [2].

In China, English, as world's lingua franca, is the second language for a majority of Chinese university students. Difficulties in Some studies investigate the difficulties Chinese university students have in English academic writing, such as language colloquialism, inappropriate word usage, Chinese style of discourse. Nevertheless, students still report benefits of using MT in their English academic writing, which even serves as an essential survival tool for them to communicate with teachers. Therefore, considering the limited and fragmented research on student' motivation in using machine translation (MT) and employing MT-assisted writing strategies, this study aims to examine

the impact of MT on Chinese university students' L2 academic writing, specifically focusing on their motivation levels and utilization of writing strategies.

1.2 Context of the Study

The study is conducted to explore how MT impacts on Chinese university students' L2 academic writing, especially on their motivation of using MT as an auxiliary tool for L2 academic writing and their writing strategies with the help of MT. This study purposely selects Chinese university students who have participated in English academic writing modules in their undergraduate or postgraduate and have employed MT as their assistance in academic writing. Technology acceptance model (TAM) is used in this research to illustrate what factors motivate these students to select MT, and how their attitudes affect their final writing strategies.

1.3 Research Design and Objectives of This Study

The overall objective of this study is to explore the impacts of MT on Chinese university students' L2 academic writing, especially on the motivation and writing strategies. The whole study employs two dominating research approaches: 1) a review of related literature; 2) the collection and analysis of empirical data. To better clarify the objective of this study, sub-objectives are listed concretely as follows:

To explore the motivations that Chinese L2 students use machine translation in academic writing.

To identify the relation between the motivations of using machine translation in L2 academic writing and Technology Acceptance Model.

To investigate the strategies of L2 academic writing with the help of machine translation.

To explore the impact of students' motivations of using machine translation in L2 academic writing on their strategies of academic writing in using machine translation.

To formulate possible proposals in adopting machine translation as a tool in academic writing.

1.4 Rationale of the Study

Some researchers highlight that the demonstrated gains in writing quality that result from MT assistance are not likely permanent, and overreliance on MT may actually hinder L2 learning and writing development [2]. Although studies have been conducted on students' attitudes and perceptions towards machine translation, there is a lack of emphasis on the motivation behind its usage, resulting in scattered points being mentioned with only a general reference to writing anxiety. However, it is important to note that ideas shape behavior. Previous research has not integrated the writing motivation associated with using machine translation and the corresponding writing strategies employed by students.

1.5 Conceptual Framework

The conceptual framework (Figure 1) examines the various factors that influence users' motivation and subsequently impact their ultimate usage, employing Venkatesh [3]'s Technology Acceptance Model (TAM). Task features, user characteristics, design attributes, and technology policies are selected as the external variables directly influencing user motivation. These external variables exert an influence on users' perceived usefulness, perceived ease of use, and attitudes towards usage. Also affected by both external variables, perceived usefulness, and perceived ease of use, users' attitudes determine their using intention, and consequently dictate their actual usage.

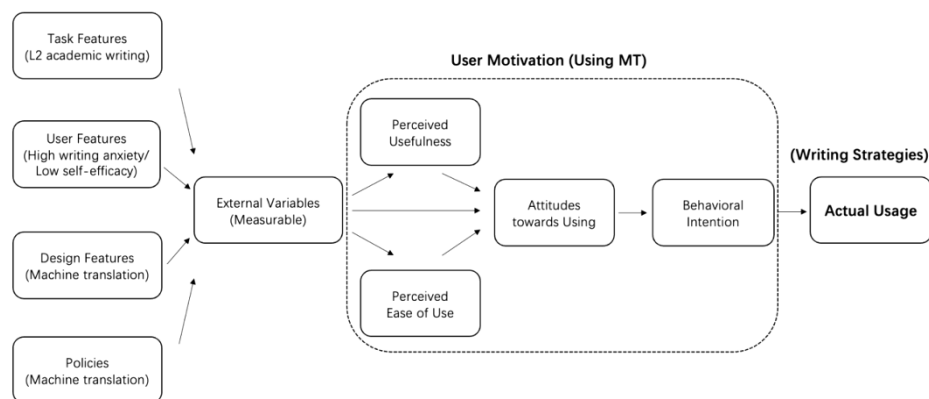


Figure 1. Conceptual Framework

2. Literature Review

2.1 Introduction

The literature review will examine the main issue surrounding the machine translation in Chinese students' L2 academic writing. The study within the literature review summarizes the holistic development and application of one of artificial intelligence, machine translation in L2 academic writing, predominantly focusing on the Objective 1 and Objective 3 of this study. Great contribution will be made to this study by exploring the extensive literatures concerning above areas.

2.2 Students' Perceptions of University Policy on Machine Translation

Despite of the widespread use of MT, HEIs rarely formulate any policy or design any curricula pertaining to it. MT issue is always related to academic integrity and, even so, there still remains ambiguity in consensus among instructors and school policy. The existing institutional policy is outdated because it ignores the value of MT as a learning tool and does not address the pervasive use of MT in English-medium HEIs for L2 students. Hence, if an institution addresses MT at policy level, it is generally restricted to legislation on plagiarism [4].

Students maintain a positive attitude towards MT. The purposes of using MT in L2 academic writing include searching for unknown vocabularies or phrases, better organizing sentences, verifying original meanings. For language learning, studies show that students utilize MT in nuanced ways to enhance language learning rather than to bypass or avoid learning [5]. Hence, although overreliance on MT may hinder the academic language development, proper use of it can support language learning and allows access to present better academic content in L2 academic writing that students can demonstrate expertise in their specialty. Pertaining to the academic integrity, Jolley and Maimone [6] report that translation segment length and frequency of use are key factors among students in judging ethicality of use. Most students indicate that using MT to translate longer pieces of text (e.g., entire texts) is unethical, whereas translation of single words or short phrases is completely ethical.

2.3 L2 Student's Motivation in Using Machine Translation

Students' engaging in MT use in L2 academic writing dominantly derives from two aspects as psychological perspective and technology acceptance perspective.

One is from the psychological perspective with two major factors as self-efficacy and academic emotions. Selcuk, Jones [7] point out that students' low confidence and high levels of anxiety in L2 academic writing are considered motivating factors to use MT (p. 19), where self-efficacy and academic emotions are involved. Self-efficacy, an affective construct pertaining to motivation and learning effectiveness, includes individual confidence in accomplishing tasks. In academic writing, it refers to students' feelings of competence as a writer or individual confidence. When students have low self-efficacy in L2 academic writing, they are unconfident in their language capability, and thus

desire to seek external assistance. Another factor is academic emotions. In academic settings, it is ubiquitous for university students to experience both positive emotions (e.g., pride, enjoyment) and negative emotions (e.g., anxiety, boredom). In L2 academic writing, foreign language anxiety is commonly considered as a dominant writing barrier.

The other is from the technology acceptance perspective, highlighting learners' attitude towards the technology. According to researches, students mention the fact that MT tools are easy to access for free and that they are time-saving. Besides, students perceive that MT tools will enhance language quality in L2 academic writing, and thus alleviate anxiety and boost their confidence [8]. It is also identified that students who recognize the benefits of MT tools use command a high level of learning motivation, which promotes students' self-directed learning based on technology.

2.4 L2 Student's Writing Strategies in Using Machine Translation

Students utilize various writing methods in using MT in L2 academic writing, such as inferencing, double checking, paraphrasing, and rewriting. Two dominating L2 academic writing strategies are summarized by scholars. Some students choose to write in L1 and then use MT to translate into English. The rationale behind L1 writing is considered as reducing cognitive stress and promoting efficiency [9]. Although L1 and L2 are linked to each other in writers' minds, this writing strategy still remains problematic owing to the inhibition of writing in the target language. The other strategy, writing in L2 initially, can better enhance students' motivation to write in a target language. There are two concrete practices under this strategy. One is that students write in L2 with the help of MT which provides them with useful words or phrases. The other is that students use MT to translate their L2 writing into L1, and then reuse MT to compare their own-written L2 version and MT L2 version, so that they can choose or integrate them into a better one.

No matter which writing strategy, post-editing is involved inevitably. Students in the past often regard academic writing as a product, not laying emphasis on revision. However, MT can assist students to revise their writing in that students have to apply their previous expertise of the target language and correct some improper expressions in MT L2 version, thus emphasizing editing and the process of writing [2]. Rather than simply copy everything from MT L2 writing version, students will use their expertise to strategically choose some alternatives.

2.5 Theoretical Framework

As there is a close association between MT and technology, TAM is extensively utilized in this field, which takes into consideration of both intrinsic features of MT and external variables associated with MT. The model is originated from the reasoned action theory which aims to explain computer usage behavior. TAM is used to examine individuals' acceptance of a new technology, including three key components: perceived usefulness, perceived ease of use, and behavioral intention. In this model, the perceived usefulness and perceived ease of use, influenced by external variables can directly or indirectly determine the final outcomes.

Perceived usefulness is considered as a key driving indicator of usage behavior. Impacts of perceived usefulness on behavioral intention are proved and recognized in more than 85% of TAM-based researches. When employing MT as an auxiliary tool, users perceive it as a reliable and effective tool to assist their L2 academic writing tasks and alleviate their negative academic emotions. Despite that MT cannot meet every request of users, post-editing in MT output is still preferred thanks to its rapidity and low cost.

Venkatesh and Davis [10] define the perceived ease of use as one's perception about how the new technology is easy to use, which is regarded as a trigger to adopt new technological advancement by students. Provided a technology is considered to be easy to use, then it is more likely for students to adopt the new service. In the MT context, students can access it through internet, and a desired target text is generated by inputting the original text and clicking the translation button.

Perceived usefulness and perceived ease of use are utilized to examine Chinese undergraduate students' feedbacks of using MT in post-editing [11]. Some extended TAM frameworks emerge to

investigate the relationship among perceived usefulness, language learning anxiety, and students' English learning motivation.

3. Methodology

3.1 Introduction

The methodology part delivers more information about the methods and procedure of the investigation carried out. The purpose of this study is to explore the impacts of MT on Chinese university students' L2 academic writing, especially on the motivation and writing strategies. Hence, to better achieve the objectives of this study, the following research questions are to be addressed in this study.

What motivates Chinese L2 students to use machine translation in academic writing?

What is the relation between these motivations and Technology Acceptance Model?

What are the academic writing strategies of Chinese L2 students with the help of machine translation?

Are these academic writing strategies affected by the motivations Chinese L2 students' using machine translation as a tool? If so, how do these motivations impact on the academic writing strategies?

To better utilizing machine translation as a tool in academic writing, what possible proposals that Chinese L2 students recommend for teachers teaching L2 academic writing and other L2 students?

This part details the research approach, data collection, data analysis, ethical issues and limitation of the study.

3.2 Research Approach

Qualitative research approach is employed in this study to investigate the impacts of MT on Chinese students' motivation and writing strategies in L2 academic writing. Qualitative research method is of great significance as it enables researchers to expand the existing theories and establish new theoretical explanations for observable phenomena. Unlike quantitative research, qualitative research employs small samples relatively, and is expressed in natural language rather than numbers and in statistical models. These natural languages include interview, written records, pictures, clothing, or observed behavior. Qualitative research approach is considered useful particularly in obtaining culturally specific information about the values, interests, behaviors, and opinions of groups in society.

In this study, Chinese students' perception, attitudes, and motivations of employing MT as an auxiliary tool in L2 academic writing are explored. And their motivations largely influence or even shape their writing strategies. This study corresponds the characteristics of qualitative research which aims to learn the subjective ideas and explain human behaviors in reality. Hence, qualitative research approach is more suitable for the topic of this study.

3.3 Data Collection

This part presents how data is collected in this study, including introducing the sampling technique, instrument and procedure, and pilot test.

3.3.1 Instrument and Procedure

The study utilizes semi-structural interview to obtain information and data. Interview is regarded as the most prevailing way to collect data and it is the core for data collection. Semi-structural interview, as the most ubiquitously used category of interview in qualitative research, requires researchers to prepare an outline of subject and relevant questions. Compared with structural interview, semi-structural interview has no rigid adherence, so that interviewees have more flexibility to voice their more ideas pertaining to the guiding questions. As such, it is vital to acknowledge that semi- structural interview is the ideal instrument for data collection in a qualitative study.

The whole interview is carried out in Chinese for eight participants including four males and four females. Each interview last about 25 minutes on average on a one-to-one basis by online WeChat call. All the responses delivered by participants are recorded verbally in Chinese on transcript and translated into English. After the transcript is perused and tagged, coding is followed.

3.3.2 Sampling Technique

Regarding the sampling technique, the strategy of selecting participant is supposed to integrated into the overall logic of any study. Considering that this study is of qualitative nature that researcher tries to explore phenomenon and understand the reason and concept behind, it is vital to choose a sample who can articulate their ideas and share their experience to promote researcher’s understanding. Hence, in this beginning stage of data collection, selecting participants with little knowledge pertaining to the topic is illogical [12]. In qualitative research, a purposively chosen and relatively small sample may be preferred, aim at widening the depth of understanding rather than breadth.

The purposive sampling technique, also called judgement sampling, aims at selecting the key informant who are observant, experienced, and most likely to yield appropriate and useful information. Hence, purposive sampling technique can better match the chosen sample and the objectives of the study, which enhances the validity and credibility of the research results.

Based on the features of this study, the pre-determined inclusion criteria for sample participant selection are as follows.

1. Sample participants are Chinese university students, including undergraduates and postgraduates.
2. Sample participants have the experience in participating the English academic writing modules.
3. Sample participants use MT in their English academic writing.
4. Sample participants are willing to share their ideas and experience of using MT in their English academic writing.

According to the criteria stated above, there are totally eight Chinese university students being invited to this research as sample participants. Table 1 below shows the general basic information of eight sample participants.

Table 1. Information of Sample Participants

| Pseudonyms | Gender | Degree | Major |
|------------|--------|----------|--------------------|
| P1 | Male | Bachelor | Finance |
| P2 | Male | Master | Applied Linguistic |
| P3 | Female | Bachelor | Computer Science |
| P4 | Male | Master | Computer Science |
| P5 | Female | Master | Finance |
| P6 | Female | Bachelor | Education |
| P7 | Male | Bachelor | Engineering |
| P8 | Female | Master | Applied Linguistic |

3.3.3 Pilot Test

Pilot test often used to examine the feasibility of the research by collecting data which utilizes a small sample of participants who are similar to the actual study interviewees. The purpose of pilot test is to confirm the coverage and relevance of the interview content and to assure that the interview questions formulated can be understood clearly without ambiguity. Through pilot test, there are

maybe some possible changes and adjustments to the interview questions are followed, thus improving the quality of data collection.

In this study, one of the Chinese university students is invited to participate the pilot test before conducting formal interview. The answers provided by the chosen participant is recorded and translated from Chinese to English. It is found that all the interview questions can be understood with no ambiguity, so the researcher does not revise the interview questions designed before.

3.4 Data Analysis

Miles and Huberman [13]' three-stage data analysis method in qualitative research is utilized in this study. The three stages include data reduction, data display, and conclusion drawing. In data reduction phase, the researcher pays attention to the key information collected from interviewees, and then simplifies the data by filtering out useless parts. During the data display phase, the qualitative data are transcribed into text, some important of which are presented as quotations in the findings part. After comparing and categorizing those data, it comes to data conclusion part. In findings and discussion part, the researcher verifies and summarizes the data into themes and sub-themes in relation to the literature review.

3.5 Ethical Issues

Creswell and Creswell [14] claim that it is crucial to consider ethical issues throughout all stages of the research. Holding the basic principles of reciprocity, relevance, responsibility and respect, the researcher should ensure that the procedure of the whole interview, including the interview questions and environment, does not infringe any rights of the participants.

In this research, after the researcher's submitting a comprehensive ethics form, ethical approval is offered by the supervisor of this research before conducting the interview. To meet the ethical requirement, the information sheet introducing the general idea of this research is sent to the interviewees to peruse, and they sign the consent form before attending the interview. Participants are anonymous and referred as P1 to P8, and they are informed having complete autonomy in withdrawing from the study at any point if they have any concerns. All the data were treated in strict confidence and only used in this research. In addition, after each interview, participants reviewed and confirmed accuracy of researcher's notes to ensure no alterations were made.

3.6 Limitation of the Study

Limitations in this study mainly lay in three aspects. Firstly, although online interview provides more accessibility to both interviewer and interviewees, considering the unstable network, online interviews in this study is not so efficient. Participants often ask for questions repeated so that they can hear them clearly, the process of which may affect participants' interviewing emotions negatively. Secondly, the number of samplings is relatively small. The study selects eight participants, who cannot represent all Chinese university students using MT in their L2 academic writing. Therefore, in this respect, it does not add sufficient credibility to the study. Lastly, this research does not consider the personal English academic writing proficiency of those participants. Compared with those who have low academic writing proficiency, students with higher level of academic English writing may have a relatively low level of writing anxiety and a relatively high level of writing confidence. Therefore, students' motivation and writing strategies for using MT may behave differently depending on their own level of academic English writing.

4. Findings and Conclusion

4.1 Introduction

The finding part summarizes and categories the data collected from the semi-structural interview, including the thoughts and experiences of eight Chinese university students in using MT in L2

academic writing. According to the findings, three themes related to the research questions are presented as follows, and some representative sampling responses are showed in quotations.

1. Chinese university students' difficulties in L2 academic writing
2. Motivation of using machine translation in L2 academic writing in technology acceptance model
3. Strategies of using machine translation in L2 academic writing
4. Evaluation of using machine translation in L2 academic writing
5. Proposals of using machine translation in L2 academic writing

4.2 Chinese university students' difficulties in L2 academic writing

As L2 academic writing was problematic for most Chinese university students, before exploring their motivation of adopting MT as an auxiliary tool, difficulties they encountered during the writing process should be explored, including the problems in psychology and problems in writing skills.

4.2.1 Psychological dilemma

Psychologically, all the participants in this research mentioned they had suffered the negative academic emotions, and writing anxiety was the most typical one. For example, P8 said:

"I have always had writing anxiety since my undergraduate. I always get very worried and concerned when it comes to academic writing in English. I am skeptical in the accuracy of the words I write, the grammatical accuracy, and I don't know how to structure my writing... It's a real struggle inside of me."

Other than writing anxiety, another salient performance in psychology was the low level of confidence, which was also known as low self-efficacy. This was mentioned by P1, P2, and P7.

"I have lost confidence in my English academic writing, not just merely anxiety. Due to my insufficient English language proficiency and poor writing ability, I no longer believe in my English academic writing ability in the previous writing feedbacks and grades. I am often in a state of slack and weakness in this area." (P1)

4.2.2 L2 Writing skills dilemma

Participants in this research all mentioned their insufficient L2 writing skills, but in different aspects. Poor English language proficiency was mentioned by P1, P2, P6, and P7, mainly in lexical and grammatical problems. In the lexical aspect, other than small vocabulary, P7 also said "I think figuring out the positive and negative meanings of words and the scope of words usage are even more demanding to me." Among them, P6 particularly pointed out that she always had trouble in syntax.

"I don't have a good command of large vocabulary, so I am confused on how to translate what I want to express in my mind. My syntax is also problematic because of the difference in the order of expression between Chinese and English... grammar is also demanding for me... When I am anxious, I take priority to my sense of well-being rather than learning." (P6)

Another challenge in L2 academic writing skills laid in the organization of the structure and content. This point was mentioned by P2, P4, P5, and P7. According to P4, "I always trap into a confusion on how to construct my academic writing since I am not clear that which parts my writing needs to involve." Based on that, P7 added that "to figure out the inner logic in writing content is also demanding."

In summary, Chinese university students' difficulties in L2 academic writing were mainly from their negative psychology, including writing anxiety and low confidence, and immature writing skills, including English language proficiency and content structure organizing.

4.3 Motivation of using machine translation in L2 academic writing in technology acceptance model

Chinese students' motivations of using MT in L2 academic writing can be categorized into three aspects: perceived usefulness, perceived ease to use, and attitudes towards MT ethical issues.

4.3.1 Perceived usefulness

The perceived usefulness derived from students' perception of MT tools and their needs in L2 academic writing. Hence in this section, how they thought MT could address their difficulties in L2 academic writing was explored. All participants mentioned that MT tools provide many alternatives in terms of vocabulary. For example, as P5 said:

“When I don't know how to translate certain words, I think that machine translation tools can provide me with a lot of synonyms or similar expressions to choose, which helps me solve the problem of vocabulary to a certain extent.”

P6 and P8 mentioned that MT was expected to help organizing a correct and complete sentence in translation, which thus helped them to avoid many grammatical errors.

“I think MT can help me avoid a lot of grammatical mistakes, because the correct grammatical logic system has been implemented in its programming, (lol).” (P8)

Psychologically, MT helped alleviating the writing anxiety (all) and low confidence (P1, P2, P7). Reliance on MT tools when outputting text or searching certain words or phrases largely reduced negative academic emotions and was conducive to self-efficacy.

“Because I know that machine translation can provide me with a lot of language support, so for me, who is not proficient in English, using MT tools in L2 academic writing has greatly improved my negative emotions.” (P5)

4.3.2 Perceived ease to use

All participants reckoned that they could access MT tools through web without any limitation and hinderance. A desired English version of certain text was available through MT easily.

“We live in an age of easy access to the Internet, and MT can be easily obtained through web. I only have to input the Chinese version of words or phrases or sentences, and then click the translation button, the English version will come out immediately.” (P5)

4.3.3 Attitudes on ethical issues of MT

Ethical issues of using MT in L2 academic writing received different attitudes by eight participants. Firstly, all interviewees mentioned that there was no clear policy on using MT in academic writing no matter in HEIs or their teachers.

“I don't know any policies and regulations about MT, either from school level or teachers. There are still some regulations for other AI-based tools, such as ChatGPT.” (P1)

Most participants (P2, P4, P5, P7, P8) reckoned that there were not any ethical problems in using MT, as they thought MT was merely an auxiliary tool in their writing.

“This does not involve any moral issues. As the content of my academic writing is conceived by myself, and MT only helps me in language expression. It shouldn't involve plagiarism, fraud, and other ethical issues.” (P4)

However, P1 mentioned that the ethical problems were associated with the usage frequency. He reckoned that “if MT was used in a high frequency by individuals, then ethical issues should be triggered, but it was hard to define ‘high frequency’ and measure it.”

Another opinion was mentioned by P3 and P6 that ethical issues of using MT were related to the translation segment length of text.

“I think that academic fraud is involved if the translated text is too long, such as full-text translation. But if it's just words and phrases involved, then there's no moral issue.” (P3)

In summary, motivations of adopting MT in L2 academic writing included the perceived usefulness that MT can be expected to address the concerns in L2 academic writing, the easiness to use, and non-ethical issue involved attitudes.

4.4 Strategies of using machine translation in L2 academic writing

With the aid of MT, different writing strategies were mentioned by eight participants. P1, P3, P6, P7 mentioned that they firstly wrote in Chinese, and then used MT to translate into English. After that, they post-edited the text of MT output.

“I major in computer science, which involves a lot of proper nouns, and my English is poor, so I choose to write directly in my native language, and then use MT to generate the English version of the paragraph or even entire text.” (P3)

Reasons behind this strategy still laid in the psychological level and academic English language skill. Other than the insufficient English language proficiency, they mentioned that “compared with writing anxiety, no confidence can better describe me.” (P1)

“Even if I wrote it myself in English firstly, I would compare my version with the MT version. Undoubtedly, I will choose the MT version as the program is infallible. So why should I spend this time producing my own English writing?” (P7)

Hence, MT helped alleviating the low confidence in L2 academic writing by offering a solid reliance.

“The quality of MT output is better than my own output in language, so I regard it as a life-saving straw which then largely helps addresses my low confidence.” (P6)

While P2 and P5 shared their writing strategies with the aid of MT. Two translations were involved in their strategy. They wrote in English firstly, and then translated what they wrote back to Chinese. Then, they employed MT to translate the Chinese text into English. They compared the two English version written by themselves and MT respectively and edited the writing to a better one.

“The reason is that I want to compare two different versions. I can have alternatives in words, phrases, syntax, or other expressions, so that I can generate a better text.” (P5)

Psychologically, these participants were prone to have the negative academic emotions, rather than the low confidence.

“I’m not losing complete confidence in my English skills, but I have writing anxiety. I need to use MT during the writing process to determine the correct translation of some expressions that I am not familiar with or do not know, so that I can rest assured.” (P2)

P8 also shared her writing strategy with the aid of MT. She wrote in English initially, and MT tools only played an auxiliary role during her generating academic English expression. She said, “I only use MT tools to search some uncertain or unfamiliar expressions during my academic writing, such as proper nouns...But sometimes I dissatisfied with my expressions, so I also use MT to offer me alternatives.” When being asked the psychological reasons behind, she added that, “Well, I do have writing anxiety but to a relatively mild degree.”

Specially, the writing strategy of P4 was to write in English firstly, and then she used MT to translate into Chinese to check whether the Chinese meaning is in accordance with the initial thoughts in her mind. But this strategy rarely involved the post-editing process.

“I am relatively confident in my academic English level. But writing anxiety is inevitable. I still need MT to translate what I write into Chinese to check whether it accurately expresses what I think in my heart... This strategy is timesaving.” (P4)

In summary, three strategies were mentioned by the participants. The first one was to write in Chinese and then translate into English by using MT. The second one was to write in English and used MT to translate back to Chinese. Then, the Chinese version was again translated into English by MT. Lastly, students compared the two versions and form a better one. The third one was to use MT to search some unfamiliar or dissatisfying expression during the writing process. The fourth one was to write in English and used MT to translate back to Chinese so that the students could check if the meaning was conveyed correctly. The former two writing strategies involved post-editing more. Additionally, the writing strategies selection was associated with the students’ cognitive knowledge about their academic English proficiency. The higher their academic English proficiency was, the less reliance was on MT tools.

4.5 Evaluation of using machine translation in L2 academic writing

Participants held different opinions towards the evaluation of using MT in L2 academic writing in their experience.

Psychologically, all participants mentioned that MT tools “help alleviating the writing anxiety” and “help addressing the problem of low confidence”. P1 added that:

“I am more comfortable with MT than with teacher guidance. In academic English writing, very few teachers are patient to help you check your language, ...I get so nervous.”

However, some participant also voiced some drawbacks in this regard. Over-reliance on MT is a case in point, P6 mentioned that “I cannot conduct my English academic writing without MT. It is now becoming a necessity for me.” Another participant expressed the similar idea as follows.

“I think I have a problem with over-reliance on MT tools. Because after understanding the characteristics of MT, I gradually lose enthusiasm for academic English writing, and I did not feel a sense of accomplishment in academic English language.” (P7)

Functionally, participants mentioned the useful functions of MT tools, such as “supplying various lexical alternatives” (all), “real-time transcription” (P4, P6), “detecting the grammatical errors” (P3, P5, P7), and “better adapt individual needs and requirements”. For example, P3 said:

“Grammarly is a MT tool I use. It can provide me with immediate feedback and revision suggestions...my academic English skills get enhanced... Compared with teachers, MT tools better know what I want, and more detailed suggestions are delivered to me.”

Besides, P2 and P5 also mentioned that using MT in English academic writing enabled them to “focus more on the academic content”, rather than “surface language form”.

“Using MT allows me to focus more on my academic writing. Language expression is just a form, and academic content is a more important part.” (P2)

Whereas some drawbacks in function were also put forward by P1, P2, and P7, as insufficient grammatical diversity and low level of accuracy in a certain context.

“MT offers few options in terms of grammatical diversity. Moreover, MT cannot recognize the context well, so the reference expressions provided are sometimes inaccurate.” (P1)

In terms of the individual’s academic writing skills, several participants positively mentioned that their academic English language skills got enhanced (P1, P2, P5, P7).

“Because I need to post-edit the text output by MT, I selectively use the reference expressions provided by MT in combination with my own knowledge, the process of which trains my language skills.” (P5)

However, drawbacks also triggered off accordingly. Participants mentioned that their writing skills did not get improved (P3, P4, P5, P8).

“MT doesn’t help improving my writing skills, such as critical thinking, logic, organization structural of the writing. It is only conducive to my academic English language.” (P4)

Another problem they met was the lack of guidance of adopting MT in L2 academic writing.

“I’ve received little guidance and training on MT use, even in academic English writing modules. Teachers will only tell us to reasonably screen some proper expressions generated by MT... But if he doesn’t say these things, I will copy all of them probably..(lol).” (P8)

In summary, evaluations towards using MT in L2 academic writing for Chinese university students were critical. According to the responses of the eight participants, three aspects were concluded: psychological level, functional level, and individual’s skills level. Psychologically, alleviating the writing anxiety and low confidence were mostly mentioned benefits, but over-reliance on MT tools also triggered off the students’ concerns on their independency on L2 academic writing. Functionally, MT tools can supply various expressions of words, phrases, and sentences for students to choose, and enabled students to focus more on the academic writing content, but it lacked the accuracy in a certain context and sufficient grammatical alternatives. Concerning individuals’ skills, MT furnished students with more opportunities to train their English language ability but had no salient positive impacts on their writing skills such as logical, reasoning, structing skills. Also, lack of guidance and instruction of using MT in L2 academic writing enabled students to trap into confusion.

4.6 Proposals of using machine translation in L2 academic writing

Based on the existing phenomenon of using MT in L2 academic writing, eight participants gave various suggestions to both teachers teaching L2 academic writing and other Chinese students engaging in using MT in L2 academic writing.

4.6.1 Proposals for teachers teaching L2 academic writing

P1, P2, P4 and P5 proposed that teachers should pay attention to the problem of using MT. Training and guidance of using MT in L2 academic writing were supposed to deliver to the students.

“I have noticed that most of the Chinese teachers are busy with professional promotion and ignore the educational technology issues. MT usage in writing is widespread but without clear guidance. So, I think that teachers should give some guidance on the use of MT.” (P4)

The rest of participants additionally reckoned that teachers should deliver more guidance on the academic content, the organization and logic of L2 academic writing.

“As instruction in language for MT can be more nuanced and individualized than teacher instruction. But guidance on academic content and logical structure cannot be done by MT. So, teachers should also give us more guidance on the content and the organization of the academic writing.” (P7)

4.6.2 Proposals for Chinese students engaging in L2 academic writing

Although MT played an important role in language assistance in L2 academic writing, participants still gave suggestions as to use MT in a moderate way.

“We still need to use MT in moderation, and we cannot accept everything translated from MT since translation from MT is not always correct and proper in the context.” (P6)

In summary, proposals delivered by eight participants were quite similar and limited. Teachers was expected to offer training or guidance on the use of MT in L2 academic writing and provided students with more expertise on the content and logic and structure of academic writing which cannot be substituted by MT. Proposals to other Chinese students engaging in the L2 academic writing were to use MT in a moderate frequency and in an appropriate way.

4.7 Summary

In sum, this part presented the important findings and conclusion of the semi-structural interview. Eight participants shared their experience and thoughts mainly from the Chinese university students' existing difficulties of L2 academic writing, their motivation of using MT in L2 academic writing in TAM, the following writing strategies, and the evaluation of using MT in L2 academic writing. Lastly, possible proposals were delivered by the eight participants for both teachers teaching L2 academic writing and other Chinese students engaging in using MT in L2 academic writing. These findings and conclusions were to be analyzed together with the literature review in the next part in new themes.

5. Discussion and Recommendation

5.1 Introduction

This part mainly put up with the new themes based on the findings, including the justice in HE, ethic issues of using MT, and the proposals to both teachers, students and HEIs. Recommendation for future studies was also stated.

5.2 Justice in Higher Education

Existing language expectations in English academic writing, including the legitimate research, thoughts, and academic merit are associated with the qualified standard English proficiency. It is undoubtedly that the phenomenon is problematic for linguistically marginalized groups whose English language proficiency is not high. Under this background, language becomes a systematic barrier for them to get access to the academy. MT, as a translation tool in language switching, can be

employed to level the playing field for L2 learners. Despite the limited transformational potential, it furnishes more possibilities for them to circumvent some language ability discrepancies, which thus is conducive to constructing a more equitable learning environment and system. Groves and Mundt [15] claim that MT plays a role of shifting students' emphasis from "shallow literacies" (e.g., spelling, vocabulary, grammar) to focus more on "deeper literacies" (e.g., logical and reasoning skills, critical thinking ability). Students then highlight the academic content and their own writing abilities, rather than the language form performance. Although MT tools cannot eliminate the disadvantage and oppression in HEIs, it is indeed considered as an effective intervention in reducing the language inequity gaps in academic aspects [16].

5.3 Ethics issues in using machine translation

With the unimpeded technology advances, policies setting pertaining to technology use in HEIs is becoming more ambiguous and open to interpretation. It is demanding to define academic integrity in HE. Although there are requirements that university students are always supposed to obey the codes of ethics, it is difficult to identify breach of conduct. Since there is few policies and regulations on the usage of MT in L2 academic writing, which is supported by previous literatures [17] students present a positive attitude on MT and use it without any external hinderance. Most students do not attach MT usage with the academic honesty, since they believe once the academic content is generated by themselves, the language form does not involve ethical issue. However, some voices reckon that the academic integrity is associated with the translation segment length and usage frequency. High frequency, though it is hard to define and measure, and long translation text, including the paragraphs and whole text, in using MT are believed to be unethical.

5.4 Proposals for higher education institutions and teachers

From the pedagogical perspective, technology can reformulate the learning environment. Therefore, various proposals are given to the teachers and HEIs.

For teachers, they should firstly aware that their perception and values of technology have impacts on their teaching practice. Facts show that most teachers disapprove of using MT in L2 academic writing, but students still employ MT at high rates of frequency, the phenomenon of which indicates that the stigmatization of MT (related to academic fraud) does not limit the usage of MT among students but leads to an adversarial status between teachers and students that students are prone to use MT secretly. This precludes the authentic learning in academic writing. As such, a more open and clearer communication pertaining to the guidelines on appropriate uses of MT between teachers and students is desired. They should cooperate together to seek more effective writing strategies that involve MT in ways that align with the academic goals. Besides, course designers and teachers should partner to explore practical ways of introducing MT tools into the L2 academic writing, and then provide trainings for students, such as evaluating the L2 academic writing generated by MT tools.

In institutional level, HEIs is expected to develop codes of practice for MT use base on a comprehensive understanding of MT's limitation and future potentials. To improve digital literacy skills, HEIs is also supposed to provide relevant training pertaining to effective integration of MT into L2 academic writing. Some scholars recommend that university should address these issues by awarding degrees based on MT-assisted language production rather than proficiency alone without MT assistance, or by ensuring that assessments are diverse, multimodal, and multilingual in order to accurately capture what students know and can do.

5.5 Recommendation for future studies

Since many studies examine the effects of AI-based tools on academic writing outcomes, the research gap of this study is to offer possible insights of how MT shapes the learning behavior. The academic English proficiency of the students themselves was not explored in this study, but it may have a certain impact on their psychological motivation. Therefore, future research can investigate the intrinsic link between students' own academic English proficiency and their motivation.

In addition, HEIs and teachers have not agreed on policies and regulations on the application of MT, so different people have different attitudes towards MT use. Some people believe that this constitutes academic fraud, but others believe that MT only assists our language expression and does not involve any academic ethics issues. However, students often get confused in using MT, because they do not know a proper way to use MT, which can generate a positive impact on their L2 academic writing ability and quality of L2 academic writing.

As it is a little-studied field on how to best utilize the MT tools to foster learner' L2 academic writing skill and well-being, future research directions can explore a feasible approach of using MT in L2 academic writing, which benefits both individuals' L2 academic writing skills and sense of happiness.

References

- [1] Anazawa, R., H. Ishikawa, and K. Takahiro, Evaluation of online machine translation by nursing users. *CIN: Computers, Informatics, Nursing*, 2013. 31(8): p. 382-387.
- [2] Garcia, I. and M.I. Pena, Machine translation-assisted language learning: writing for beginners. *Computer Assisted Language Learning*, 2011. 24(5): p. 471-487.
- [3] Venkatesh, V., Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information systems research*, 2000. 11(4): p. 342-365.
- [4] Mundt, K. and M. Groves, A double-edged sword: the merits and the policy implications of Google Translate in higher education. *European Journal of Higher Education*, 2016. 6(4): p. 387-401.
- [5] Tsai, S.-C., Using google translate in EFL drafts: a preliminary investigation. *Computer Assisted Language Learning*, 2019. 32(5-6): p. 510-526.
- [6] Jolley, J.R. and L. Maimone, Free online machine translation: Use and perceptions by Spanish students and instructors. *Learn languages, explore cultures, transform lives*, 2015: p. 181-200.
- [7] Selcuk, H., J. Jones, and H. Vonkova, The use of Google Translate as an ICT tool in web-based collaborative writing: Self-reported accounts of EFL learners. *Proceedings of IAC*, 2019: p. 74-80.
- [8] Tsai, S.-C., Chinese students' perceptions of using Google Translate as a translingual CALL tool in EFL writing. *Computer assisted language learning*, 2022. 35(5-6): p. 1250-1272.
- [9] O'Brien, S., M. Simard, and M.-J. Goulet, Machine translation and self-post-editing for academic writing support: Quality explorations. *Translation quality assessment: From principles to practice*, 2018: p. 237-262.
- [10] Venkatesh, V. and F.D. Davis, A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, 2000. 46(2): p. 186-204.
- [11] Yang, Z. and H.R. Mustafa, On Postediting of machine translation and workflow for undergraduate translation program in China. *Human Behavior and Emerging Technologies*, 2022. 2022: p. 1-11.
- [12] Morse, J.M. and P.-A. Field, *Nursing research: The application of qualitative approaches*. 1995: Nelson Thornes.
- [13] Miles, M.B. and A.M. Huberman, *Qualitative data analysis: An expanded sourcebook*. 1994: sage.
- [14] Creswell, J.W. and J.D. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches*. 2017: Sage publications.
- [15] Groves, M. and K. Mundt, Friend or foe? Google Translate in language for academic purposes. *English for Specific Purposes*, 2015. 37: p. 112-121.
- [16] Groves, M. and K. Mundt, A ghostwriter in the machine? Attitudes of academic staff towards machine translation use in internationalised Higher Education. *Journal of English for Academic Purposes*, 2021. 50: p. 100957.
- [17] Clifford, J., L. Merschel, and D. Reisinger, Meeting the challenges of machine translation. *The Language Educator*, 2013. 8(5): p. 44-45.