Machine Translation for Editing Compositions in a Chinese Language Class: Task Design and Student Beliefs
(应用机器翻译编辑中文作文：
任务设计与学生信念)

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Abstract: The frequent use of machine translation (MT) in the daily lives of the digital generation presents challenges and opportunities for language teaching and learning. Rather than excluding MT from the classroom, educators have begun exploring various ways to integrate it into classroom instruction. While most studies ask students to post-edit a translation provided by MT, this study employed a different task design: having students post-edit self-written Chinese compositions with the help of MT. The study was conducted in a fourth-year Chinese language class at a public university. The beliefs of 12 students in the value of MT were investigated based on responses to a questionnaire and open-ended questions. The study found that students hold a positive attitude towards using MT in writing assignments. The students noted that MT helped them learn vocabulary and grammar, improve the quality of writing, boost confidence in Chinese use, and acquire autonomous learning skills. A comparison between this study and previous studies also revealed the critical role of task design in successfully implementing MT in classroom instruction.

摘要：机器翻译在日常生活中的广泛应用为语言教学带来了机遇与挑战。越来越多的研究在探索如何在课堂教学中应用，而不是排斥机器翻译。许多先行研究关注于学生如何通过机器翻译来编辑由机器翻译提供的写作版本，本研究采取了与其不同的任务设计。 12 位来自某公立大学四年级的中文学生使用机器翻译来编辑自己的中文作文。通过分析学生对问卷和开放式问题的回答，本研究发现学生对使用机器翻译编辑作文抱有积极的态度。 他们认为使用机器翻译可以帮助学习词汇和语法、提高作文质量、增强信心以及掌握自主学习策略。另外，本研究与先行研究比较结果也证明了任务设计在课程教学中应用机器翻译的重要性。

Keywords: Machine translation, L2 writing, Chinese language teaching, student beliefs, task design

关键词: 机器翻译、L2 写作、中文教学、学生信念、任务设计

1. Introduction

Nowadays, the digital generation frequently uses machine translation (MT) in their daily lives. The use of MT for language teaching and learning, however, has been controversial. The accuracy of MT products, academic dishonesty, and a possible impediment to language learning are the primary concerns identified in the literature (Benda, 2013; Case, 2015; Clifford, Merschel, & Munné, 2013; Correa, 2011, 2014; Ducar & Schocket, 2018; Garcia & Pena, 2011; Groves & Mundt, 2015; Jiménez-Crespo, 2017; Luton, 2003; Mundt & Groves, 2016; Stapleton & Kin, 2019). However, the quality of MT has improved significantly because of advances in artificial intelligence. For example, Google Translate (GT) launched a new GNMT (Google Neural Machine Translation) system in 2016. GNMT can learn from millions of examples and provide a significantly better quality of translation by encoding the semantics of sentences rather than merely memorizing phrase-to-phrase translation (Schuster, Johnson, & Thorat, 2016). Rapid improvement in MT resulted in the correction of many errors discussed in previous studies (Ducar & Schocket, 2018; Tian, 2018). Meanwhile, several studies reported that students still consult MT for assignments even though their instructors prohibit its use. (Correa 2011; Clifford et al., 2013; Tian, 2018). Also, pedagogical tools can include MT. Instead of being detrimental, MT use contributes to language learning from cognitive, linguistic, and affective perspectives (Correa, 2014; Enkin & Mejías-Bikandi, 2016; Garcia & Pena, 2011; Grove & Mundt, 2015; Jiménez-Crespo, 2017; Lee, 2019; Tsai, 2019; White & Heidrich, 2013).

Considering the widespread availability, easy accessibility, and the potential benefits of MT, educators no longer can merely defy the possibilities of MT in language learning and teaching by emphasizing its negative aspects. Instead, it is imperative to explore best practices to help students effectively and responsibly use MT to facilitate language learning (Benda, 2013; Correa, 2014; Ducar & Schocket, 2018; Groves & Mundt, 2015; Mundt & Groves, 2016; Jiménez-Crespo, 2017). However, only limited empirical research on this issue has been conducted (Lee, 2019; Tsai, 2019; White & Heidrich, 2013; Zhang, 2019).

Thus, using a task design that differs from previous studies, this preliminary study aims to investigate student beliefs regarding the use of MT as a language learning tool. Specifically, students first have an opportunity for discussion and instruction about using MT. Then students write compositions in their target languages (L2) without the help of MT, followed by corrections of their L2 writing using MT translation for comparison.

The reasons behind such a task design are twofold. First, Ducar and Schocket (2018) emphasized the importance of directly teaching learners how to use appropriate technology responsibly. However, previous studies failed to find instructions or discussions about using MT. Students in this study had an opportunity to receive guidance and discuss the use of MT with others before undertaking writing assignments; doing so seems to be an

indispensable component of the task design for MT as a tool for language teaching and learning. Second, MT is often treated as a "bad model" because, as Lee (2019) pointed out, most studies focused on students' post-editing of the MT translation. In this study, students post-edited their self-written compositions by using MT, a "peer" with intermediate level proficiency, as Correa (2014) and Ducar and Schocket (2018) suggested.

Meanwhile, this study also attempts to explore student beliefs about using MT with this task design. Students' experiences and expectations are essential factors in evaluating the effectiveness of language learning technology because the evaluation must "begin with the question 'effective for whom'" (Chun, Kern, & Smith, 2016, p.75).

2. Literature Review

While the significant potential of MT as a useful pedagogical tool of L2 writing has been described in previous studies, only limited empirical research exists. This section provides a brief overview of the task designs and the students' perceptions of the use of MT in such empirical research.

2.1 Task Design and the Use of MT

The application of MT for language learning and teaching has mainly focused on a process in which students write in their native languages (L1) first and then post-edit the translation provided by MT (Garcia & Pena 2011; Niño, 2009; White & Heidrich, 2013). For example, White and Heidrich (2013) asked students to write in their native language, English, to describe a picture prompt. The students were not told that the text would be used in a translation task later. Upon completion, they were instructed to use Google Translate (GT) to translate their L1 writing into German and edit that translation.

Using such a procedure, MT was treated as full of lexico-grammatical errors needing to be corrected, although students can benefit from the correction process (Garcia & Pena 2011; Lee, 2019; Niño, 2009). For example, Enkin & Mejías-Bikandi (2016) argued that MT can "help raise metalinguistic awareness of second language grammar and of the differences between grammatical constructions in the first and second language, which can help with the language learning process" (p.128). Besides, students can see the pitfalls of using MT. Ducar and Schocket (2018) pointed out that students can become aware of the fact that GT "does not take into consideration the roles that context, connotation, denotation, register, and culture play in language production and comprehension " (p.785).

Recent empirical MT studies modified such procedures by adding a step providing students with lexico-grammatical references in the target language to facilitate language learning (Lee, 2019). For example, Lee (2019) and Tsai (2019) investigated the effectiveness of such task design in the EFL context. Thirty-four Korean native-speaker students in a Korean university whose English proficiency was between intermediate and high-intermediate participated in Lee's (2019) study. Tsai (2019) explored the use of MT with Chinese EFL students from a university in Taiwan at three different levels (50

sophomores, 49 juniors, and 23 seniors) whose majors were English. Their English proficiency was between B1 and B2 of CEFR (Common European Framework of Reference for Languages). The students first wrote in their native language, Korean and Chinese, respectively (Step 1). Before using MT for editing, they translated those writings into English without the help of MT (Step 2). Then, students used MT to translate their L1 texts in Step 1 into English (Step 3). Comparing the MT versions and students' self-written versions, Tsai (2019) found that the quality of MT versions was significantly higher than those of students in terms of more words, fewer mistakes in spelling and grammar, and few errors per word. The MT versions also contained more advanced vocabulary. The results in Lee (2019) also indicated that the final versions had few lexico-grammatical errors and were of better quality. Although the students were satisfied using MT in their English writing and the quality of their papers improved significantly, one might be skeptical about whether and how such task design in which students used L1 to initiate the whole writing process facilitates language learning.

2.2 Student Beliefs About Using MT

Student beliefs about using MT have been examined utilizing questionnaires and interviews (Lee, 2019; Niño, 2009; Tsai, 2019; White & Heidrich, 2013). The studies showed that most students valued MT as a useful and supportive tool for writing assignments. In Niño's (2009) study, 75% of students reported MT as a helpful language tool, and 69% of them noted that they would use MT in the future. Furthermore, 75% of the students responded that practicing MT post-editing into the foreign language boosted their confidence in foreign language writing. Tsai (2019) reported that students were satisfied with their GT texts, and they believed that GT helped them complete the assigned writing task. Also, the studies showed that students thought that MT helps them find appropriate vocabulary. Tsai (2019) reported that most students thought the great benefit of GT was vocabulary use. Lee (2019) also found that 88% of students believed that MT was particularly helpful in helping them find more accurate words or authentic expressions for a given context. Besides, the studies also reported that students thought they became aware of potential grammatical errors in their writings and saw the limitations of MT by using MT (Lee, 2019; Niño, 2009; Tsai, 2019).

On the other hand, White and Heidrich's (2013) study reported students' unencouraging belief in MT based on pre-task, post-task questionnaires, and interviews. Students were confused about how to use MT in a sophisticated way. The questionnaire results showed that students agreed most with the statement, "I am wondering whether I used this resource sophisticatedly, i.e., whether it made my writing better or worse." Also, many students felt like using MT was cheating, even though they were told to use MT for the task. The lack of training about using MT may contribute to such unpromising results. Niño (2019) noted that not introducing MT properly to students is one example of bad practice when using MT. She argued that it is fundamental for language educators and students to foster awareness of the potential and limitations of MT in order to use MT in language learning.

Collectively, these studies outline a critical role for task design to play in using MT and influencing student perceptions of it. Thus, this study employs a different task design

with an emphasis on pre-task instructions and students editing self-written L2 writings with the help of MT. Based on such a task design, the study intends to address the following research questions:

1. Whether students perceive MT as a useful tool for L2 writing assignments?
2. What beliefs do students have regarding the use of MT under this task design?

3. Data and Methodology

3.1 Participants

Twelve students of a fourth-year Chinese class from a public university in the western US participated in this study. All were English native speakers with various Chinese learning experiences. Nine students started to learn Chinese after university matriculation, two students studied in high school, and one student was a heritage learner who spoke Cantonese at home. Three students had one semester or eight weeks of summer study abroad experience in China. Because of the variety of backgrounds, participants' Chinese proficiency varied from intermediate-low to advanced-low based on their homework and classroom performance evaluated by the researcher, who was the course instructor.

Table 1 Participants

Students	Learner type*	Study abroad	Proficiency
S1	High school	No	Intermediate-Mid
S2	University	Yes	Intermediate-Low
S3	University	No	Intermediate-Low
S4	Heritage	No	Advanced-Low
S5	University	No	Intermediate-Low
S6	University	Yes	Intermediate-Mid
S7	University	No	Intermediate-Mid
S8	University	No	Intermediate-Low
S9	University	No	Intermediate-Low
S10	University	Yes	Intermediate-High
S11	University	No	Intermediate-Low
S12	High school	No	Intermediate-Mid

*Learner type is defined as when the students initially began studying L2 Chinese.

3.2 Task Description

The participants were required to write two compositions and submit reflection papers after the completion of each draft. The two composition assignments were response essays to readings in class. The first task was about the "Tiger Mother," and the second task was about the issue of US gun control. The first task took place in October and the second task was conducted in December. The steps for each task followed the same procedure, although Step 1 was only applied to Task One (see Table 2). Contact hours for the course were three 50-minutes classes per week. Students completed Draft One

Monday, and Draft Two and Reflection One on Wednesday. Draft Three and Reflection Two were submitted on the Monday of the following week.

In Step 1, MT, including Google Translate, Baidu Translate, and Sogou Translate, was introduced to students in the class. Following Ducar and Schocket's (2018) suggestions, the instructor and students discussed ethical issues, strengths, and pitfalls regarding the use of MT. The following points were particularly emphasized: the use of MT as one autonomous learning strategy; writing as a process, not just a product (Williams, 2006); the internet as a corpus to explore the use of vocabulary suggested by MT; and MT, particularly Baidu, as an online dictionary. Students were instructed to carefully make decisions on whether to adopt the alternatives provided by MT. In addition, students were told that their grades were only based on the final draft to train students to "understand and practice writing as a growth and revision process rather than a short-term product" (Ducar & Schocket, 2018, p.792).

Table 2 The procedure of tasks in the writing assignment

Step 1	Instructions and discussion about using MT
Step 2	In-class writing in Chinese without any help (Draft One)
Step 3	In-class post-editing with machine translation tools (Draft Two)
Step 4	Submit Draft One and Draft Two as well as Reflection One
Step 5	Out-of-class revision
Step 6	Submit Draft Three and Reflection Two

In Step 2, students completed the writing assignment (Draft One) on computers without the help of MT at a lab during the regular class meeting time. After that, in Step 3, students were advised to choose one or all machine translation tools to complete Draft Two through a "translate-compare-detect errors-consider alternatives-rewrite" process (Lee, 2019). The students first translated the self-written Draft One into English with MT and edited the English to make it accurate and appropriate. The next step was to use machine translation tools to translate the revised English version back into Chinese. Students compared their self-written Chinese versions with the machine-translated Chinese versions and detected any errors. They edited their self-written Chinese versions by accepting or rejecting certain parts of the machine-translated Chinese version. Upon completing Draft Two, they must highlight any parts adopted from the machine-translated version.

In Step 4, students submitted their self-written Draft One and revision Draft Two as well as Reflection One. In Reflection One, students answered several questions about the use of MT, such as "what and how did you use MT in revision?" and "what did you gain from the revision process?" The questions were adopted from Zhang (2019).

In Step 5, students revised their Draft Two based on the instructor's comments and submitted their final draft, Draft Three, as well as Reflection Two in Step 6. Although the questions in Reflection Two for Task One were the same as those for Reflection One, students were guided to reflect on the whole writing process involving self-writing, revision with the help of MT, and instructor's comments. Reflection Two for Task Two, the issue of US gun control, which serves as data for the present study, was specially designed to understand students beliefs about using MT for writing after practicing two

tasks. It consisted of a questionnaire and open-ended questions adapted from Niño (2009), White and Heidrich (2013), and Zhang (2019) (see Appendix).

The excerpts in Table 3 show the same paragraph from student S7's first task. She completed Draft One in class on a computer without the help of MT. After that, she used Baidu to translate her self-written text into English. She underlined the parts to which she made changes to be acceptable English. The revised English translation was then translated into Chinese by Baidu. She also highlighted the changes between her Draft One and the Baidu Chinese translation. Finally, she compared her self-written Draft One and the Baidu Chinese translation and decided what to revise to complete Draft Two. She underlined all the items adopted from Baidu as well. It is important to note that several errors, such as "小时" in Draft One, were not corrected in Draft Two. Also, student S7 did not carefully underline all the parts she adopted from Baidu. For example, she changed "是因为她们没有努力画" to "而是因为她们没有努力画" without highlighting the "而是" part in Draft Two. What students *actually* changed and what errors students *should* correct were not examined in this study.

Table 3 Excerpts of student S7's writing

Draft One	Sophia 也说她和 LuLu画一篇 card 给妈妈，但是蔡美儿觉得不够好，还给女儿。很多西方家长觉得太 extreme ，但是女儿知道其实不是因为她们画的 card 不够好，是因为她们没有努力画。蔡美儿培养她们的努力。
Revised Baidu English translation	Sophia also said that she and Lulu drew a card <u>to give to</u> her mother when they were young, but Chua felt it wasn't good enough <u>so</u> give it back to her daughters. Many Western parents think it's too extreme, but <u>her</u> daughters know it's not because they <u>didn't</u> draw good cards, it's because they <u>didn't</u> work hard. <u>Chua nurtured their work ethic.</u>
Baidu Chinese translation	索菲亚<u>还</u>说，她和露露<u>小时候画了一张卡片送给母亲</u>，但蔡美儿觉得不够好，<u>所以把卡片还给女儿</u>。很多西方父母认为这太<u>极端了</u>，但她的女儿们知道，这不是因为她们没有<u>画好牌</u>，而是因为她们没有努力<u>工作</u>。蔡美儿培养了他们的<u>职业道德</u>。
Draft Two	Sophia<u>还</u>说她和 LuLu 小时<u>画了一张卡片送给母亲</u>，但是蔡美儿觉得不够好，<u>所以把卡片还给女儿</u>。很多西方家长觉得太<u>极端</u>了，但是女儿知道，不是因为她们<u>没有画好牌</u>，而是因为她们没有努力画。蔡美儿培养她们的<u>职业道德</u>。

Worth noting is the difference in task design between this study and previous studies. First, the present study included formal instruction and discussion about using MT. Second, students wrote compositions in the target language without any help (Step 2) in this study. This step is different from Lee (2019), Tsai (2019), and White and Heidrich (2013), in which the participants wrote compositions in their native languages first (Step 1) before translating them into L2 with MT.

Comprehensible output in L2 is essential for language learning. According to Swain and Lapkin (1995), "in producing the target language, learners may encounter a problem

leading them to recognize what they do not know, or know only partially. In other words, the activity of producing the target language may prompt second language learners to consciously recognize some of their problems, it may bring to their attention something they need to discover about their L2" (p.373). Thus, students were asked to write their Draft One in L2, Chinese, rather than their native language, English.

Also, the use of MT was limited to revision but not for the initial product. Revision is critical in L2 writing because it is unrealistic to expect error-free first drafts (Polio, Fleck, & Leder, 1998). By modifying writing outputs, learners can "test hypotheses about the second language, experiment with new structures and forms, and expand and exploit their interlanguage resources in a creative way" (Pica, Holliday, Lewis, & Morgenthaler, 1989, p.64).

In addition, the reason students were asked to translate back and forth and compare their self-written texts and corresponding English texts is that such a method can facilitate learning by noticing (Schmidt, 1990, 2010) and seems to be the standard practice in the literature (Lee, 2019; Tsai, 2019).

3.3 Data and Analysis

The data examined for this study was Reflection Two of Task Two (the issue of US gun control). Edwards and Liu (2018) propose that students should have multiple opportunities to experiment with any new method of teaching. Thus, this study focused on students' last reflections after completing two tasks. In addition, the Final Reflection was specially designed differently from the other three Reflections to allow students to reflect on the use of MT over the entire semester. Thus, the other three Reflections were excluded from this examination.

The Final Reflection consists of a 5-point Likert scale questionnaire and five open-ended questions. The questionnaire investigates students' general perceptions regarding the use of MT in writing exercises. It is identical to the one used in White & Heidrich (2013), which consists of 13 items ranging from 1 "strongly disagree" to 5 "strongly agree." The majority of the five open-ended questions are from Niño (2009) and Zhang (2019), which provided students opportunities to elaborate on their opinions about using MT. Following the methods in Baralt (2012) and Duff (2012), common themes, such as vocabulary, grammar, quality, confidence, and learning strategies were identified through multiple steps of coding the responses to open-ended questions.

4. Results

All students used Baidu, Sogou, or both to edit their writings. No student chose GT. Generally, students showed significantly positive attitudes towards the use of MT. This section first reports the results of the questionnaire regarding the participants' general perceptions of using MT. Then the responses to the open-ended questions will be discussed.

4.1 Results of the Questionnaire

Table 4 shows the participants' responses to the question: "When you used the machine translation, how did it make you feel?" from the questionnaire. Students indicated their level of agreement or disagreement with each statement on a five-point scale, with one showing "strongly disagree," and five indicating "strongly agree." The rank of each statement in Table 4 is based on the means of participants' responses. The top of the table suggests which statements students most strongly agreed with while the bottom of the table shows participants' strong disagreement with the statement. It is worth noting that the questionnaire consists of both positive and negative statements.

In general, students showed an extremely positive attitude towards the use of MT. The means of the top eight items were four and above; four indicated agreement (Q7, Q1, Q4, Q8, Q5, Q9, Q13, Q11). Students believed that vocabulary was the most beneficial outcome of using MT because MT helped them find the words to articulate what they wanted to say as well as new and sophisticated ones (Q7, Q8). Moreover, students responded that they were able to deliver their best work with the help of MT (Q4, Q5). It is important to note that most students did not agree that the use of MT was cheating (Q3). Only two students responded with "agree" to the statement, "Q3: I feel like I might have cheated." In contrast, eight students responded with "disagree" and "strongly disagree" to the statement.

Table 4 Students' beliefs about the use of MT

	Questions	Mean	SD
Q7	I feel like it helps me use words that fit what I want to say.	4.58	0.67
Q1	I feel I am giving my best effort by using this resource.	4.33	0.49
Q4	I feel like it helps me deliver my best work for my own satisfaction.	4.33	0.65
Q8	I feel like it helps me use words that are new and sophisticated.	4.33	0.65
Q5	I feel like it helps me deliver my best work for getting a good grade.	4.25	0.45
Q9	I feel like it helps me organize what I want to say more clearly.	4.17	0.94
Q13	I feel like it helps my voice emerge more distinctly.	4.08	0.90
Q11	I feel like it helps me develop better content.	4.00	0.95
Q12	I feel like it helps improve my style.	3.92	0.90
Q6	I feel like it helps me use more complex grammatical structures.	3.67	1.50
Q10	I feel like it helps me spell more sophisticatedly.	3.67	1.07
Q2	I am wondering whether I used this resource sophisticatedly, i.e., whether it made my writing better or worse.	3.42	0.90
Q3	I feel like I might have cheated.	2.08	1.16

*Scale:1=strongly disagree; 2=disagree; 3=Neither agree nor disagree; 4=agree; 5=strongly agree

4.2 Responses to Open-ended Questions

Student responses to the open-ended questions revealed more detail about their beliefs on using MT during post-editing. As indicated in Table 4, students appeared to

agree that MT was beneficial for vocabulary (Q7, Q8). To elaborate on this point, first, MT seemed to be able to help students find the words to express what they wanted to say. Student S3 noted that "using translation software has helped me develop good phrases and find helpful vocabulary for what I want to say." Another student, S4, responded that "using machine translation helps me find new, and often more sophisticated, vocabulary that can elevate my writing if I use it correctly." Second, students used MT as a useful tool to "fill in the gaps," as student S6 explained, between what they know and the unknown. The student further said that MT was useful when "I know how to structure a sentence, and I know most of the words, but a key phrase may be missing." Another student, S5, responded that "sometimes, I am close to saying what I really want to say but am not quite there yet, and the translation process helps me find the right words to better express my thought." Third, MT seemed to be useful in identifying appropriate words for various situations. Student S1 mentioned that MT "helps me choose a more appropriate word because there are different characters that are more appropriate for different situations."

Grammar is another aspect of the perceived usefulness of MT. Student S1 responded that MT helped her put things in the correct order. The student further explained that "sometimes I know the components of the sentences, but I'm not sure grammatically how to structure it." Moreover, by translating self-written sentences and corresponding English back and forth, MT functioned as a proof-reader so that students could *notice* grammatical errors. Student S4 commented that "machine translation has helped me realize when my grammar is completely wrong, which is paralleled by the sentence not reflecting what I intended to write. When I modify what I want to say in English and re-translate it back into Chinese, then I can see what grammar structure should be used." Another student, S9, noted that "after writing out sentences, sometimes I would translate my Chinese into English to make sure I did not have any grammatical mistakes."

Also, students believed that MT helped them deliver papers of better quality. First, MT seemed to be able to help articulate students' thoughts. By translating the self-written Chinese paragraphs to English, student S12 used MT to confirm whether her ideas were delivered without confusion. The student noted that "I mostly use translators to get an idea of what my work would sound like if translated back into English. By reading what the translator says when I place my Chinese writing in it, I get an idea of what the passage sounds like." Second, students could easily and quickly detect and fix errors with the help of MT. Student S10 explained that "I can quickly find mistakes which help me write better papers. I quickly find my mistakes by taking passages that I have written in Chinese and translating them into English. If I read English, I can quickly discover if I made a mistake, or if what I wrote in Chinese didn't make much sense." Another student, S4, compared MT with Microsoft Word and explained:

> *"Machine translation is like a more complex version of the grammar check feature in Microsoft Word. When I'm typing something in Word, there's the blue lines that indicate if the grammar is wrong or the red squiggly line if the word is spelled incorrectly. By using machine translation, I can see where I used improper grammar if the sentence doesn't translate well into English and I can also see where I accidentally typed the wrong character*

because it translated into a word that I've never learned before in Chinese (e.g., 枪击案 accidentally became 强奸)."

In addition to the benefits of MT concerning vocabulary, grammar, and better writing quality, students also elaborated on other strengths unlisted in Table 4. First, MT functioned as a reminder of what students have learned. Student S7 explained that she was "being reminded of vocab and grammar." Student S11 added that MT "reminds me of a way to say it differently than I have already learned but maybe forgot how to use well." Second, students used MT to confirm the correctness of what they wrote. Student S11 said that MT "validates the way I was going to say something." Third, MT also acted as a thesaurus not only for words but also for grammar structures. Student S4 noted that "re-translating what I wanted to say in English back into Chinese will often show a more sophisticated version of what I wanted to write." Last, students praised the practice of using MT itself because it is an autonomous learning skill. Student S7 noted that MT "helped me practice using a translator in the right way. I probably will never be fluent in Chinese; I'll always need some help from a translator. Practicing using the translator to incorporate into my own writing was the most useful aspect."

Eleven students responded that MT made them feel more confident in their Chinese or in the quality of their submissions. First, MT provided them an opportunity to confirm what they know, and consequently, boosted their confidence. Student S12 noted that "surprisingly when using the translators, I noticed that I already knew a decent amount of what I wanted to say and usually typed well. This made me feel more confident because the translators were telling me that what I had written was quite similar to what I had planned to say. In this sense, using translators has affirmed that I already know a decent amount of Chinese, but can occasionally refer to it for extra help." Second, students felt more confident in submitted assignments because MT functioned as a checker to identify mistakes in their writings. Student S5 explained that MT identified many "silly" mistakes she made. Another student, S9, responded that thanks to MT, "I have become more aware of my common grammar mistakes in Chinese." Student S10 noted that "I feel much more confident about being about to write an essay that lacks mistakes. It gives me confidence because I can look at my sentences and see if they have mistakes, whereas before using machine translation, I would frequently have many mistakes." On the other hand, however, Student S3 responded that MT did not improve his confidence in Chinese because he believed that confidence is "built up through speaking the language."

It is of importance to note that one student, S6, carefully distinguished between confidence in Chinese writing and confidence in the quality of the submitted writing assignment. He explained that MT "does make me more confident in pieces I am turning in because I believe they are of good quality due to a mix of machine translation and my personal skill helps improve the quality." However, "it's just that I become less confident on my own if I depend on these tools."

Students also explained whether their opinions on MT changed after completing the two writing assignments. Half of the students, six out of twelve, responded that their opinions remained the same because they were already aware of the benefits and potential risks of MT before the current study. Some of them used MT for various purposes since

high school. They had been cautiously using MT, despite their concerns, without becoming overly dependent on MT. Student S6 noted MT's potential to undermine student motivation for L2 learning. He explained that MT "can benefit and improve students writing. However, it will also cause some students who aren't as passionate about learning a foreign language to rely on it for an easy grade." Another student, S8, responded that "I also find it is really easy to cheat yourself out of knowledge in the language if you rely on the translator too much."

The other half of the students reported positive changes in their opinions about using MT. They previously avoided using MT because of concerns about academic dishonesty, inaccuracy in MT output, and instructions from former teachers. Two students, S1 and S12, mentioned they did not trust MT because their high school teachers completely forbade the use of MT for language learning because of inaccurate outputs and possible violations of academic integrity. Now, student S12 believed that "these tools provide extra support and assistance when learning a language." Student S10 mentioned that it felt like cheating to use MT at first, and then "it feels like a powerful tool." He further explained that "I think that my opinion changed because I learned how to use machine translation to its full advantage while avoiding its pitfalls."

Further, all students expressed willingness to continue using MT in the future for various purposes, from checking words and grammar to communication with family members. Six students mentioned that they would use MT to check their writing assignments; as student S5 wrote, "I will use it in the future to check over my writing once I have the first draft." Interestingly, student S3 decided to use MT to read documents in the future. Probably, the student had a positive experience with using WeChat online translation for reading in class during the in-class MT instruction.

5. Discussion

As mentioned in the literature review, students value MT as a useful tool for language learning (Lee, 2019; Niño, 2009; Tsai, 2019). The beliefs expressed by the students in this study were in line with those studies. The students in this study believed that MT was beneficial for their writing. Vocabulary improvement appeared to be the most favorable outcome of MT for students in this study. MT also helped them detect grammatical errors in their papers. Students were confident that MT helped elevate the quality of their submissions. All the students plan to continue using MT in the future.

One interesting finding was that students in this study distinguished between their confidence in products submitted to instructors and their confidence in Chinese proficiency in general. While student belief in MT's usefulness in improving the quality of their submissions have been identified in this and previous studies, students in this study revealed that MT also helped build up their confidence in Chinese. A possible explanation for this might be due to the task design. Contrary to previous studies in which students write in their L1 first, students in this study wrote in L2 *first* and then used MT to translate their writings to L1. The procedure, including the sequence of L2 writing, translation into L1, comparison, detecting errors, considering alternatives, and rewriting, provided them an

opportunity to validate what they knew regarding vocabulary and grammar, and what they wrote was correct. Consequently, their confidence in the Chinese language, in general, was established through such a process.

Another interesting finding was that students not only believed they would continue to use MT in the future but also thought they learned how to use it effectively and responsibly. Task design might also be related to such beliefs. Different from previous studies in which students' views were examined only after one task, here, students' opinions were investigated after training and two tasks. Edwards and Liu (2018) suggested the importance of multiple practice to fully take advantage of peer-response activity. Students in this study had two opportunities to practice MT to edit their writings, which might contribute to their overall positive attitude toward using MT.

The significant difference between the results of the questionnaire in this study and the identical one in White and Heidrich (2013) is surprising. First, the overall rate of approval of MT in the current study was higher than those in White and Heidrich (2013). As mentioned above, the means of the eight items in this study were four and above, while all items in White and Heidrich (2013) were under four. Second, the two statements with the highest means in White and Heidrich (2013) were "Q2: I am wondering whether I used this resource sophisticatedly, i.e., whether it made my writing better or worse" (Mean=3.59, SD=0.71) and "Q3: I feel like I might have cheated" (Mean=3.59, SD=1.18). In contrast, surprisingly, these two items were the two lowest in this study (Q2: Mean=3.42, SD=0.90; Q3 Mean=2.08, SD=1.16). Third, in White and Heidrich (2013), students showed the lowest agreement to the statement, "Q1: I feel I am giving my best effort by using this resource (Mean=2.06, SD=0.97). In the current study, this item ranked second-highest (Mean=4.33, SD=0.49).

Overall, the students in this study showed significantly more positive attitudes toward the use of MT compared with White and Heidrich (2013). They believed they were aware of a competent and responsible way to use MT while the students in White and Heidrich (2013) seemed very confused about how to use MT. Further, students in White and Heidrich (2013) considered the use of MT as a violation of academic integrity, while such was not the case in this study. The improved accuracy of MT might contribute to the different students' experiences in these two studies. Since Google Neural Machine Translation was launched in 2016, the quality of MT has significantly increased, which might ultimately positively affect students' user-experience. Another possible explanation for these discrepancies may be the lack of instruction on the use of MT and multiple opportunities to use MT. In White and Heidrich (2013), students of German were asked to describe a picture prompt in L1 (English) without knowing they were going to use Google Translate to translate their writings into German. Their opinions were asked immediately after the task. Students in Niño (2009) felt MT was useful was because "they reflect the views of a group of advanced students of Spanish who have received previous training in translation and who have been introduced of MT and in particular to MT post-editing" (p.249). Therefore, the task design in this study, including pre-task instruction and discussion as well as two opportunities to practice, might be one of the reasons for students positive attitudes towards the use of MT in writing assignments.

These findings, while preliminary, suggest the importance of task design in the practice of using MT in language teaching and learning. First, because Edwards and Liu (2018) pointed out the importance of instructions in order to fully take advantage of the benefits of peer response, it seems imperative to integrate instructions on the use of MT into writing class practice. During the instruction sessions, students should not only be informed about the strengths and pitfalls of MT but should also be made aware of how to use MT effectively and responsibly. It is also important to remind students of the error tolerance feature of MT, which can translate the original text with errors into correct outputs (Massardo et al., 2016). Translating the original text and corresponding text provided by MT back and forth is essential for the revision process so that students can avoid overlooking errors and recognize them in the original text. Second, students should learn how to use the internet as a corpus to examine critically and strategically alternate expressions suggested by MT. As student S1 noted, "when it suggests words I am not familiar with, I don't know what I want to do with them, or how to study them, so I build vocabulary." Third, students might need multiple opportunities to experience the excitement and frustrations through the complex revision process. Long-time training and practice of MT can help students eventually discern their autonomous learning strategies.

6. Conclusion

The present study aimed to examine student beliefs on using MT in post-editing self-written L2 Chinese writing assignments. This study showed students expressing more positive attitudes towards using MT when task design included pre-task instructions and discussions about using MT as well as multiple tasks. Students believed that MT helped them find new and appropriate vocabulary and grammar as well as expressions, improve the quality of writing, and boost their confidence in Chinese. Also, students felt that MT helped remind them of what they learned earlier and validate what they wrote. MT also functioned as a thesaurus for learning alternative expressions. Finally, students thought they had acquired an effective and responsible way to use MT in the future.

However, the small sample size of this study makes these findings less generalizable. Also, the results were solely based on students self-reporting. Other methods, such as interviews and think-aloud, might bring about different insights. Since the study was limited to student beliefs about using MT, whether their beliefs matched their behavior during the post-editing process remains unclear. Also, it is essential to test more profound and permanent learning with the use of MT in the future.

Despite its limitations, the study certainly added to our understanding of using MT for language learning and teaching. First, it confirmed that students believed MT could play a critical role in language learning. Second, it also suggested that students did not patently accept but employed various strategies to examine what MT provides. For this reason, instructors must reconsider their position about using MT in the classroom. Third, the findings also revealed the critical role of pre-task instruction regarding the use of MT. Altogether, the study expanded our understanding of the practice of MT for classroom instruction. Chun et al. (2016) pointed out that "the use of technology should not be seen as a panacea or a goal in and of itself, but rather as one means to support specific learning

goals" (p.77). Given the prevalence of MT in the digital generation's daily life and the unlikelihood that students will avoid taking advantage of MT, educators must carefully design a way of including MT to support language learning so that ultimately our students become "career, life, and world-ready" (ACTFL, 2017). The insights gained from this study may be of assistance for educators to adopt MT as a powerful pedagogical tool for language teaching and learning.

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Appendix

Final Reflection

1. When you used the machine translation, how did it make you feel? Please indicate your dis/agreement with the following statements:
   Strongly Agree=5
   Agree=4
   Neither Agree nor Disagree=3
   Disagree=2
   Strongly Disagree=1

   Q1: I feel I am giving my best effort by using this resource
   Q2: I am wondering whether I used this resource sophisticatedly, i.e., whether it made my writing better or worse.
   Q3: I feel like I might have cheated.
   Q4: I feel like it helps me deliver my best work for my own satisfaction.
   Q5: I feel like it helps me deliver my best work for getting a good grade.
   Q6: I feel like it helps me use more complex grammatical structures.
   Q7: I feel like it helps me use words that fit what I want to say.
   Q8: I feel like it helps me use words that are new and sophisticated.
   Q9: I feel like it helps me organize what I want to say more clearly.
   Q10: I feel like it helps me spell more sophisticatedly.
   Q11: I feel like it helps me develop better content.
   Q12: I feel like it helps improve my style.
   Q13: I feel like it helps my voice emerge more distinctly.

2. Do you think Machine Translation has helped you to improve your writing in Chinese? Why? In what sense?

3. Has Machine Translation given you more confidence in your foreign language written production? In which sense?

4. Are you going to use Machine Translation in the future? For what purpose?

5. What was your opinion on Machine Translation? What is your current opinion? Are they the same? Why?

6. What are your suggestions for future writing classes?