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The effect of editing techniques on machine translation-informed academic foreign language writing

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Abstract

Although the field of machine translation has witnessed huge improvements in recent years, its potentials have not been fully exploited in other interdisciplinary areas such as foreign language teaching. The aim of this paper, therefore, is to report an experiment in which this technology was employed to teach a foreign language to a group of students. This mixed-method study explores the effect of teaching editing techniques in machine translation to a group of Persian EFL university students in an academic writing course. Twenty students took part in a 4-day workshop in which one session was devoted to teaching editing techniques and three remaining sessions to the use of editing techniques, namely, correcting mistakes, removing ambiguities, simplifying structures and combining structures. Each session consisted of a pre-test, a training and a post-test. In addition, in each session, one key writing point, namely, determiners, paraphrasing and collocations **were discussed. A questionnaire for candidates' dem**ographic information and another for learning experiences were administered. The results indicated a statistically significant improvement in the overall gain score. Further analysis showed a significant improvement in the use of determiners in contrast to paraphrasing and collocations. Lack of improvement in data driven learning in paraphrasing and collocation seemed to stem from weakness in vocabulary and grammatical knowledge in both the mother tongue and the target language. Analysis of questionnaire data revealed that the instruction proved to be beneficial since it could be easily implemented in correction and confirmation. On the whole, it can be concluded that providing the correct type of guidance and feedback on

how to use machine translation will indeed have a profound effect on foreign language writing skill.

Keywords

Editing; machine translation; data driven learning; writing

1. Introduction

Online tools such as search engines, dictionaries and encyclopedias have greatly affected learning in general and language learning in particular. In foreign language writing classes, students are engaged with these online tools and receive online feedback from peers and instructors (Kern, 2006; Egbert, 2005). Students write in online collaborative environments and teachers check student writings and provide immediate corrective feedback. In addition, other online resources such as dictionaries and search engines have been implemented by the students since they are easy to use and reflect real life language usage (Shei, 2008; Kilgarriff & Grefenstette, 2003). Corpora such as the British National Corpus (BNC Consortium, 2007) and the Corpus of Contemporary American English (Davies, 2008) have also been integrated into academic writing classes.

These digital online resources have been successfully integrated into foreign language writing classes making data driven learning (DDL) a reality. The potential benefit of DDL has been described by Boulton (2010) as encouraging consciousness-raising and noticing, leading to better language learning skills and greater learner autonomy in the long run. However, since DDL can be both cost-ineffective and intensive, some concerns have been expressed. Learners, for example, have to spend lots of time and effort to identify correct linguistic form while employing DDL. In addition, many learners may not have access to digital devices due to various reasons (Boulton, 2010).

Many foreign language writing classes in developing countries are still conducted in traditional form. The teachers are the suppliers of correct linguistic forms and their working load is daunting. In this case, they have to provide general training and feedback ignoring individual differences and needs in the writing process. In addition, these analog teachers deprive their students of the enormous digital opportunities available to them. If these online tools are correctly incorporated into writing classes, in addition to reducing **the teachers' workload, they will actively engage students with their writing assignments,** leading to greater self-confidence in writing (Milton, 2006; Chapelle, 2003). Therefore, at this stage we could ask ourselves what digital technologies can be incorporated into our writing classes and how?

In order to identify such technologies, the present study has been devoted to the implementation of teaching editing the input for machine translation (ETMT) which to the best of the res**earchers' knowledge has not been used in this context. We think this** inclusion will lead to inductive learning in foreign language writing classes (Geluso, 2013; Acar, Geluso & Shiki, 2010, Yang, 2018). In this study, we have focused on the effect of teaching editing techniques in machine translation in an Iranian EFL academic writing context. Machine translation was specifically employed to improve the use of determiners, paraphrasing and collocations among our language learners.

2. Literature Review

Machine Translation (MT) has not found its way into foreign language classes as it should have. Bueno (1992) compares MT systems with handheld calculators and claims MT systems have not been fully integrated into language classes. If they were, we should need to think about how to use them and how to train teachers to use them as pedagogical devices. The majority of teachers forbid students from using such tools. However, it seems appropriate to teach students how to use these systems to improve their language learning.

So it seems to be appropriate to suggest an optimistic view regarding this technology in the classroom. Anderson (1995) describes a set of tools converting translation systems into powerful tools for language classes. Despite some studies into the use of MT in language teaching, (Garcia and Pena, 2011; Nino, 2008; Somers, Gaspari, Nino, 2006; Shei, 2002; Lewis, 1997; Anderson, 1995; Richmond, 1994), the findings are not conclusive and to some extent contradictory. For instance, Richmond (1994) focused on **grammatical and linguistic drills with MT tools to increase students' grammatical** awareness.

Lewis (1997) asserted that MT tools could be useful in language classes and both teachers and students should have access to them. Shei (2002) investigated the implementation of MT in learning a second language and teaching translation. He asserted that pre-editing was an effective technique that could enhance language teaching pedagogy.

O'Neil (2012) also explored the effect of MT on L2 composition. He concluded that the quality of texts produced by students who used MT was superior to those who made no use of MT. Garcia and Pena (2011) conducted research on the use of MT and found that MT could be more beneficial to elementary learners than to intermediate and advanced ones.

There are also studies claiming that MT could be detrimental to language teaching. Somers, Gaspari and Nino (2006), for example, admit that MT cannot be ignored due to its widespread use; however, they claim that assessment of student homework for language teachers is highly difficult, and students may project a wrong image of their true competence using MT tools.

With the advance of online technologies, DDL has been accepted as a useful way to learn and teach foreign languages (Reppen, 2010; Granger, Hung & Petch-Tyson, 2002; Crosthwaite, 2017). The term DDL, as coined by Johns (1991), refers to a kind of language learning in which the learner is exposed to various examples in the target language, and tries to figure out what the correct form in the target language would be (Flowerdew, 2015).

In DDL, the roles of both students and teachers are different from the traditional classroom settings. In this scenario, teachers are facilitators of learning, not the authority or expert, and students are guided through problem solving activities to raise their linguistic awareness and gain independence. So, when learners are exposed to numerous examples of a given linguistic topic, they will improve their self-editing skills and become autonomous foreign language writers (Todd, 2001; Reppen, 2010; Liu & Jiang, 2009).

Some arguments have been leveled against DDL. For instance, it may not be suitable for all types of language learners. Flowerdew (2015) maintained that some learners may not benefit from this type of learning due to their previous learning background, learning styles, etc. For instance, studies have revealed that advanced and intermediate students seem to benefit more than elementary and beginner ones. Based on this finding, Liu and Jiang excluded lower level students from their study. It is interesting to note that few studies have used DLL with low-level students (Yoon & Jo, 2014; Chujo, Oghigian & Akasegawa, 2015). Likewise, some learning goals and learning styles have been considered to be detrimental to DDL (Yoon & Hirvela, 2004; Yoon, 2016). The question then is, if it has been proven that DDL is not beneficial for all language learners, would the use of ETMT help to open it up to a wider population of learners?

To address such a gap in the literature, the present study addresses the following research questions using its mixed method research:

1. What is the effect of teaching ETMT to Iranian foreign language writers in using determiners, paraphrasing and collocations?
2. Compared to online bilingual dictionaries, how much use did the foreign language writers make use of ETMT for determiners, paraphrasing and collocations?
3. How did the language learners use ETMT in their draft writing?
4. What were the language lear**ners' attitudes and perceptions toward**s ETMT?

3. Method

3.1. Participants and Settings

The study was conducted in an intermediate academic writing course, Grammar and Writing I, in a university in Tehran over a five-week summer semester. The students met for three hours three times per week in a computer lab. The students were 20 Iranian foreign language writers who were enrolled in the course. They signed the consent form and participated in the study voluntarily.

Table 1. lists the demographic profile of the 20 students (15 males, 5 female) from a pre-treatment questionnaire. **The students' age range was 20 to 26, with the majority being** in their final year at the university. Their self-rated English score on the four language skills using a 5-point Likert scale indicated that they considered themselves poor in all language skills. Though the course was aimed at intermediate students, the proficiency test developed by TOEFL showed that the class included intermediate level students. They had no experience of living or studying in an English speaking country. In addition, they were familiar with Google Translate but not familiar with pre- and post-editing techniques.

Table 1

Demographic profile of participants in the study (N=20)

Characteristic	Mean	SD	Range
Age	22.68	1.54	19-26
TOEFL	580	1.00	310-677
Writing	2.77	1.01	1-5
Reading	3.21	0.87	
Speaking	1.88	0.91	
Listening	2.16	0.88	

Among various pre- and post-editing techniques in Machine Translation, we selected the most useful, namely, correcting mistakes, removing ambiguities, simplifying structures and combining structures. Based on the literature review, we expected the application of ETMT to be beneficial to these writers in their implementation of determiners, paraphrasing and collocations (Yoon, 2016; Shei, 2008; Park, 2010; Acar, Geluso and Shiki, 2011;).

3.2. Procedure

On day one, participants' background information was collected using a pre-treatment questionnaire. An overview session on using Google Translate and editing techniques **were offered to increase students' awareness of how to use these techniques to improve** their writings. They learned how to manipulate their input into the MT and how to edit the output generated by the MT. Subsequent days were arranged in this way: session 1 for determiners, session 2 for paraphrasing and session 3 for collocations.

For each writing component, 30 minutes of training was offered with a pre-test conducted two days before and a post-test administered immediately after each session. In fact, Pre-tests 1 and 2 and post-tests 1 and 2 were divided into two five-item parts: Part A (error diagnosis and correction) and Part B (Persian to English translation). Pre-test 3 and post-test 3 contained five paraphrasing items. All the sentences and examples used were common mistakes made by Persian students. At the end, a post-treatment questionnaire was administered **to obtain the students' perceptions and experiences regarding** the ETMT workshop. The students were asked to complete all the work online using Google Docs.

3.3. Data Analysis

The data from this study was analyzed based on the performance on the tests and the responses to the questionnaires. As for the test data, the responses to pre- and post-tests 1 and 2 were labelled as 0 for incorrect answers and 1 for correct ones. Based on this coding, descriptive statistics as well as effect sizes were calculated. For pretest and post-test 3, a coding sheet was implemented to classify and quantify paraphrased sentences.

Three categories were adopted for the evaluation, i.e., 0 for inappropriate vocabulary and grammar and 1 for appropriate vocabulary and grammar; 0 for different meaning in the paraphrased form and 1 for almost the same meaning in the paraphrased form and 2 for exact meaning in the paraphrased form; and finally, for the type of paraphrase employed, 1 for different grammatical structure, 2 for different vocabulary form and 3 for both.

As for the pre- and post-tests, the effect size of learning gains was calculated based on the benchmarks for foreign language writing using within-groups design (Plonsky and Oswald, 2014). The test data were coded and the inter-coder reliability was calculated using the Pearson correlation coefficient and reported as 0.89

The remaining data were coded and analyzed using the following procedure: First, the **students' online bilingual dictionary pre**-test and self-reported use of ETMT were analyzed to see how much they relied on ETMT. Second, the underlined expressions employed in the second drafts were classified into four types of changes compared to those they had used in their first drafts: new information, revision, correction and confirmation. These types of changes showed us how students used ETMT to confirm their original expressions, change wrong vocabulary and grammatical items, revise the expressions completely and add further information using new words and expressions. Frequency counts for these four types were also calculated for each student.

At the end, student responses to the nine questions in the post-treatment questionnaire were split into three categories: computer knowledge and use (Questions 1-2), training in ETMT (Questions 3-6) and the use of ETMT (Questions 7-9). For the last question, the students were also asked to write about their experience in the course in English.

4. Results

Our data consisted of responses to the post-test questionnaire as well as test scores. Table 2 depicts descriptive statistics for both pre- and post-tests conducted in order to measure learning gain in the three training sessions. On average, in all three sessions, the post-test score was higher than the pre-test score. In particular, the use of determiners greatly improved ($p < 0.01$) with the medium effect ($d = 1.14$). However, the use of paraphrasing and collocations were less significant. The total gain score was 3.88, being statistically significant ($t = 3.85$, $p < 0.01$, $d = 0.88$).

Table 2

Descriptive statistics for pre-tests and post-tests

	pre-test		post-test					
Session	Mean	SD	Mean	SD	t	p	d	95% of CI
1	4.16	1.81	6.55	2.20	3.71	0.01	1.14	0.43-1.84
2	6.62	1.87	7.12	7.13	1.13	0.27	0.28	-0-36-0.94
3	11.05	3.18	12.16	12.16	1.16	0.08	0.44	-0.22-1.08
Total	21.82	4.98	25.71	4.03	3.83	0.00	0.85	0.16-1.52

Figure 1 shows the percentage of using ETMT while completing the three post-tests for determiner, paraphrasing and collocations. Post-test 1 and 2 both included parts A and B (for error correction and Persian to English translation), while post-test 3 included only one part. Overall, the students reported that they used ETMT more than the online bilingual dictionary (72% versus 28%). They relied more on ETMT than the online dictionary to correct their erroneous expressions in part A of pre-tests 1 and 2. For post-test 3, they used ETMT more than the online dictionary but the difference was the minimum among the three post-tests (58.7% versus 42.3%).

Figure 1

he percentage of ETMT and online bilingual dictionary use across post-tests
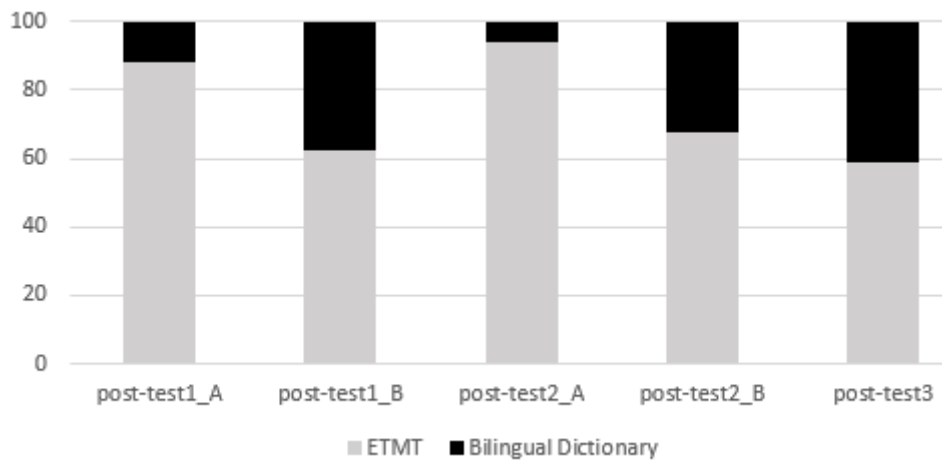

Table 3 presents the descriptive statistics for students' answers to nine questions on the post-**test questionnaire. Overall, the data revealed that the students' computer skill**s and use were to some extent fair (M=3.84, SD = 0.66), and the ETMT training was effective (M=4.44, SD =0.64). As a result, they mentioned that they could and would use ETMT for their English writings (M=4.51, SD =0.65).

Table 3

Descriptive statistics for post-test questionnaire

Question	Mean	SD
Computer knowledge and use		
Before this course, I used computers a lot.	4.21	0.66
I have good computer knowledge and skill	3.43	0.71
Total	3.82	0.66
ETMT		
It improved my writing in general	4.62	0.51
It improved my correction skill	4.66	0.50
It helped me make sure my expressions were correct	4.43	0.52
There was enough time to learn ETMT	4.05	1.01

Total	4.44	0.62
Implementation of ETMT		
I can correct mistakes	4.38	0.77
I can remove ambiguities	4.38	0.60
I can simplify structures	4.71	0.56
Total	4.51	0.66

5. Discussion

Based on the questionnaire and test data, the four research questions in this study are discussed below.

5.1. The overall effectiveness of teaching ETMT to improve writing

The overall results indicated that the ETMT training resulted in a small-to-medium effect size (d=0.88) for teaching determiner use, paraphrasing and collocation. This effect was the highest regarding the use of determiners resulting in a medium effect size (d= 1.14). The discrepancy in learning gains among the three language components is an indication of how difficult it is to learn fundamental skills and knowledge to become good foreign language writers. It has to be noted that an incremental progress was considered while presenting these three writing components to Persian ELF students. As in many previous studies, our students were taught to use ETMT and were good at finding appropriate lexico-grammatical and word combinations in the given output (Park, 2010; Geluso, 2013; Geiller, 2014; Conroy, 2010). They also learned paraphrasing by consulting MT. Learning gain in paraphrasing and collocation were lower than determiner use and this can be due to the fact that ETMT was useful in providing the correct determiner. Another explanation can be attributed to the fact that the majority of L2 writers (especially at beginning and intermediate levels) do not possess paraphrasing and collocation skills (Nesselhauf, 2005). For this reason, it can be concluded that an ETMT workshop should be of sufficient length to make a difference in the use of paraphrasing and collocation in foreign language writing (Eubanks, Yeh and Tseng, 2018).

5.2. Perceived use of ETMT versus online bilingual dictionary

The data for the use of ETMT and the online bilingual dictionary in pre-tests suggest that **the students' use of these two tools w**ere different regarding writing tasks and components. While several studies have compared the effectiveness of using online resources, this study represented a real writing situation in which the Persian EFL learners looked up expressions and vocabulary items in online bilingual dictionaries (Yoon, 2016; Park, 2010). They were permitted to use online bilingual dictionaries during the ETMT workshop to resolve any problems during writing tasks.

On the whole, the novice writers preferred ETMT to online bilingual dictionaries for error correction in both determiners and collocation. However, when working on more productive tasks such as translation from mother tongue into foreign language or paraphrasing, they relied more on online bilingual dictionaries. So it can be concluded here that ETMT can be more useful for controlled tasks than productive ones since it can provide the student with immediate corrective feedback. Students in controlled tasks are presented with sentences and phrases which are lexically and grammatically incorrect, and they are required to correct them using an online tool whereas in uncontrolled tasks, it is a challenge for the students to find problems and rectify them. In this regard, ETMT can be used as an error identifier if the errors **are marked in the assignment (O'Sullivan & Chambers, 2006; Chambers and O'Sullivan, 2004).**

5.3. How ETMT was used for the revision process

ETMT was used by the students in this study to revise first drafts of their writings. It was their first encounter with using ETMT and with how to use it for determiner use, which happens to be challenging for Persian students due to differences in the two languages (Persian and English). It turned out that many students used ETMT for confirming and

correcting their mistakes in addition to revising the whole sentence or enriching their vocabulary use. It has to be mentioned that students' motivation, learning style and prior familiarity with this technology may also play a role. It can also be attributed to the novelty of the tool which makes it interesting for the students to use it.

Another point worth mentioning is that intermediate level students used ETMT for revision and confirmation rather than correcting mistakes. This is in line with findings by Yoon (2016) whose advanced level students tended to use a variety of DDL-based materials to confirm their hypotheses instead of exploring new linguistic items. Based on this study and similar studies, it can be assumed that advanced learners with a good command of grammar and vocabulary employ these tools to confirm their hypotheses rather than using them to check their mistakes. This kind of approach to DDL self-editing techniques can encourage both inductive as well as deductive learning (Flowerdew, 2015).

5.4. Perceptions and attitudes toward ETMT

The post-treatment question data showed that all our students were happy with the ETMT training and also discovered that using ETMT instead of a search engine was more useful (Yoon, 2016; Park, 2010; Geluso,2013). Students proficient at using this technology reported that ETMT training was useful in their writings and they would use this tool in their future writings. Their views over the use of ETMT as a reference tool also showed that it increased their level of confidence in their writings. However, paraphrasing with ETMT was much more difficult compared to collocations and determiners since they had to provide alternative forms in the first language in order to be provided with acceptable paraphrases.

Paraphrasing was challenging for novice learners since it included both collocations and determiner use. That is because these students had comparatively limited knowledge of structure and vocabulary in both languages. This can explain why some preferred using online bilingual dictionaries instead of MT. Thus, it must be mentioned that the effectiveness of ETMT mostly depends on the proficiency level of the students as well as the linguistic points in question which have already been mentioned by various researchers as critical factors in DDL (Yoon & Jo, 214; Franken, 2014).

6. Conclusion

This study was devoted to the effectiveness of ETMT in the use of determiners, paraphrasing and collocations among Persian L2 writers in an academic context. A 4-day ETMTworkshop was provided to the students with special focus on the use of determiners, paraphrasing and collocation. These areas were all challenging for the students who took part in this study.

The qualitative as well as quantitative data revealed that two important pedagogical findings can be obtained from teaching ETMT in foreign language writing classes. First, detailed guidance by the teacher on the use of ETMT is crucial if students are to obtain maximum results from such online tools. Second, ETMT should be accepted as a fact by language teachers and incorporated into language teaching in general and foreign language writing in particular. The students should be taught how to edit and manipulate their input in order to attain best results.

This calls for more research on the use of MT in various language learning settings particularly foreign language writing. Some avenues of research can be suggested to cover the limitations of the current study. First, longitudinal studies should be conducted to see how much training is needed and how long the effects of such training will last. It would be interesting to observe whether students use of these online tools would change and whether such use would be employed in other language skills and areas. Second, other factors such as learning style, task types and proficiency levels of students with regard to ETMT should be investigated.

It seems that the key to successful implementation of DDL with regard to online technologies lies in how teachers introduce them to students. Almost all language

teachers are against MT and do not encourage its correct use. Discovery learning relies heavily on learner autonomy and to achieve it, training sessions should be conducted to turn learners into autonomous language users. Almost all DDL researchers agree that to make use of this technology, guided introduction is more successful than leaving the students on their own (Smart, 2014). Providing individualized guidance and feedback is crucial in achieving successful DDL learning.

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