Impact of Online Versus Hardcopy Dictionaries' Application on Translation Quality of Iranian M. A. Translation Students

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ABSTRACT

The study aimed at investigating the impact of online versus hardcopy dictionaries' application on translation quality of senior M.A. students of translation based on Bleu model introduced by Papineni et al. (2002). To this end, using Oxford Proficiency test 50 (out of 70) female senior M.A. students of translation were selected and they were assigned to two groups: Online and hardcopy, using systematic sampling. Next, an English text was selected as the reference text. This reference text was given to three translators: 1) A male English translation expert with a Ph.D. degree in Computational Linguistics (Ref. 1); 2) A female English translation expert with an M.A. degree working at an English Translation Center and with more than 5 years of experience (Ref. 2), and 3) A male Ph.D. candidate in English translation (Ref. 3). These three versions were used as reference Persian standard translations to be entered into Bleu. Later, the English text was given to the hardcopy and online groups. Then, the translations of the participants were compared with the three reference Persian translations using Bleu. The time taken by each student to translate the text into Persian was also recorded. The results indicated that there was no statistically significant difference between the translations of the hardcopy and online groups from fluency/precision points of view. Comparison of the speed of translation in the two groups indicated that the online group was meaningfully faster. The possible beneficiaries of the findings of this research can be university professors, policy makers, and students in the realm of translation.

1. Introduction

Identification of prominent factors affecting the quality of translation has been under much focus in the field of translation since without identification of such factors no objective assessment of translation could ever be made. Use of computer aids has been one of-and in fact one of the most recent and attractive- tools to assess human translations. In simple terms, computer aided human translation assessment implies evaluation of human translation using computer software. This field of study has proved to have many good implications: It can accelerate the process of human translation assessment, and it can introduce more objectivity to the process of translation assessment. So far, a number of tools have been introduced to the scientific community. Some have been developed to provide help to translators while rendering a piece of document from one language into another – introduction of online dictionaries vs. hard copy ones is one such example. Scholfield (1997, p. 120) believed, "among all types of translation tools, dictionaries-ranging from hardcover versions to online dictionaries-were prominent and very common to translators." Further, a number of translation assessment software have been developed most of which rely on a number of criteria, i.e. fluency/precision, to assess the target translation. They also work at different-word, sentence, and system-levels. AM-FM is one such example. This software "is a semantic framework for machine translation evaluation…it aims at

assessing translation quality without the need for reference translations, while maintaining consistency with human quality assessments" (Banchs & Li, 2011, p. 12). NIST is another translation assessment model. This model evaluates translation at sentence and system levels. At the sentence level, the predictions could be correlated directly with human judgments using Spearman's ρ, a rank correlation coefficient appropriate for non-normally distributed data. ρ ranged between-1 and 1. The score-1 meant perfect inverse correlation, 0 meant no correlation, and 1meant perfect correlation (Pado, Cer, Galley, Jurafsky, & Manning, 2009). Bleu as stated by Seljan et al. (2012, p. 2144) is "one of the most popular automatic evaluation metrics proposed by Papineni et al. (2002), which actually represents a standard for MT evaluation". BLEU matches translation n-grams with n-grams of its reference translation, and counts the number of matches on the sentence level. On advantages of BLEU, Banchs et al. (2011, p. 56) stated, "Among all proposed models, Bleu model is considered as an objective function to optimize the values of parameters such as feature weights in log linear translation models, until a better metric has been proposed". The scoring system in BLEU ranges from 0 to 1 "where higher scores indicate closer matches to the reference translations, and where a score of 1 is assigned to a hypothetical translation which exactly matches one of the reference translations" (Papineni et al., 2002, p. 313).

Despite the many works undertaken in the field of translation assessment, the volume of computer aided human translation assessment research has been limited for Farsi language. In fact, from those already undertaken some have focused only on one issue, i.e. comparison of online vs. hardcopy dictionaries, and some have tried to compare human translation vs. machine translation manually (Falahati Qadimi Fumani & Nemati, 2004; 2006). But the present article endeavored to use students' translations, three reference human translations and the Bleu software to assess the translation quality of Iranian senior M.A. students from fluency/precision points of view. It also attempted to examine the impact of dictionary type (hardcopy vs. softcopy) on translation speed in the same students for the English-Persian language pair. Combination of both variables (fluency/precision assessment and online vs. hard copy dictionary assessment) in one single study and the software aided human translation assessment design used are the two factors that make the present research distinct from other research activities already undertaken regarding the English-Persian language pair.

With this background, the aim of the present study was to evaluate the impact of online versus hardcopy dictionaries' application on translation quality of senior M.A. students from fluency/ precision points of view based on Bleu model introduced by Papineni et al. (2002). It also attempted to examine the impact of dictionary type (hardcopy vs. softcopy) on translation speed in senior M.A. students of translation.

Following the above, the researchers introduced the following questions:

Q1: *Do senior M.A. students of translation who use online dictionaries translate more precisely/fluently than those who use hardcopy dictionaries based on Bleu model introduced by Papineni et al. (2002)?*

Q2: *Do senior M.A. students of translation who use online dictionaries translate faster than those who use hardcopy dictionaries?*

Accordingly, the following hypotheses were formulated:

H0.1: *There is no significant difference between senior M.A. students of translation who use online dictionaries and those who use hardcopy dictionaries in terms of precision/fluency based on Bleu model introduced by Papineni et al. (2002).*

H0.2: *There is no significant difference between senior M.A. students of translation who use online dictionaries and those who use hardcopy dictionaries in terms of speed of translation.*

2. Literature Review

Researchers have already undertaken a number of works on software assisted translation assessment. For ease of discussion, the literature on the topic can be categorized under four parts. The first part covers studies on various kinds of dictionaries which are available in the market as well as their advantages and disadvantages. Dictionaries are the main source from which translators extract TL equivalents for SL terminology. Dictionaries are not of a single type and in fact various versions of dictionaries are

available in the market, i.e. hardcopy vs. softcopy. Regarding dictionaries, some researchers tried to evaluate the effect of online dictionaries on translation process. For example, Tarp (2014) asserted that a translation dictionary should be much more than a mere bilingual dictionary if its ultimate goal is to fulfill the needs of users of various types. He concluded that use of online dictionaries was an important factor in producing fast high quality translation. Recently, various types of electronic dictionaries have been publicized which are of great help in learning new vocabularies. These dictionaries are of various types including mobile dictionaries, online dictionaries, dictionaries on CD-ROMs as well as concordances. They are advantageous due to a number of reasons including ease of access, high speed, multimedia environment, co-references, and a non-leaner approach in giving vocabulary knowledge to the language learner (Nesi, 1999). But, as elaborated by some researchers, not all online dictionaries are of the same quality. For example, Al-Jafr (2001) reported that although students used an ED, most of them found it inadequate for their translation. He found that they needed an ED that provided as many senses of the word as possible, covered as many technical terms as possible, gave the meanings of a word in context, indicated the domain in which the word was used, gave many illustrative examples that clarified the different senses of the word, and finally gave the equivalent of idioms, compounds, collocations, derivatives, prefixes, suffixes and roots. Taylor and Chan (1994) reported that using dictionaries could increase the translation speed and that many translators preferred to have electronic format because it was much quicker and easier to look up words.

The second group of studies covers those on the quality of translation by TQA tools and the role of dictionaries in translation performance. There have been a number of Foreign researchers who have endeavored to determine the quality of translation by TQA tools. Kucis, Seljan, and Klsnic (2009), for instance, used the example of a Slovenian bilingual corpus called Evrokorpus and the multilingual terminology database Evroterm. In their paper, the hypothesis that modern online translation tools contribute to the quality and consistency of expert translations, as well as to the acquisition of new competitive skills and knowledge was examined. They found that the introduction of additional computer-aided translation tools significantly influenced the quality and consistency of translation. They concluded that use of electronic tools could increase translation quality and speed. Miguel (2015) contrasted the quality in a corpus of White House official translations of Obama's speeches to a parallel corpus of similar translations released by online media immediately after their delivery. It was found that there was not any direct relationship between translation quality and the potential for use and subsequent reuse. Rather, there was a direct relationship between translation reuse and the volume of traffic of the website in which a translation was posted.

About the evaluation of translation quality by TQA tools, a number of studies have already been conducted by Iranian researchers. Kargarzadeh and Paziresh (2017), for instance, assessed the quality of Persian translation of Kite Runner based on House's (2014) functional pragmatic model. Their results indicated minute mismatches including mistranslations of tenses and selection of inappropriate word meanings. In another study, Ghasemi and Hashemian (2015) used Keshavarz's (1999) model of error analysis to carry out a comparative study between the raw English-Persian translations and Persian-English translations from Google Translate. Based on the criteria presented in the model, 100 systematically selected sentences from an interpreter app called Motarjem Hamrah were translated by Google Translate and then evaluated and brought in different tables. Results showed no significant difference between the qualities of Google Translate from English to Persian and Persian to English. Another Iranian researcher (Miangah, 2012) evaluated the effect of using parallel corpora software as a translation tool on translation quality. The researcher tried to compare the quality of translations produced with and without the help of parallel corpus software to see whether using a parallel corpus could impact the translation quality. The results showed that all students achieved 55% improvement in the translation with the help of the corpus which was very encouraging. In a similar study, Miangah (2010) investigated the role of large monolingual Corpora on

improving machine translation quality. The researcher tried to evaluate the role of Corpora software as a translation tool in improving machine translation quality. The researcher managed to study the efficiency of this corpus in finding the most appropriate Persian equivalents for English collocations in order to enhance the output quality of the machine translation system. The results of the study revealed an efficiency rate of 90.83%.

There were also some Iranian researchers who investigated the role of dictionaries on translation quality. Jelveh and Nejadansari (2013), for example, tried to find out if the application of dictionaries in translation tasks could improve the quality of translation. They tackled the study both quantitatively and qualitatively in two phases. In the opening phase of the project a questionnaire was given to 230 Iranian translators in seven Iranian state universities to investigate the type of monolingual dictionaries they used while translating informative texts like news reports. In the main phase of the study, three groups of translators with different types of dictionaries (hardcover, computer software, and mobile dictionaries) were selected and given the task of translating three news texts from English to Persian, and their translations were assessed in terms of accuracy and speed. It was found that the translators who used mobile dictionaries rendered the texts more accurately and much faster than the other two groups. Translators using computer software held the second rank, and hardcover dictionary users, bringing up the rear, were the slowest. Another research was conducted by Motahari and Taherian (2010). They examined whether there was a significant difference between the translation quality of students who used bilingual (English to Farsi) dictionaries and those who used monolingual (English to English) dictionaries. The conclusion was that there was no significant difference in the quality of translation of the two groups. In other words, using a bilingual or monolingual dictionary was not a determining factor in generating a qualitative translation. Zarei and Gujjar (2012) investigated the contribution of paper and electronic dictionaries to EFL learners' vocabulary learning. To do so, four groups of male and female EFL learners were selected. The experimental groups (one male, one female) used only electronic dictionaries while the two control groups (male and female) used only paper dictionaries. The scores of all four groups on a vocabulary test were compared using a two-way ANOVA procedure. Results indicated that although the gender of the participants did not meaningfully influence their vocabulary learning and did not interact with the kind of dictionary the learners used, the contribution of electronic dictionary to vocabulary learning was significantly greater than that of the paper dictionary. Some researchers tried to evaluate the role of electronic dictionaries on learning English. One of them was a study conducted by Dashtestani (2012). The aim of the study was to evaluate EFL teachers' and students' perspectives on the use of electronic dictionaries for learning English. The researcher tried to compare both EFL teachers' and students' perspectives on the use of electronic dictionaries for learning English. The results of the study suggested that both EFL teachers and students held moderately positive attitudes towards the use of electronic dictionaries during the EFL learning process. They also indicated that there were several obstacles and challenges, including lack of training on the use of electronic dictionaries, students' use of unsuitable versions of electronic dictionaries, lack of facilities to use electronic dictionaries in EFL classrooms, and distraction from learning caused by using electronic dictionaries in the classroom. The analysis of data further revealed that the majority of Iranian EFL students used electronic dictionaries installed on their cellphones. The students showed a preference for using electronic dictionaries over paper dictionaries claiming that they were faster and more easily reachable.

The third series of research works covers studies on the effect of using computer aided or mobile dictionaries on improving the translation quality. For instance, Alshebab (2017) attempted to evaluate the effect of using mobile dictionaries in improving students' translation. Their sample consisted of 40 translation students divided into two experimental, and control groups. Experimental students were asked to use their mobiles in translation, while the control students used a normal method in translating English. They revealed the higher level in translation for the benefit of the experimental group. In another study, Taghizadeh and Azizi (2017) explored the

computer-aided translation competences of some Iranian translators. In their studies, they compared BA and MA students of translation in terms of their abilities in IT skills. Based on their results BA students were more competent in using the Internet, word processing and computer maintenance, while MA students were more familiar with formatting and publishing, word processing, presentation software, and computer maintenance, respectively. Some other researchers also evaluated the role of technological development on changing the form and use of dictionaries. For instance, Kodura (2016) evaluated the dictionary-using skills of translation students. He reported that technological development had changed dictionary form and use and that new media required the translator trainer to devise inspiring activities leading to improvement of dictionary-using skills of translation students.

The fourth part includes studies on translation speed. For instance, Zarei et al. (2012) stated that hardcopy dictionaries were so time-consuming and that translators preferred to use softcopy dictionaries. In another study, Zarei et al. (2012) concluded that many students of translation preferred to give up the traditional approaches such as paper dictionaries because they often had many difficulties in recognizing the best equivalent for their terms by these kinds of dictionaries.

An overview of the brief literature introduced above reveals that the number of works undertaken on TQA (Translation Quality Assessment) and the role of hard copy vs. soft copy dictionaries in production of high quality translation has been quite remarkable. Yet, the number of works on software-oriented TQA for English-Persian language pair has been very limited. This, in fact, illustrates the gap in the literature and justifies the composition of the present paper.

3. Methodology

3.1. Participants

The participants in this study were selected from among 70 female M.A Senior students of translation (from the Islamic Azad University, Marvdasht Branch, within the age range of 24 to 40) who had been selected through availability sampling. To guarantee the homogeneity of the students in vocabulary and reading comprehension, the Oxford Proficiency

Test was administered to these students and those within ±1SD range were used as participants. These participants (50 cases) were then assigned, using systematic sampling, to two groups. All odd numbered students formed 'group 1' (online group) and all even numbered students on the list formed 'group 2' (hardcopy group). Each group had 25 students in it. Senior students were used since they were believed to have acquired the highest level of knowledge compared to junior and sophomore students.

3.2. Instruments

The instruments used in the present study included Oxford Proficiency Test (OPT), the hardcopy and online versions of Oxford Advanced Learners Dictionary (OALD, 2015), a piece of English text selected to be translated by the three reference translators and the students in the two groups, and Bleu model (it was used to assess the translation quality of the participants). Each instrument has been described below very briefly:

3.2.1 Oxford Proficiency Test

This test was used as a placement test to evaluate the homogeneity of students in vocabulary and reading comprehension. The proficiency test was selected from www.oxfordenglishtesting/proficiency test.com (the advanced level). It consisted of 20 questions in two parts: Vocabularies and reading comprehension (Appendix 1).

3.2.2 Oxford Advanced Learners Dictionary

Online and hardcopy versions of OALD (2015) were used in this study. The students in group 1 used the online version and those in group 2 used the hardcopy version while rendering the English text into Persian. The assignment of the two groups to the two versions of the dictionary was also random.

3.2.3 English Text from TOEFL Textbook

To undertake the study, a source English text was required. So, the researchers consulted three professors of translation from Islamic Azad University, Marvdasht Branch, to select an appropriate piece of scientific text, in English, as the source text (ST) to be translated by the participants. The researchers wanted the text to fit the proficiency level of the participants. They also wanted the text to be such that it could expose the participants to some unknown terms and hence force them to use a dictionary. With this in mind, three texts from TOEFL

textbook (2015), Longman Press, were first chosen by the researchers. Then, the three professors went through these three texts and chose one entitled, "Measles Campaign Reduces Deaths in African Children" as the ST (Appendix 2). In fact, the validity of the text was verified in this way. To determine the time required for translation of the text into Persian, the researchers translated the text and recorded the time it took to finish the translation.

3.2.4 Three Reference Translations

First, the finalized English text was translated into Persian by: 1) A male English translation expert with a Ph.D. degree in Computational Linguistics (Ref. 1); 2) A female English translation expert with an M.A degree working at an English Translation Center and with more than 5 years of experience (Ref. 2), and 3) a male Ph.D. candidate in English translation studies (Ref. 3).

3.2.5 Bleu Model

The Bleu model was introduced by Papineni et al. (2002). This model was implemented by Asiya software to assess the quality of translations made by students. This software was found in http://asiya.cs.upc.edu/demo/ (Note: in this article, the term 'Bleu' whenever and wherever used refers only to work undertaken by Papineni et al. (2002)). To do so a reference translation should also be available, that is, Bleu compares translations with a reference translation provided by the researchers. It assesses translations in terms of precision and fluency.

To assess the translations Bleu uses N-grams. It assesses the precision and fluency of a given translation simultaneously and shows them in the form of a single score.

3.3. Procedure

To carry out the study, first the OPT was selected and administered to the students to attain homogeneous participants. The students within the ±1SD range were selected. This resulted in 50 female senior M.A. students who were assigned using systematic sampling to two groups (group 1 and group 2) each with 25 students. Then, using the help of three professors of English translation (with a Ph.D. degree), from Islamic Azad University (Marvdasht Branch), an English text was selected to be used, after undergoing modifications, as the main text to be translated from English into Persian by the participants. This text was selected

from the TOEFL textbook (2015). The text was given to 10 students as pilot to find how many unknown words they encountered. Since most of the words were known to the students, the thesis advisor changed some words. This time five words were unknown to the students. So, this modified version was used as the final ST. Then, this reference text was given to three translators- 1) an English translation expert with a Ph.D. degree in Computational Linguistics, 2) an English translation expert with an M.A degree working at an English Translation Center and with more than 5 years of experience, and 3) a Ph.D. candidate in English translation studies- to render it into Persian. These three versions were used as reference standard translations to be input into Bleu. Later, using availability sampling the English text was given to 50 senior students of translation (M.A. level) who had been assigned using systematic sampling to hardcopy and online groups. Then, the translations of the participants were all typed by the researchers after which the performance of the participants was compared with the three reference Persian translations using Bleu. The time it took for each student to translate the text into Persian was also recorded (The overall time of the translation activity for the students was 30 minutes). This data was used as the main data source in this study.

3.4. Scoring System in the Bleu Model

To elaborate the scoring system in Bleu, "Papineni et al. (2002) calculated their modified precision score, pn, for each n-gram length by summing over the matches for every hypothesis sentence S in the complete corpus C as below" (Burch et al., 2010, p. 250).

$$p_n = \frac{\sum_{S \in C} \sum_{ngram \in S} Count_{matched}(ngram)}{\sum_{S \in C} \sum_{ngram \in S} Count(ngram)}$$

The Bleu score is calculated as:

$$\text{BLEU} = \text{BP} * \exp(\sum_{n=1}^{N} w_n \log p_n)$$

A Bleu score can range from 0 to 1, where higher scores indicate closer matches to the reference translations, and where a score of 1 is assigned to a hypothetical translation which exactly matches one of the reference translations.

4. Results

The objective of the present study was to respond to the two following questions:

Q1: Do M.A. students who use online dictionaries translate more precisely/fluently than those who use hardcopy dictionaries based on Papineni et al.'s (2002) model?

Q2: Do M.A. students who use online dictionaries translate more quickly than those who use hardcopy dictionaries based on Papineni et al.'s (2002) model?

In section below, first, the descriptive statistics for both online and hardcopy groups will be presented, then each research question will be answered using the relevant statistics.

4.1. The Analysis of Scores Obtained by Bleu for the Online Group

In the online group, the translation of each student along with the three reference translations, each time a single one, was input into Bleu software. This enabled the researchers to assess the students against each of the three reference translations. Besides the three scores obtained, an average score was also computed which showed the average performance of the students against all the three reference translations. The detailed data gathered for the online group has been presented in Appendix 3, and the results of the analyses have been presented in Table 1.

Table 1: Descriptive Statistics for the Online Group

	N	Range	Minimum	Maximum	Sum	Mean		Mode	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error		Statistic	Statistic
Ref.1_online	25	.20	.20	.40	6.73	.2692	.01277	.27	.06383	.004
Ref.2_online	25	.18	.20	.38	6.51	.2604	.00846	.23	.04228	.002
Ref.3_online	25	.14	.19	.33	6.66	.2664	.00842	.28	.04212	.002
Average_online	25	.16	.20	.36	6.54	.2616	.00854	.22	.04269	.002
Time_online	25	15	15	30	564	22.56	.775	.20	3.874	15.007
Valid N (listwise)	25									

As shown in Table 1, for the 25 students in the online group, the average score (when compared with the three reference translations as a single group) was 0.261 with a standard deviation of .042. The minimum and maximum scores were 0.20 and 0.36 respectively. Further, the range and mode scores were 0.16 and 0.22 respectively. The average scores of students with regard to Ref. 1, Ref. 2 and Ref. 3, when each was considered separately, were 0.269, 0.260 and 0.266 respectively.

Also, the average time of translation for students in the online group was 22.56 minutes with a standard deviation of 3.874. The minimum and maximum time recorded for the students were 15 and 30 minutes respectively.

Table 2: Frequency Table for the Online Group

Ref. 1 online		Freq	Percent	Ref. 2 online	Freq	Percent	Ref. 3 online	Freq	Percent
Valid	0.20	4	16.0	0.20	1	4.0	0.19	1	4.0
	0.21	2	8.0	0.21	1	4.0	0.2	2	8.0
	0.22	1	4.0	0.22	3	12.0	0.21	2	8.0
	0.24	1	4.0	0.23	4	16.0	0.23	2	8.0
	0.25	3	12.0	0.24	2	8.0	0.24	1	4.0
	0.26	3	12.0	0.25	3	12.0	0.25	1	4.0
	0.27	5	20.0	0.26	1	4.0	0.26	1	4.0
	0.28	1	4.0	0.27	2	8.0	0.27	1	4.0
	0.30	1	4.0	0.28	1	4.0	0.28	5	20.0
	0.39	1	4.0	0.30	3	12.0	0.29	2	8.0
	0.40	3	12.0	0.31	3	12.0	0.3	2	8.0
				0.38	1	4.0	0.31	2	8.0
							0.32	2	8.0
							0.33	1	4.0
Total		25	100.0		25	100.0		25	100.0

Freq. =Frequency

As shown in Table 2, from among the scores obtained by the students when compared with Ref. 1, in the online group, three students (12.0%) had received the maximum score (0.40) and four students (16.0%) had received the minimum score (0.20). In evaluating the scores obtained by the students when compared to Ref. 2, it was found that one student (4.0%) had received the maximum score (0.38) and one student had received the minimum score (0.20). Also, when the students' scores were compared with Ref. 3, it was found that one student (4.0%) had received the maximum score (0.33) and one student (4.0%) had received the minimum score (0.19).

4.2. The Analysis of Scores Obtained by Bleu for the Hardcopy Group

In the hardcopy group, the translation of each student was input into the Bleu software and evaluated against the three translation references (Ref. 1, Ref. 2 & Ref. 3). This produced three scores for each student. Further, the average over all the three scores was also computed. The data gathered for the hardcopy group has been presented in Appendix 4. The results of the analyses have been presented in Tables 3 to 4.

Table 3: Descriptive Statistics for the Hardcopy Group

	N	Range	Minimum	Maximum	Sum	Mean		Mode	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error		Statistic	Statistic
Ref.1_hardcopy	25	.26	.17	.43	6.49	.2596	.01335	.25	.06674	.004
Ref.2_hardcopy	25	.20	.18	.38	6.37	.2548	.00949	.24	.04744	.002
Ref3_hardcopy	25	.21	.18	.39	6.50	.2600	.00931	.29	.04655	.002
Average_hardcopy	25	.21	.19	.40	6.35	.2540	.00956	.23	.04778	.002
Time_hardcopy	25	7	23	30	688	27.52	.332	26	1.661	2.760
Valid N (listwise)	25									

As shown in Table 3, for the 25 students in the hardcopy group, when compared with the three reference translations, the total average score was 0.25. The minimum and maximum scores were 0.19 and 0.40. Further, the range and mode scores were 0.21 and 0.23. The average scores of the students when

compared with Ref. 1, Ref. 2 and Ref. 3 (one each time) were 0.259, 0.254 and 0.260 respectively.

Also, the total average time of translation for students in the hardcopy group was 27.52 minutes with a standard deviation of 1.661. The minimum and maximum times obtained were 23 and 30 minutes respectively.

Table 4: Frequency Table for the Hardcopy Group

Ref. 1 hardcopy		Freq	Percent	Ref. 2 hard copy	Freq.	Percent	Ref. 3 hard copy	Freq	Percent
Valid	0.17	1	4.0	0.18	1	4.0	0.18	1	4.0
	0.18	1	4.0	0.19	1	4.0	0.19	1	4.0
	0.19	2	8.0	0.21	3	12.0	0.20	2	8.0
	0.20	1	4.0	0.22	1	4.0	0.21	1	4.0
	0.22	3	12.0	0.23	3	12.0	0.22	2	8.0
	0.23	1	4.0	0.24	4	16.0	0.23	1	4.0
	0.24	3	12.0	0.25	3	12.0	0.25	2	8.0
	0.25	4	16.0	0.26	1	4.0	0.26	2	8.0
	0.26	2	8.0	0.28	2	8.0	0.27	2	8.0
	0.27	1	4.0	0.30	4	16.0	0.28	3	12.0
	0.30	1	4.0	0.35	1	4.0	0.29	4	16.0
	0.33	2	8.0	0.38	1	4.0	0.30	3	12.0
	0.38	1	4.0				0.39	1	4.0
	0.39	1	4.0						
	0.43	1	4.0						
Total		25	100.0		25	100.0		25	100.0
Freq=Frequency									

As shown in Table 4, from among the scores obtained for the students in the hardcopy group when compared with Ref. 1, one student (4.0%) had received the maximum score (0.43) and one student (4.0%) had received the minimum score (0.17). When the students were compared with Ref. 2, it was found that one student (4.0%) had received the maximum score (0.38) and one student had received minimum score (0.18). Similarly, when the students' scores were compared with Ref. 3, it was found that one student (4.0%) had received the maximum score (0.39) and one student (4.0%) had received the minimum score (0.18).

4.3 The Comparison of Online and Hardcopy Groups with Regard to Precision/ Fluency

To compare the average performance of the online and hardcopy groups, independent sample t-test was used. In fact, the first research question was, "Do M.A. students who use online dictionaries translate more precisely/fluently than those who use hardcopy dictionaries based on Papineni et al.'s (2002) model?" An independent sample t-test was run to compare the quality of hardcopy and online group translations. The descriptive statistics computed and the results of the independent sample t-test have been shown in Tables 5 & 6.

Table 5: Mean and Standard Deviation Scores Obtained for the Online and Hardcopy Groups.

	Mode	N	Mean	Std. Deviation	Std. Error Mean
Translation	Online	25	.2616	.04269	.00854
	Hardcopy	25	.2540	.04778	.00956

As displayed in Table 5, the online group (Mean= 0.261, SD = .0426) showed a slightly higher mean score than the hardcopy group (Mean= 0.254, SD = .0477).

Table 6: Levene's Test for Equality of the Variances (precision/fluency).

Translation	Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.078	.781	.593	48	.556	.00760	.01282	-.01817	.03337
Equal variances not assumed			.593	47.402	.556	.00760	.01282	-.01817	.03337

The result of the Levene's test for equality of the variances illustrated that there were no significant differences between the variances and they were equal. The significant value reported for Levene's test was .781, which was larger than .05. Therefore, the row in which variances were assumed equal should be considered. So, t_{48}=.593 and the significance level was .556 which was greater than .05. This demonstrated that there was no statistically significant difference between the translations of the two (hardcopy and online) groups from fluency and precision points of view. Comparing the means of online (Mean=0.261) and hardcopy (Mean=0.254) groups' scores indicated that both groups were similar.

4.4. The Comparison of Online and Hardcopy Groups with Regard to Speed

The second research question of the study was, "Do M.A. students who use online dictionaries translate more quickly than those who use hardcopy dictionaries based on Papineni et al.'s (2002) model?" To answer this question, first the mean and standard deviation scores regarding the duration of translation for both the online and hardcopy groups were obtained. The results of translation speed have been shown in Table 7.

Table 7: Mean and Standard Deviation Scores for the Hardcopy and Online Groups with Regard to Speed.

	N	Mean	Std. Deviation	Std. Error Mean
Time_online	25	22.56	3.874	.775
Time_hard copy	25	27.52	1.661	.332

The results in Table 7 indicated that the average time it took the students in the hardcopy group to translate the text was

27′:52″. This figure was 22′:56″ for the online group. To check the significance of difference between the two groups with regard to their translation speed, the independent sample t-test was used.

Table 8: Levene's Test for Equality of Variances (speed).

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Time_online	29.118	24	.000	22.560	20.96	24.16
Time_hardcopy	82.825	24	.000	27.520	26.83	28.21

The result of Levene's test for equality of the variances illustrated that there was a significant difference between the two groups and they were not equal. The results of the analysis of the speed with which the groups translated the text revealed the following statistics for the two groups: t_{24} =29.118, Sig=.000, for the online group, and t_{24} =82.825, Sig=.000, for the hardcopy group. It demonstrated that there was a statistically significant difference between the translation speeds of the two groups, that is, the online group translated the text faster (Mean=22.560 vs. Mean=27.520).

5. Discussion

The first research question of the study was, "Do M.A. students who use online dictionaries translate more precisely / fluently than those who use hardcopy dictionaries based on Papineni et al.'s (2002) model?" The findings of this research question indicated that the online group (Mean= 0.261, SD = .0426) had revealed a slightly higher mean score than the hardcopy group (Mean= 0.254, SD = .0477) in terms of precision and fluency. However, the difference observed was not statistically significant. Thus, the hypothesis, "There is no significant difference between the translation of M.A. students who use online dictionaries and those who use hardcopy dictionaries in terms of precision/fluency based on Papineni et al.'s (2002) model" was accepted.

The findings of the present study in the first research question were not in line with those reported by Jelveh and Nejadansari (2013) who identified that from precision and accuracy points of view, there was a significant difference between the hardcopy dictionary users and computer dictionary users. In fact, they reported that translations of the computer dictionary group were better than the hardcopy dictionary group from the precision and accuracy points of view. Unlike this finding, there were many other researchers whose works supported the results of the present study. For example, Chen (2010) reported that there was no significant difference in the efficiency of use of paper and electronic bilingual dictionaries for translation of texts. Or, Almind (2005, p. 37) stated, "electronic dictionaries have pure equivalents of the printed ones with the same features as paper dictionaries and the results of previous studies do not advocate the distinct advantages of one dictionary form over the other from precision and accuracy points of view". In fact, other researchers targeted other elements as contributing the translation quality. As an example, Ramos (2005) believed that in translation, lack of skill for searching and interpreting the best meaning was one of the main factors that influenced on quality of translation. She suggested, "Our students need instruction in dictionary skills and they need to become familiar with electronic dictionaries and other reference materials to have better translations from quality point of view" (p. 10).

The second research question of the study was, "Do M.A. students who use online dictionaries translate more quickly than those who use hardcopy dictionaries based on Papineni et al.'s (2002) model?" The findings of this research question indicated that the average time it took the students in the hardcopy group to finish the translation was 27′:52″. This figure was 22′:56″ for the online group. This demonstrated that there was a statistically significant difference between the translation speeds of the two groups, that is, the online group translated the text faster (Mean=22.560 vs. Mean=27.520). Thus, the hypothesis, "There is no significant difference between senior M.A. students of translation who use online dictionaries and those who use hardcopy dictionaries in terms of speed of translation." was not accepted. This finding was supported by Jelveh and Nejadansari (2013) who identified that those who used computer and mobile dictionaries translated the text faster than the hardcopy dictionary group. The findings of this study were also supported by the results of research conducted by Al-

Jafr (2001, p. 13) who concluded, "In comparison of both electronic and hardcopy dictionaries, the electronic dictionaries were faster, more practical, and easy to use". To justify this claim Chen-Josephson (2006, p. 1) asserted:

In online dictionaries, many volumes get compressed into one, storage and retrieval become quickly and easy, they are light, compact and faster than any paper dictionary, and one can easily update some of the brands by using internet and software.

Similarly, Zarei and Gujjar (2012, p. 630) stated, "Working with hardcover dictionaries is also time-consuming for translators because they are bulky and their weights make them difficult to handle". Elsewhere they said, "Features like shape, size are different but their contextual structure and application policies are the same". In the same vein, Spidzer and Munnheim (2009, cited in Tarp, 2009, p. 102) declared, "Since both online and hardcopy dictionaries include the same textual structure, they have no contextual differences. There are so many theoretical articles that freely discuss various types of structure in electronic dictionaries while, they have the same content as those found in printed dictionaries." Likewise, regarding the second research question, the results of this study were supported by the results of previous studies on the role of online dictionaries in speeding up the translation process. For example, Al-Jafr (2001, p. 12) declared, "Electronic dictionaries are fast, practical, and easy to use and they can be used anytime and anywhere. It seems that in our modern world, most of students are accustomed to computer systems as if computers are a part of their lives". In another research, Li (2015, p. 25) said, "Translation based on electronic dictionaries facilitates translation and reduces time with the help of quality assurance tools, translation management system, translation servers and other technologies". Li (2015, p. 25) believed, "electronic dictionaries may save translation time, avoiding duplication of work, greatly enhancing the efficiency and speed of translation." About the impact of new invented dictionaries on increasing the speed of looking up new word, Zarei and Gujjar (2012, p. 634) mentioned:

Newly invented dictionaries have better contributions to vocabulary learning in EFL students. This is somehow due to their high capacity of vocabulary, their speed in looking new word up and many others in comparison with paper back dictionaries which are fragile, heavy to handle and time consuming while looking up new words.

In today's business world, time plays an important role, and this is what that necessitates the application of online dictionaries. In this regard, Keriston (2014, p. 31) stated:

In order to communicate effectively, business translation is an important tool in conveying business messages from one language into another. Business, legal, scientific, mass media or tourist industry texts are instruments of communication in everyday life and the factor of time is also so important.

And finally as mentioned by Keritson (2014), since reducing the time of translating business texts plays an important role in communicating with other people of the world, online dictionaries could be regarded as appropriate tools to reduce the time and cost of business translation.

6. Concluding Remarks

Although the results of this study indicated that there was no significant difference between the translation of online and hardcopy groups from precision and fluency points of view based on Bleu model, there was a significant difference between the translations of both groups in terms of speed. Thus, the results of this study could be applied by university professors and policy makers. They could implement some practices to improve the speed of translation of both graduate and undergraduate students especially in translation of business texts. This goal could be achieved if professors and policymakers could persuade students to use new technologies such as online dictionaries in their translations. The results of this study could also be applied by business organizations to conduct commercial research as they could be applied by software development sectors especially software engineers. Since Bleu software is a kind of quality assessment tool which compares the output of a machine translation system against reference human translation, this could widely be used by researchers in the realm of translation.

Despite its advantages and implications, the present study faced a number of limitations as well. Due to time limitation only one English text was selected as the English source text for this study. The

sample in this study (N=50) was limited to M.A. students. Definitely in further studies, a replication with a greater number of participants would be needed in order to obtain more reliable and generalizable results. The study focused on female students, so the results could not be generalized to both genders. The results might also have been influenced by a number of extraneous factors. The sampling technique used in this study was availability sampling. Probability sampling methods were more generalizable but in this study, a non-probability sampling technique was used due to lack of access to the required number of students and lack of their zeal for participation in this study.

Despite the strides made by the researchers to undertake a comprehensive study, many aspects of the issue have been left untouched by the present researchers due to the scope of the study and the limitations imposed on the research. Hence, many further research areas are open to other interested researchers. In this study, it was tried to evaluate the impact of online versus hardcopy dictionaries' application on the quality of translation of senior M.A. students from fluency and precision points of view based on Bleu model introduced by Papineni et al. (2002). It also attempted to find the impact of dictionary type (hardcopy vs. softcopy) on speed of translation in senior M.A. students. In this study, Bleu model was used to assess the quality of translation in hardcopy and online groups. Other researchers could use other translation quality assessment tools such as NIST. Other researchers might conduct further research to assess the quality of the Bleu model. The statistical sample in this study comprised senior M.A. students of translation; other researchers could study students from other educational levels. In this study, gender was not regarded as a variable; others could consider this variable in their studies as well. The scientific genre was applied in this study from which to collect the original data. Other researchers could use other text types such as literary texts.

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Appendix 1: Sample of Oxford Proficiency Test

Name & Surname:	Gender:	Degree:

Part A
Vocabularies (13 Tests, 25 mins.)
A word or phrase is missing in each of the sentences below. Four answer choices are given below each of the sentences. Select the best answer to complete the sentence by clicking **A**, **B**, **C**, or **D**.
1. The Small Order Execution System allows small investors near-instant execution of trades of 1,000 or fewer shares on the Nasdaq, and these SOES ……… are a growing force in the market, accounting for about 15% of the trades on the Nasdaq Stock Market.
a) bandits   b) desperados   c) pirates   d) raiders
2. The director of a funds management company says that smaller companies focusing on a single service like sustainable living, alternative energy, etc. are less likely to be involved in big ……… like the defense industry and oil.
a) dirties   b) filthies   c) piggies   d) uglies
3. All employees are kindly requested to ……... from smoking in the presence of customers.
a) stop   b) restrain   c) refrain   d) restrict
4. There is increasing research on the subject, more and more courses in entrepreneurship, and heightened ……... by the media.
a) coverage   b) distribution   c) journalism   d) publication
5. The entrepreneur's connection with risk evolved in the 17th century, when an entrepreneur was someone who entered into a contract with the government to perform a service or to supply ……... products.
a) simulated   b) stimulated   c) stippled   d) stipulated
6. The bridge is becoming unsafe, so we must decide whether to make ………... or build a new one.
a) amends   b) differences   c) renewals   d) repairs
7. An ……... is an adventurous act that is not usually considered conventional or traditional.
a) escapade   b) entrance   c) entrapment   d) esquire
8. ……... is another word for danger and usually denotes the possibility of some kind of injury or destructive action.
a) Penchant   b) Persistence   c) Peril   d) purport
9. I was pleased to receive your response to my proposal but there are one or two points that need ……...
a) notification   b) certification   c) clarification   d) signification
10. All vehicles driving through this wild godforsaken region have been attacked by……….
a) trespassers   b) robbers   c) burglars   d) bandits

Appendix 2: English Text Chosen by Three English Translation Professors

Name:
Family Name:
Age:
Gender: Female
Education: M.A Senior in translation field

Measles Campaign Reduces Deaths in African Children
An international group says cases of measles in Africa have dropped by sixty percent since nineteen ninety-nine. The group is known as the Measles Initiative. It says almost two hundred million children have been vaccinated against the disease in the past six years.
Measles is the leading cause of vaccine-preventable death in children. Vaccination campaigns have controlled the disease in Western countries. But it still claims more than four hundred thousand deaths each year. Measles itself does not kill children. Instead, it weakens their systems so they can die from other infections.
Measles is one of the most infectious diseases known. It spreads through the air. Signs include high body temperature, skin peeling, cough and difficulty breathing. Measles can cause diarrhea, pneumonia, blindness and an array of other disorders.
Health officials assert the Measles Initiative has led to other improvements for children in southern Africa. Through the campaign, children receive bed nets treated with insecticide to kill mosquitoes that spread malaria. They receive vitamin A to prevent blindness and they receive treatment for stomach worms.
Representatives of the Measles Initiative announced the progress at a Global Health Summit in New York earlier this month. The Bill and Melinda Gates Foundation, Time magazine and other organizations provided support for the meeting.
The Measles Initiative has raised more than one hundred forty million dollars since two thousand one. The alliance encompasses the American Red Cross and United States Centers for Disease Control and Prevention. It also comprises UNICEF, the World Health Organization and the United Nations Foundation, a private group led by businessman Ted Turner.
Note: Those parts of the text that have been changed by the professors have been underlined.

Appendix 3: Scores Computed for the Online Group

Row	Reference Translation 1 (Ref. 1)	Reference Translation 2 (Ref. 2)	Reference Translation 3 (Ref. 3)	Average	Time (mins)
1	0.26	0.27	0.29	0.27	25.0
2	0.21	0.22	0.24	0.22	20.0
3	0.26	0.22	0.33	0.27	24.0
4	0.27	0.30	0.28	0.28	26.0
5	0.39	0.30	0.32	0.33	29.0
6	0.21	0.24	0.21	0.22	30.0
7	0.25	0.26	0.28	0.26	20.0
8	0.20	0.23	0.20	0.21	22.0
9	0.27	0.20	0.30	0.25	20.0
10	0.26	0.28	0.26	0.26	25.0
11	0.40	0.31	0.28	0.33	23.0
12	0.20	0.22	0.19	0.20	23.0
13	0.30	0.27	0.32	0.29	20.0
14	0.20	0.25	0.23	0.22	25.0
15	0.27	0.25	0.30	0.27	26.0
16	0.27	0.31	0.29	0.29	30.0
17	0.40	0.30	0.31	0.33	20.0
18	0.25	0.24	0.23	0.24	19.0
19	0.24	0.25	0.28	0.25	19.0
20	0.20	0.23	0.28	0.23	18.0
21	0.27	0.21	0.25	0.24	15.0
22	0.28	0.31	0.27	0.28	20.0
23	0.40	0.38	0.31	0.36	21.0
24	0.22	0.23	0.20	0.21	25.0
25	0.25	0.23	0.21	0.23	19.0
Average	0.2692	0.2604	0.2664	0.2616	22.56

Appendix 4: Scores Computed for the Hardcopy Group

Row	Criterion Translation 1 (Ref. 1)	Criterion Translation 2 (Ref. 2)	Criterion Translation 3 (Ref. 3)	Average	Time (mins)
1	0.33	0.21	0.29	0.27	27.0
2	0.30	0.30	0.30	0.30	26.0
3	0.24	0.21	0.20	0.21	28.0
4	0.43	0.38	0.39	0.40	27.0
5	0.23	0.28	0.25	0.25	29.0
6	0.17	0.18	0.27	0.20	30.0
7	0.25	0.24	0.27	0.25	26.0
8	0.22	0.23	0.21	0.22	26.0
9	0.25	0.19	0.28	0.24	26.0
10	0.27	0.26	0.25	0.26	28.0
11	0.38	0.30	0.30	0.30	29.0
12	0.19	0.24	0.20	0.21	26.0
13	0.22	0.24	0.28	0.24	28.0
14	0.18	0.23	0.22	0.21	28.0
15	0.26	0.25	0.29	0.26	30.0
16	0.25	0.30	0.28	0.27	30.0
17	0.39	0.28	0.30	0.32	29.0
18	0.24	0.24	0.22	0.23	28.0
19	0.22	0.23	0.26	0.23	29.0
20	0.19	0.25	0.26	0.23	23.0
21	0.25	0.22	0.23	0.23	26.0
22	0.26	0.30	0.29	0.28	28.0
23	0.33	0.35	0.29	0.33	27.0
24	0.20	0.21	0.18	0.19	28.0
25	0.24	0.25	0.19	0.22	26.0
Average	0.2596	0.2548	0.2600	0.2540	27.52