

## The Impact of Online Machine Translation (OMT) on Vocabulary Learning and Translation Ability

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### Abstract

There has been growing evidence in recent years that L2 learners are increasingly using various online machine translation (OMT) applications. While advanced technologies have improved the accuracy of machine translated texts, many language teachers are still sceptical about their pedagogical value. Recently, many L2 researchers have shown interest in investigating the affordances of OMT in language learning. This study initially examined the role of OMT in L2 learning and whether L2 learners would value and/or trust OMT output. The study also investigated the extent to which vocabulary learning can accrue from integrating OMT in a translation course and whether the quality of self-translated texts would improve as a result. A total of 128 participants attending a core translation course took part in this study. The study involved the use of a pre-post vocabulary test, a pre-post translation test, vocabulary uptake sheets (VUSs), a questionnaire, self-translated and machine-translated tasks. The major findings indicated perceptions of its positive role in enhancing L2 learning. The study also found evidence of vocabulary enhancement and a slight improvement in self-translated text quality. The affordances and limitations of OMT for L2 teaching and learning are discussed.

Keywords: Online Machine Translation (OMT), self-translated text, Google Translate

**أثر الترجمة الآلية عبر الإنترنت في تعلم المفردات والقدرة على الترجمة**

هناك أدلة متزايدة لاسيما في السنوات الأخيرة على استخدام متعلمي اللغة الإنجليزية - بوصفها لغة أجنبية/ ثانية - لمختلف تطبيقات الترجمة الآلية عبر الإنترنت. بيد أن كثيرا من معلمي اللغة الإنجليزية لا يفتنون يشككون في القيمة التربوية لهذه التطبيقات بالرغم من التحسينات التي أضافتها هذه التطبيقات إلى دقة النصوص المترجمة آلياً. وهو ماجعل عددا كبيرا من الباحثين يبدون اهتماما ملحوظا بالبحث في الإمكانيات التي يمكن أن تقدمها هذه التطبيقات في مجال تعلم اللغة. وعليه؛ فقد هدفت الدراسة الحالية استقصاء الدور الذي يمكن أن تلعبه الترجمة الآلية عبر الإنترنت في عمليات تعلم اللغة الأجنبية/ ثانية، وما إذا كان متعلمو اللغة الأجنبية/ الثانية يُقدرون و/أو يثقون في نتائجها. كما سعت الدراسة أيضا إلى التحقق من مدى إمكانية اكتساب المفردات من خلال دمج الترجمة الآلية في أحد مقررات الترجمة، وما إذا كانت جودة النصوص المترجمة ذاتياً ستتحسن نتيجة لذلك. شارك في هذه الدراسة 128 طالبا ممن درسوا مقررا أساسيا في الترجمة. وقد تم تبني المنهج شبه التجريبي لتحقيق أهداف الدراسة؛ فتم استخدام اختبار قبلي بعدي لقياس تحصيل المفردات، وآخر في الترجمة. كما تم استخدام أوراق لثبت المفردات المتعلمة، واستبانة لقياس تصورات الطلاب حول مدى نفعية الترجمة الآلية، ومهمات ترجمة ذاتية، وأخرى آلية. وقد بينت نتائج الدراسة - بشكل عام - وجود تصورات إيجابية لدى عينة الدراسة حول الدور الذي يمكن أن تلعبه الترجمة الآلية في إثراء تعلم المفردات؛ الأمر الذي أوضحت نتائج الاختبار البعدي في قياس تحصيل المفردات. كما أشارت النتائج إلى وجود تحسن طفيف في جودة النصوص المترجمة ذاتيا. بالإضافة إلى ذلك تمت مناقشة إمكانية الاستفادة من الترجمة الآلية عبر الإنترنت وحدودها.

## **The Impact of Online Machine Translation (OMT) on Vocabulary Learning and Translation Ability**

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### **1. Background: Online Machine Translation**

Interest in Machine Translation (MT) can be traced back to the 1940s (Cancedda et al., 2009), the 1950s (Slocum, 1985) and specifically after World War II (Bowker, 2023). Bowker (2023) refers to the American mathematician Warren Weaver's "translation memorandum", which suggested the concept of using computers to translate between English and Russian. Similarly, Ranathunga et al. (2023) describe the 1954 word-for-word translation system introduced by IBM in which computers were envisioned as capable of translating from one language to another. Here, Sakamoto (2022, p. 56) describes MT research in the mid-20<sup>th</sup> century as aiming to achieve FAHQT or "fully automatic high-quality translation", which witnessed a change later on towards HAMT or "human-assisted machine translation".

In relation to using MT in L2 teaching and learning, Jolley & Maimone (2022) suggest that these attempts have been ongoing for the last thirty years or so, but a wider interest can easily be observed over the last decade. A bird's eye view suggests that the 1980s had limited research attempts which explored the use of some computer-assisted translation systems (e.g., Clarke, 1986; Corness, 1985), but the 1990s witnessed the beginnings of a wider range of research interest in the area. At that time, many academic forums showed interest in MT, and various studies looked at the use of computer-based translation as a teaching tool (e.g., Clark, 1994; DeCesaris, 1995; Gurina, 1997). For example, Anderson (1995) evaluated a computer-based translation system, and the study acknowledged the potential of MT despite describing it as poor. Similar attempts to create and review translation software, such as Talking Dictionaries (Nelson, 1999), also came to the fore. In 1997, David Crystal predicted a hundred years of controversy about MT (Crystal, 1997), but, as described by Cribb (2000), he could not anticipate how the omnipresent use of the Internet would rapidly amplify such controversy and probably give rise to more MT use, i.e., Online Machine Translation (OMT). Indeed, by the turn of the century and with the

availability of the Internet, an extensive range of studies focused on the technology and the resources on issues including teaching MT at graduate and undergraduate levels (e.g., Balkan, 2001; Bandyopadhyay, 2002; Somers, 2001), MT tool evaluation (Belam, 2002), translators' need for MT, MT training (Bowker, 2002; Forcada, 2002; Koby & James Baer, 2003; Yuste, 2002), the impact of online machine translation (OMT) on translation teaching (McCarthy, 2004), hand-held translation machines (Myers, 2000). Furthermore, Deng and Yu's (2022) systematic review suggests that there is evidence that OMT research has given more attention to undergraduate and graduate users compared to university educators and elementary and secondary school students and teachers. Additionally, pre-university students and pre-service teachers attracted the least attention on the part of OMT researchers.

In L2 *research*, the first decade of the twenty-first century witnessed a remarkable increase mainly due to the advancement in technology, but research from this decade seems to describe MT engines as commonly producing inaccurate output (e.g., Kliffer, 2005; Niño, 2008). More recent research, however, suggests that such inaccuracy has been largely eliminated, and many empirical studies support the use of OMT in L2 classrooms to the extent that it has been described as:

- a) *an instrumental pedagogical tool* (Lee, 2020),
- b) *an inevitable phenomenon among L2 learners* (Omar, 2021),
- c) *“a powerful focal point to improve second language (L2) skills”* (Anderson, 1995, p. 68),
- d) *“a key pedagogical issue of our time”* (Ducar & Houk Schocket, 2018, p. 779) and,
- e) *having the capability to alter foreign language education* (Urlaub & Dessein, 2022) and *existing teaching methods* (Deng & Yu, 2022).

This is particularly important with the development of Neural Machine Translation (NMT) and researchers' expectation that applications will soon speed up the translation process producing high-quality texts which will be as accurate as human translation. Goulet et al. (2017) put forward that the quality of texts produced by OMT exceeds intermediate-level L2 learners. In her review of OMT research, Lee (2023) reported that findings emphasise that even when L2 learners *showed* awareness of the imperfection of these automated translation applications, they valued such tools for various reasons including “accessibility, convenience, speed, cost, and efficiency in the language learning context” (p.114). Additionally, Lee (2023) reports that results generally indicate that

learners believed that MT tools provide accurate vocabulary translation. Despite being aware of its limitations, students' positive attitudes towards, and trust in, OMT was also reported by many researchers (e.g., Bahri & Mahadi, 2016; O'Neill, 2016; Valijärvi & Tarsoly, 2019). Tsai and Liao (2021) put forward that OMT use reduces anxiety and enhances students' motivation to learn L2. To Deng and Yu (2022) "there is growing interest in the ways that MT tools can be implemented to facilitate students' learning" (para 1).

Hence, the availability of the tools and the seemingly irresistible use by L2 learners deem investigations of the potential pedagogical value compulsory. At the same time, the need for more research, and to help L2 learners understand the translation process has been recommended by various researchers (e.g., Fountain & Fountain, 2009; Garcia & Pena, 2011). Google Translate (GT) is reportedly the most widely used OMT tool that is independently manipulated by L2 students (Carreres, 2014; Ducar & Houk Schocket, 2018; Niño, 2020). However, researchers' attention seems to vary from one language skill to another. While GT is essentially a *translation* tool, many studies focused on L2 writing (e.g., Cancino & Panes, 2021; Lee, 2020; Stapleton & Ka Kin, 2019) and reading (e.g., Tsai & Liao, 2021), but fewer focused on translation in EFL teaching contexts (e.g., Pardo-Ballester, 2022).

This study examines the role of OMT (and particularly GT) in L2 learning and the extent to which L2 learners value and trust GT output. The study also investigates the extent to which vocabulary learning can accrue from integrating GT in a translation course and the extent to which the quality of self-translated texts would improve as a result.

## **2. Literature Review**

### **2.1 Translation in L2 Teaching and Learning**

The use of translation in foreign language teaching and learning can be traced back to the sixteenth century when students at that time translated texts from classical languages (i.e., Greek and Latin) (Bowen, Madsen, & Hilferty, 1985). However, translation played tremendously "various roles under different language teaching methods" (Liao, 2006, pp. 191-192). Indeed, a move from being a cherished approach to being frowned upon, dismissed or even banned was marked by the advent of the audiolingualism and the communicative approach, which was accompanied by vocal opposition and absolute rejection of teaching translation in the ELT curriculum. Such attitude towards translation has been documented with its connotations with the general opposition to the

use of L1 in L2 or, as Liao (2006, p. 192) states, “a second language (L2) should be taught without reference to the learners' first language (L1)”. This is also reflected in Hall and Cook’s (2012) article titled “own-language use in language teaching and learning”. Indeed Pennycook (2008, p. 33) describes the position of ELT towards translation saying, “the global ELT is paradoxically viewed as a monolingual enterprise”. Similarly, Cook (2010, p. 156) describes the dismissal of translation in L2 teaching as forming a “collective consciousness of the language-teaching profession”. Malmkjær (1998) adds that not all language teachers would strongly support the use of translation in language classes. Thus, the negativity against translation use in ELT is justified by claims such as a) translation teaching keeps the Grammar Translation approach alive, b) L1 translation gets in the way of L2 acquisition, c) the complexity of the translation act and d) the disadvantage of processing the L2 system through the use of learners’ L1 (Cook, 2009; Károly, 2014; Liao, 2006).

As a teaching activity, the use of translation in EFL classes is referred to as “pedagogical translation” (Carreres, 2014). In fact, Liao (2006, p. 194) defines translation as “a strategy for learning foreign languages” in addition to traditional views about transferring meanings. It is also described by Campbell (1998) as the product of a process (i.e., language learning). Research on second/foreign language teaching includes debates about the use of translation with young and adult learners (Atkinson, 1987; Gatenby, 1948). Several researchers state that the use of translation has often been ignored despite recognition of the facilitating role L1 might have in L2 learning (Artar, 2017; Atkinson, 1987; Karimian & Talebinejad, 2013) and the acknowledgement that the translation act is “a natural part of language learning” (Briggs, 2018, p. 6) that promotes language awareness (Cook, 2010) and lexical gap filling (Rogers, 1996). Here, Károly (2014, p. 90) states that “There is little research available on using translation as a tool to develop students’ translation and communicative competence in foreign language programmes”. This is also described by Carreres (2014, p. 124) as “the lack of interest in translation on the part of researchers in second-language acquisition (SLA) studies and language teaching methodology (LTM)”. In their attempt to explain the debate about the existence of translation in language teaching programmes, Kelly and Bruen (2015, p. 151) state:

“Despite the widespread popular assumption that translation should play a major and necessary part in the study of a foreign language, recent theories of language teaching and learning have at best ignored the role of translation, and at worst vilified it”.

However, the inclusion of translation as a teaching activity has been maintained in various EFL contexts, and a few researchers argued for its benefit. Duff (1994) states in his book *Translation* that accuracy, clarity, and flexibility are three benefits of translation. Duff (1989) explains that translating is not just learning to translate but using translation to learn. According to Laviosa (2014) translation is a means of L2 learning and teaching in addition to being a skill in itself. Likewise, Kelly and Bruen (2015) put forward that research findings, such as those obtained from Butzkamm and Caldwell (2009), argue for the benefits of translation in developing reading, writing, autonomy, learning-to-learn, peer feedback and communication. Following the same line of thought, Laviosa (2014) accounts for the beneficial role of translation not only in teaching but in language testing too. Liao (2006, p. 191) suggested that researchers have not given enough attention to the role of translation in language learning despite knowing that “learners often use translation as a learning strategy to comprehend, remember, and produce a foreign language” (p.191). Using interviews, the IBT (Inventory for Beliefs about Translation) and the ITLS (Inventory for Translation as a Learning Strategy), Liao’s (2006) study examined Taiwanese college students' beliefs and learning strategies about using translation to learn English. The most important finding in the study identified participants’ perception of the positive impact of translation on their English learning experiences.

L2 research findings, explains Laviosa (2014), support the useful role of translation in focus on form in language classes, and this is why she maintains that integrating translation in the L2 curriculum has various pedagogical values. Here, some researchers have shown interest in exploring both L2 teachers’ and learners’ views of the use of translation in language teaching (TILT). For example, Calis and Dikilitas (2012) carried out a seven week study which involved 28 L2 learners in Turkey. The study used translation as a technique to teach grammar. Using questionnaires and interviews, participants viewed translation as beneficial to reading comprehension and vocabulary learning. A key point in this study is the participants’ responses that they frequently translated the text first using bilingual dictionaries to comprehend it. Similarly, Pekkanli (2012) carried out a study which involved sixty pre-service teachers at a university in Turkey. These participants had to undertake compulsory translation courses. The majority of participants in Pekkanli’s (2012) study deemed translation as having high pedagogical value and a communicative function through which language skills can be developed. Similarly, Navidinia et al. (2019) carried out a questionnaire based study with 132 EFL students in Iran. L2 learners who participated

in the study reported the linguistic and humanistic value of translation classes. Here, Carreres (2014, p. 123) states:

*“While there is increasing consensus favouring the use of the first language in the second-language classroom, the role of translation in language learning is still an object of debate and the case for it is not sufficiently supported by empirical data”.*

Thus, translation courses are still part of EFL study in various contexts. To Popescu (2013, p. 1075), “students of linguistics need to develop their translation competence alongside their linguistic competence”. However, there is still a need for more research. Using Károly’s (2014, p. 93) words, despite the role translation can play in improving communicative competence, not enough attention has been given to integrating translation in EFL programs.

## **2.2 OMT in L2 Teaching and Learning**

There has been interest in the pedagogical value of machine translation use in EFL/ESL classrooms for a few decades, even when such applications were described by various researchers as poor (Niño, 2008) and 65% accurate at their best (Anderson, 1995). Terms such as computer-aided translation and non-assisted human translation were used in some forums (Perscheid, 1985). Despite being far from perfect and the negative views that many teachers hold (Briggs, 2018; Van Praag & Sanchez, 2015), the advancement of online machine translation (OMT) tools has more recently gone far afield to the extent that the focus of some second language researchers changed from teachers’ perception of machine translation use (see Niño, 2009) to whether instructors would be able to differentiate machine translated from non-machine translated texts (see Maimone & Jolley, 2023). Indeed, L2 students are reportedly using OMT applications such as Google Translate, DeepL and others inside and outside the classroom. The need to explain the pedagogical value of OMT has been identified (Crossley, 2018; Klimova et al., 2023; Lee, 2023) and researchers have been exploring using such applications as a supplementary tools for learning and they also acknowledge the irrationality and illogicality of prohibiting its use (e.g., White & Heidrich, 2013).

Based on the idea that acceptance of digital technology, or lack of it, would have an impact on teachers’ approaches to teaching (e.g., Cementina, 2019), pre-service teachers (e.g., Sun & Bing, 2022) and learners’ learning (e.g., Alsalem, 2019), some studies examined attitudes towards OMT. Alsalem (2019) carried out a case study in a Saudi Arabian context using think-aloud protocols to examine the impact of GT

use on translation skills. Her findings report students' overreliance on GT in these tasks. The findings also revealed that L2 participants' use of GT went beyond seeking help with word meanings to the translation of full texts. Alsalem (2019, p. 47) explains that L2 learners use GT as a post-editing tool, which she describes as their "safety net". She describes her students' behaviour by stating, "Some students even log in to GT while translating in the classroom, using their smartphones. The students sometimes bring raw GT translations to class with them... hide these translations as much as possible". Data from the four cases involved in Alsalem's (2019) study indicates that these students did not start translation from scratch but relied heavily on GT to obtain editable first drafts. However, the researcher concludes that engagement in the editing of these drafts was useful as it involved manipulation of the participants' linguistic resources.

Briggs (2018) used the term Web-based machine translation (WBMT) in his 15-week study, which examined the use, evaluation of and attitudes towards OMT among eighty 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> year South Korean university students attending a communicative English language course. Briggs (2018) explains that OMT provides a platform for students to compare their language output with that produced by online OMT. He also states that the use of OMT tools in an exam-oriented context is viewed as essential by students. Results revealed that 85% of participants used OMT either inside or outside of the classroom. The majority of participants reported using OMT in their search for lexical meaning inside and outside the classroom. While 41% of those Korean students did not trust the outputs, about 24% stated they trusted the output. Briggs (2018) concludes that the great pedagogical value of OMT tools is only achievable when L2 learners engage in critical analysis of their outputs. Pardo-Ballester (2022) carried out a mixed method study with 53 3<sup>rd</sup> year students enrolled in an online introductory Spanish-English translation course in which OMT was the main tool (i.e., learning Spanish via OMT). Course delivery adopted a mixture of face-to-face, flipped, and online models, and participants in the course had B1 Spanish proficiency level. The researcher adopted a teacher-learner-oriented approach in which the teacher guided participants to reflect and interpret the meaning OMT offered. An important finding in the study revealed the importance of the teacher's role when using OMT. Another finding showed the difference in noticing and learning from the back translation, which benefitted students with higher proficiency levels more.

### 2.3 Vocabulary Learning and (Machine) Translation

It is probably acceptable to claim that good L2 learners are expected to make use of available tools which would support their attempts to recognize the meaning of new words, practise memorising and repossessing these words, and find ways to note them down. Using Hulstijn's (2001, p. 258) words, "Most learners of a second language (L2) feel concerned with the burden of vocabulary learning and worry about the question of how to cope with the formidable task of learning thousands of words". It is also what has been referred to by Tseng & Schmitt (2008) and Barcroft (2009) (cited in Gu, 2015) as the "learner's deliberate and strategic efforts in learning vocabulary". Some L2 researchers suggest that a translation task could serve as an active cognitive strategy for vocabulary learning (e.g., Alroe & Reinders, 2015; Liao, 2006). For example, Hummel (2010) suggests that translation tasks could be particularly beneficial to vocabulary learning in classrooms in which learners share their first language. In his study, Laio (2006) quotes Naiman et al.'s (1978) description of the GLLs (the good language learners) as those who "refer back to their native language(s) judiciously (translate into L1) and make effective cross-lingual comparisons at different stages of language learning" (p. 14).

Researchers have shown interest in using different technological tools to promote L2 vocabulary. The acronym CAVL (computer-assisted vocabulary learning) has been used by several researchers (e.g., Ma, 2017; Ma & Kelly, 2006). To help vocabulary learning, various tools have been empirically manipulated including bilingual/electronic/online dictionaries (e.g., Jin & Deifell, 2013; Loucky, 2004, 2013), digital games (e.g., Hitosugi, Schmidt, & Hayashi, 2014), glossed captions (e.g., Fievez et al., 2021), flashcards software (e.g., Nakata, 2011), music video games (e.g., deHaan, Reed, & Kuwada, 2010) among others. The wide range of tools has also imposed challenges in relation to selection, vocabulary task design and level of self-regulated learning (Chapelle, 2007). The area of OMT shares the same characteristics, but it is different in the sense that learners seem to be finding various ways to integrate it in their L2 learning. In Lo's (2023) words, OMT has recently "gained increasing popularity among EFL learners as a CALL tool to improve vocabulary, and many learners have reported its helpfulness for vocabulary learning". Based on the scarcity of OMT research in relation to vocabulary retention, Lo (2023) studied whether editing with OMT would result in vocabulary improvement, immediate vocabulary retention and delayed vocabulary

retention. Findings suggested the high proficiency level students maintained a parallel level of immediate and delayed retention compared to their lexical improvement, but lower proficiency learners were highly bound to vocabulary improvement and immediate vocabulary retention. Another study by Omar (2021) examined the role of OMT in vocabulary learning, Omar (2021) carried out a study involving 47 native-Arabic speaking participants. The study examined the question “has MT fully succeeded in replacing traditional dictionaries and providing an ideal tool for vocabulary acquisition among L2 learners?”. Her findings suggested that OMT can facilitate vocabulary learning, but students need to be guided otherwise they miss out on authentic learning opportunities.

### 3. Method

The current study primarily aimed to scrutinise the impact of integrating GT, the most extensively used machine translation application tool, on vocabulary learning and translation ability. In doing so, an understanding of the role of OMT in L2 learning on the side of L2 learners was essential. The participants were 128 third year students (75 female & 53 male) in the English section who were attending a compulsory translation course at a university in Egypt. Four research questions were developed in this study, and these were:

- (1) *What level of online machine translation familiarity do participants exhibit, and to what extent do they use such tools?*
- (2) *How do participants perceive the role of online machine translation in their L2 learning, and to what extent do they value and trust the OMT output?*
- (3) *How far can the use of OMT in translation tasks promote vocabulary learning?*
- (4) *What is the impact of OMT use on participants' self-translated texts?*

#### 3.2.1 Study Design

This study adopted a quasi-experimental design in which 128 third year students (75 female & 53 male, aged 19-20 years old) at an English Section in a Faculty of Education in Egypt were conveniently selected (one intact group). The study was carried out as part of the 3rd year translation course, which was taught in the second term of their academic year.

### 3.2.2 Study Instruments and Procedures

A combination of data collection instruments was used, including a questionnaire, a vocabulary pre-post test, uptake sheets (USs), a translation pre-post test, and a series of L1 to L2 and L2 to L1 translation tasks in which GT was integrated. These instruments are discussed in more details below. The rationale for using several research instruments aimed to produce rigorous data could contribute to the overall validity of the findings. The following sections describe the four instruments in further detail focusing on the design, the validation and the piloting processes involved in each instrument.

### 3.2.3 The questionnaire

The questionnaire used in this study included 32 items which collected data on OMT familiarity/use, perception of translation ability and the role of machine translation in L2 learning (see Appendix A). Some items were based on Liao's (2006) but the rest of items were developed by the researcher. The instructions required participants to respond based on their *actual behaviour* rather than their *views* on how they should act (see questionnaire instructions in Appendix A). The questionnaire included five sections with various question types (i.e., open/closed-ended and Likert scales). The first section collected demographic information about the participants. Section two included only three items and collected data on participants' behaviour (i.e., how they act) when they are assigned a translation task. This section also collected data on tools they often employed and the frequency of use of such tools. Sections three (14-items) and four (6-items) included two dis/agreement Likert scales. The two scales collected data on participants' views of the role of OMT in their learning and when/how they specifically use OMT tools. Section five included seven self-report items about participants' translation abilities.

The questionnaire was validated by four types of evidence, namely, construct, content response and reliability (the four common dimensions sought in survey studies (Spada et al., 2009 – cited in Shabara, 2014). Construct validity evidence ensures that a research instrument measures what it claims to measure based on theory. This evidence was ensured by selecting some items from already-validated questionnaires. Content-related validity evidence assesses whether a research instrument effectively covers and represents the content domain being studied. This evaluation is based not only on the item content but also on the format, wording, administration, and scoring of the instrument (Johnson & Christensen, 2012). In order to provide this evidence, a pilot testing

involving three distinct groups: experts in EFL, linguistics and applied linguistics (n=6), specialists with master's degrees in EFL and applied linguistics (n=6), and a group of second and fourth-year undergraduate students from the English department of the same faculty (n=6). The first two groups were purposefully selected for in-depth insights, while members of the third group were randomly chosen. The details of the pilot-testing sample are outlined in Table 1 below.

**TABLE 1**

*Respondent Groups to the Questionnaire in the Pilot-testing Phase*

<i>Respondents</i>	University Faculty Staff Members	Specialists (MA Degree)	Student-teachers (Undergraduates)	
			2 <sup>nd</sup> Year	4 <sup>th</sup> Year
<i>n=18</i>	6	6	3	3
<i>Sampling Technique</i>	Purposive		Random	

In this phase, 18 participants received the initial questionnaire and provided feedback on (1) the homogeneity, clarity, and comprehensibility of directions, items, and formats. The first two groups, unlike the third (i.e., undergraduate student-teachers), were specifically asked to evaluate whether the questionnaire items represented the areas of interest. To facilitate this, the questionnaire was printed with items and their respective domains in the margins. Participants were required to mark the alignment of items with the domains of interest by adding a tick (√). The third group (students) were asked to respond to the questionnaire items and provide their feedback related to items comprehensibility and structure. Their feedback was positive and consequently they suggested no modifications. Subsequent to the feedback received from all three groups, very minor adjustments were made to the questionnaire.

Response-related validity evidence was gathered through two 30-45-minute discussion group sessions, separated by a three-week interval, with a group of 20 third-year undergraduate students from the English department of another faculty. They responded to the questionnaire, evaluating its clarity, relevance, and appropriateness. Feedback was documented, summarized, and reviewed. based on the feedback received, no modifications were made.

Reliability-related validity evidence assesses the consistency of measurements collected. In this study, internal consistency reliability was examined using Cronbach's alpha coefficient ( $\alpha= 0.74$ ), indicating a good reliability index (Dornyei, 2007).

### **3.2.4 The Vocabulary Pre-post Test**

The participants involved in this study sat a vocabulary pre-test in week three and a post test at the end of the study (see Appendix B). However, a delayed post test was not feasible due to students' participation in the practicum, which was immediately followed by their final exams. The pre-post test was mainly based on an isolated English word/multi-words translation task in which participants were required to write down the L1 equivalent of 100 items. These were elicited from the actual translation texts that were assigned to these participants during the study and as part of their course.

### **3.2.5 The Translation Pre-post Tests and the USs**

The translation pre-post tests required participants to produce self-translated texts from L1 (source language) to L2 (target language) and from L2 to L1, without the use of any external sources such as machine translation apps, mobile devices or dictionaries. To create a controlled environment, exam conditions were simulated in translating pre-post tests where two junior staff members helped the class teacher with administration and invigilation.

From week three onwards, participants were assigned either an L1 to L2 or L2 to L1 translation tasks. In each task, participants were initially required to individually translate the assigned text without using any external resources (i.e., no machine translation tools, dictionaries or mobile apps). Then each participant submitted the assigned text to GT to compare the GT output with his/her self-translated text. This was followed by a process of editing the self-translations. The Uptake Sheets (USs- see Appendix C) were integrated with each translation task to provide opportunities for participants to:

- a) reflect on the assigned text before self-translating (e.g., identifying potential challenges),
- b) evaluate the quality of the GT output,
- c) specify any mediation strategies used to evaluate the output and
- d) record how useful/useless GT was in editing self-translated texts.

Furthermore, two trained raters were used to evaluate the translation pre-post tests. The inter-rater reliability coefficient was ( $r=0.89$ ) which indicated a strong scoring-validity/reliability evidence.

### **3.2.6 Validating the Vocabulary & Translation Pre-post Tests**

Following Weir's (2005) test validation model, the study involved both the *a priori* and *a posteriori* stages of test validation. In the *a priori* phase, the characteristics of test takers, as well as the purpose and use of

the tests, were outlined. These tests were intended to assess EFL undergraduate student-teachers' vocabulary and translation achievement, following an OMT intervention. The constructs of the tests were theoretically and operationally defined based on relevant literature, then sampled by multiple items. A pilot test with 25 third-year student-teachers in another faculty of education provided feedback, leading to minor, yet necessary modifications.

Moving to the posteriori phase, after administering the tests pre and post-intervention, scoring-validity evidence was gathered. To fortify the tests' validity, a model answer and rubric were developed, and two raters underwent training. Furthermore, internal reliability was assessed using Cronbach's alpha coefficient ( $\alpha = 0.81$  and  $0.83$ , respectively), indicating robust reliability indices (Dornyei, 2007).

### 3.1 The Study Procedures

The study followed the following procedures:

*Week 1: orientation and mock task.*

*Week 2: questionnaire and translation pre-test (no OMT tools allowed)*

*Week 3: vocabulary pre-test and first translation task assigned (OMT tools allowed)*

*Week 4: second translation task assigned (OMT tools allowed)*

*Week 5: third translation task assigned (OMT tools allowed)*

*Week 6: fourth translation task assigned (OMT tools allowed)*

*Week 7: translation task assigned (OMT tools allowed)*

*Week 8: vocabulary post test & translation post-test (no OMT tools allowed)*

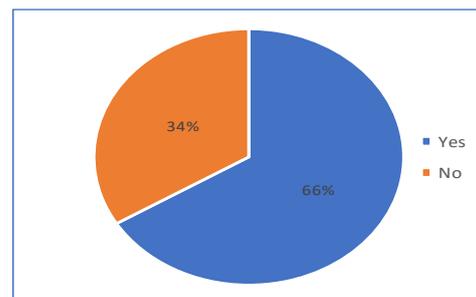
## 4. The Study Results

The results of the study are introduced in the same order as the research questions, where each heading in this section is meant to answer a research question.

### 4.1. Familiarity with & use of OMT

The first research question in this study investigated participants' levels of OMT familiarity/use. To do so, the questionnaire included questions in which participants were required to report their knowledge and use of

Figure 1. Google Translate Use



online machine translation. Interestingly, all 128 participants responded positively to familiarity with and use of OMT. When these participants were asked to name the tool they often use, the majority of participants indicated that they are regular users of GT (Always=66%). The rest of the participants (34%) indicated that they prefer to use other applications alongside GT. Some of these are U Dictionary (<https://www.u-dictionary.com/>), Collins (<https://www.collinsdictionary.com/translator>), online and offline Dict Box (<https://apps.apple.com/us/app/arabic-dictionary-dict-box/id425129943>) and Reservo (<https://www.reverso.net/text-translation>). Responses seemed to suggest that access to the internet can be influential as some participants use offline applications that do not require an internet connection (e.g., Dict Box). Thus, all participants were OMT users, and all participants were familiar with GT and how it works (see Figure 1).

#### **4.2. OMT Role in L2 learning**

The second research question in this study aimed to provide an understanding of the role of OMT in the participants' L2 learning activities, i.e., how OMT applications influence any aspects of their language learning. The questionnaire instructions required participants to provide their level of agreement/disagreement with statements regarding OMT based on their actual use rather than what should happen. Open-ended responses in the questionnaire are also used here to help understanding the findings (see Appendix A).

As seen in Table 1 below, the data elicited from participants revealed that OMT seems to generally play an important role in their L2 learning activities (item 10). In terms of the receptive skills, whilst responses suggest a moderate perception that OMT helps in reading comprehension (item 1, mean=2.9), OMT is more helpful in understanding spoken English (item 3, mean= 3.36). Open-ended responses suggest that participants thought OMT could facilitate text reading comprehension and bridge gaps between ideas in L1 when they write in L2. A relatively moderate perception of OMT use in speaking (item 4, mean= 3.32) and even less in writing (item 2, mean= 2.36) was shown in the data. Here, qualitative responses suggest that machine translated texts can act as a cognitive process and a mental exercise that supports comprehending and producing verbal communication. Participants had a relatively higher perception (item 6, mean= 4.27) that OMT aids in understanding. OMT was perceived as helpful for memorizing target language vocabulary (item 5, mean=3.84) and learning new idioms and phrases (item 6, mean=3.78).

**Table 2. Perception of OMT role in L2 learning**

#	OMT helps me ...	Mean	St D.
1	understand textbook readings.	2.9	1.9
2	write English composition.	2.36	1.34
3	understand spoken English.	3.36	1.05
4	speak English.	3.32	1.08
5	memorize English vocabulary.	3.84	0.95
6	understand English grammar rules.	4.27	0.83
7	translate texts from L1 to L2	3.36	1.22
8	translate texts from L2 to L2	3.59	1.01
9	learn English idioms and phrases.	3.78	0.99
10	make progress in learning English.	3.41	1.05
11	understand my teacher's English instructions.	2.91	1.12
12	interact with classmates to complete tasks.	3.08	1.1
13	finish my English assignments quickly & save time	2.93	1.51
14	recall the content of a lesson while studying later	2.41	1.16
15	The more difficult the English tasks are, the more I depend on OMT.	4.14	1.07
16	I like to use OMT to learn English.	4.06	0.99
17	The use of OMT may interfere with my ability to learn English well.	3.77	1.17
18	OMT reduces the amount of English input I receive.	2.7	1.06
19	At this stage of learning, I cannot learn English without OMT.	3.08	1.1
20	I think everyone has to use OMT at this stage of learning.	2.93	1.51
r= 0.74			

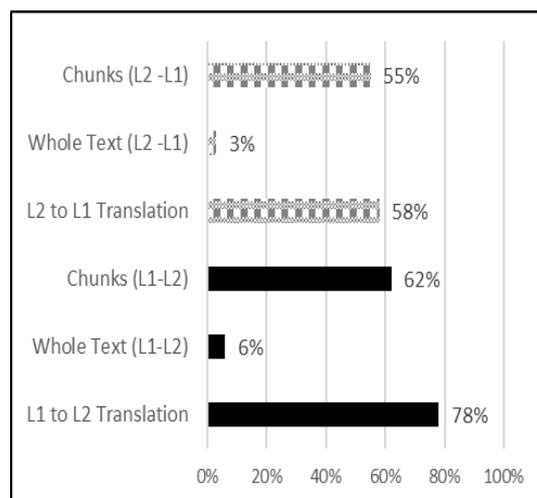
Further responses from the participants revealed perceptions of the positive impact of OMT on classroom dynamics, such as understanding L2 teachers' instructions and facilitating collaboration and communication with peers in group work (items 11,12&13). Participants also had a moderate perception (item 13, mean= 2.93) that OMT can speed up task completion (i.e., save time). Responses also suggest trust in OMT for more challenging tasks and results revealed a moderate perception (item 17, mean= 3.77) that OMT may interfere with their ability to learn L2 effectively and a fairly lower perception (item 18, mean= 2.7) that OMT decreases the amount of L2 input they receive. They also exhibited a moderate level of reliance on OMT, especially when tasks become more challenging (item 15, mean= 4.14). So,

participants' responses generally highlighted the multifaceted nature of OMT in the context of L2 learning.

As translation is more relevant to this study, the questionnaire included more item on this topic. Participants had a moderate perception that OMT helps in translating texts both from L1 to L2 (item 7, mean= 3.36) and from L2 to L2 (item 8, mean= 3.59). Furthermore, 78% of participants reported the use of OMT in L1 to L2 translation tasks. In relation to how the machine translation tools were being used, the majority of participants 62% referred to using OMT for unknown words and phrases chunks compared to 6% who used OMT to produce a translation of a whole text (see Figure 4).

Equally important was how participants used OMT in L2 to L1 translation tasks. More than half of the participants (58%) use OMT in these tasks, and 55% of these participants indicated translating chunks as their general use compared to 3% who translated L2 to L1 whole texts. Yet, the current findings about chunks versus whole texts could have been influenced by social desirability in the students' responses. This assumption is further explained later in this section.

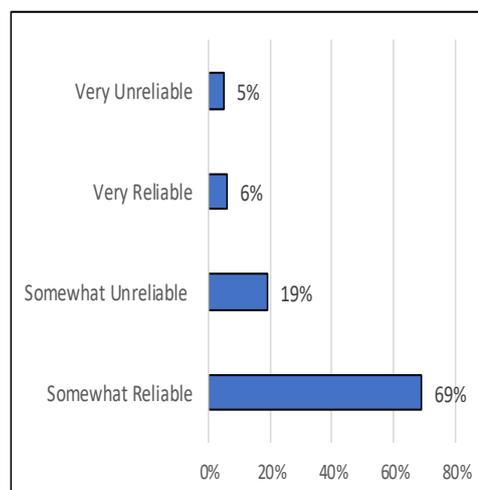
**Figure 2. OMT use in Translation Tasks**



**4.2. Value and dis/trust in OMT Output**

The second research question examined participants' perception of the role of OMT in L2 learning and how much they trust the quality of OMT output (i.e., computer-translated texts). Additionally, the questionnaire collected data about participants' evaluation of OMT output and their perception of whether these tools can enhance L2 learning. The data revealed that 69% of participants thought that OMT is somewhat reliable compared to smaller numbers of responses who referred to these tools as somewhat unreliable (19%). Absolute trust (6%) and distrust (5%) in the tools were

**Figure 3. Participants' perception of OMT**



also present in the data, although in very small numbers (see Figure 5). Some qualitative responses explained how students trusted the OMT output (i.e., Somewhat reliable). Some of these responses were:

*'Students can use OMT, but they must avoid relying solely on them'.*

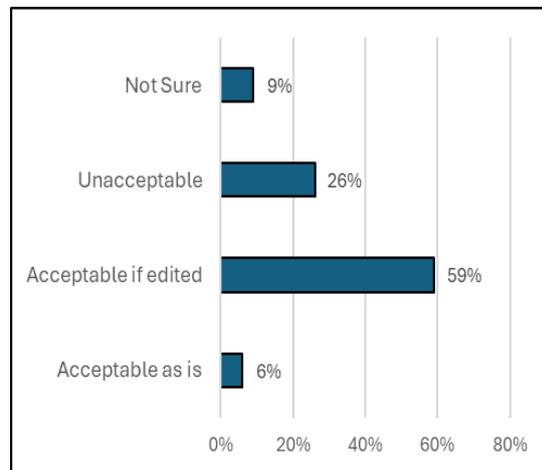
*'Students should use OMT only when they encounter hard words or phrases'.*

*'We can use OMT as supplementary tools in case new words or phrases appear in a text'.*

The questionnaire collected further data about how participants evaluate the quality of translated texts produced by machine translation tools.

While a small percentage thought that the output can be accepted as is (6%), 58% referred to the benefits of machine translation texts provided that an editing process follows. This indicates students' awareness of their role in the process. However, 26% of participants evaluated OMT output as unacceptable (see Figure 6). More open-ended responses explained how participants use OMT to improve their language

**Figure 4. GT Output Evaluation**



abilities. These generally describe the positive impact on vocabulary as unknown words and phrases are promptly translated. Furthermore, many of these responses referred to the inclusion of word pronunciation in some OMT platforms, which seemed to be detrimental in favouring certain tools such as GT. Examples of responses from the questionnaire that showed awareness of the need to edit OMT output include:

*'the best way for me is to decide on the difficult part or the unfamiliar words. Then, we should put these into more than one OMT application'*

*'I only use unfamiliar short phrases/words, but I do not insert the whole text'*

*'only use OMT to check my translation and my comprehension'*

## The Impact of Online Machine Translation (OMT) on Vocabulary Learning and Translation Ability

Another example of responses in L1 was:

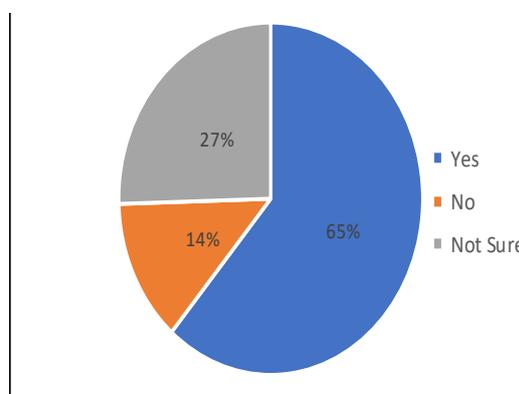
*Google translate provides literal translation which lacks contextual awareness*

جوجل على الأغلب يقوم بترجمة حرفية. ولا يضع الكلمات في سياقها الصحيح.

Similarly, participants were asked in the questionnaire whether they thought the use of OMT could have positive effects on language learning and development. Findings revealed that while a huge number of participants (65%) thought that OMT could help L2 learners develop their language skills, a small number (14%) thought otherwise, and about 27% were not sure (see Figure 5).

Thus, students were generally in favour of using OMT tools, and many of them provided details about how they use the tool or check across more than one tool to make sure the computerized translation is correct.—This also indicates that students are still using their linguistic resources to judge the quality of the machine translation.

Figure 5. OMT and Language Development



### 4.5. The Impact of OMT and L2 Vocabulary

The third research question examined whether the use of OMT can enhance vocabulary learning. Findings were mainly elicited from two sources: the vocabulary pre-post tests and the USs that participants filled in while completing each task. The research context involved in this study offers some international language tests (e.g., IELTS or TOEFL) in addition to other standardized tests such as OSEPT (Oral Standardized English Proficiency Test) designed by the American University in Cairo (Boraie & Shabara, 2021). However, the participants involved in this study sat no standardized language tests that would identify their actual proficiency levels simply because it is not a requirement for enrolment in an undergraduate programme at a state university. The vocabulary pre-post tests included 100 words/multi-words that students encountered in the translation tasks. For this study, the lexical items involved in the translation tasks were profiled against the CEFR by using the vocabulary profiler website (<https://www.vocabkitchen.com/profile>). Results from profiling the lexical items involved in the translation tasks indicated that 27% of the items were A1 and A2, but the majority of the lexical items

were distributed between B1 and B2 (37% in total). C1 and C2 formed 12% and, 24% were identified as Off List (see tables 3 and 4).

**Table 3. CEFR-oriented profile of pre-post lexical items**

A1	A2	B1	B2	C1	C2	Off List
20%	7%	17%	20%	8%	4%	24%

**Table 4. Off List Lexical Items**

algorithms	analogue	armature	automated	Barrel
bodied	bulk	catastrophic	colossus	cumulative
cyberbullying	daunting	deforestation	disheartening	engagement
erected	fermentation	fingerprint	fossil	fragments
greenhouse	hybrid	interconnections	linkages	liveable
mathematicians	neural	neurons	palaeontologist	replica
shadowing	spontaneously	sturdy	threaded	touting
unearth	utilise	worth		

In week three, participants were required in the vocabulary pre-post test to provide the L1 equivalents for items that they thought they already knew and insert the number “5” for all lexical items that were unknown to them at the time of the test. As seen in Table 4 below, the mean score in the vocabulary pre-test was 44.25 and 89.48 in the post test in week 8, which indicates the enhancement of participants’ vocabulary in the post test. Similarly, data analysis revealed a significant difference in the mean score of unknown items in the pre-test (16.07) compared to 2.21 in the post test, which provides evidence of vocabulary learning (see Table 5 below).

**Table 5. Pre-Post Tests Mean Scores**

	Mean
Pre-test	44.25
Post test	89.48
Pre-test unknown items	16.07
Post-test unknown items	2.21

Evidence of vocabulary learning was sought in the USs. Here, it was necessary to examine several issues. First, data analysis focused on finding out which lexical items were reported as challenging at the time of carrying out the translation task; and if these were the items participants thought they had learned from the use of GT in the translation task. Secondly, the analysis of unknown lexical items examined the match/mismatch of unknown words with the CEFR profiling procedure described above. Such analysis also examined whether vocabulary learning would vary across tasks. Equally important

was examining the extent to which the data participants reported in the VUSs conformed to the results of the vocabulary pre-post test. Results obtained from profiling lexical items were compared to the data obtained in the vocabulary pre-test and the data reported in the VUSs. Analysis of the pre-test confirms that most of the Off List items (see Table 3 above) were either reported as unknown or incorrectly translated. As described earlier, the USs used in each task required participants to record challenging lexical items in the script they were asked to translate either to L1 or to L2. Findings revealed that most of the Off List lexical items (almost 100%) were highlighted by the majority of participants before engaging in the translation tasks.

Further analysis of the USs revealed that the Off List items were identified as learned items through the use of GT. Open responses from the participants in this respect referred to an initial use of a guessing strategy followed immediately by the use of GT. It was evident in many participants' responses that guessing strategies were used, but machine translation was employed any way to consolidate their guesses and as a safety net. An example of the responses provided in English is:

*First, I read the text very well before translating it into the target language. If I can't get the meaning of the words or what is the idea of the sentence. I translate the word I don't know in google and then I link the word with the sentence to know what the word means in its text.*

Other example responses given in L1 also suggested that guessing and machine translation seem to be the standard procedures for many participants. Some of the responses include:

I guess the word based on the context and then compare it with Google

اقوم تخمينها من النص ومقارنتها بجوجل

I guess the words from the test or I get help from Google.

اقوم بتخمين الكلمات من خلال النص و استعين بجوجل

Analysis of the vocabulary pre-test also confirmed that most of the Off List items were either reported as unknown or incorrectly translated. These were also extensively stated by the majority of participants in the USs as vocabulary learned through the use of GT (see Table 5).

**Table 6. Analysis of Off List items**

			Unknown in Pre-test (%)	Incorrect Trans (%)	Unknown in Post test (%)	Reported in USs (%)
C1: 8%	1	diversity	2	46	0	2
	2	drastic	9	15	8	19
	3	emission	12	61	3	66
	4	exceptionally	21	19	1	32
	5	immense	35	57	3	62
	6	industrialization	8	21	0	27
	7	isolation	5	39	0	28
	8	productivity	5	11	1	9
	9	recruitment	15	22	0	26
	10	retail	25	43	4	56
	11	scope	19	32	5	42
	12	tanks	16	39	6	38
C2: 4%	1	circuits	7	71	12	61
	2	indispensable	12	74	19	76
	3	legitimate	16	52	11	43
	4	proximity	24	69	13	79
	5	unprecedented	11	72	9	71
	6	yields	13	55	10	41

This paper also analyzed participants' data to examine whether learning vocabulary occurred more/less in L1 to L2 translation tasks. Many participants reported lexical items in the L1 texts that were not included in the pre-post tests. Some explained that they spent more time using GT when they carried out L1 to L2 translation tasks. These participants explained that they had to rely more on their linguistic resources in L1 and L2 to make an informed decision about the machine translation output. Some of the most commonly recorded items are illustrated below in L1 as given by participants in the USs. L2 equivalents are also provided for the sake of this analysis (see Table 7).

**Table 7. L1 Lexical items**

	L1 Item	L2 Equivalent
1	حيثيات	rationale
2	مآزقه	predicaments
3	الزج	impose
4	تبعات	consequences
5	أصداء	reverberation
6	يكفل - كفل	guarantee

Thus, it can be claimed here that, based on the vocabulary pre-post tests and the data obtained from the USs, the use of GT was particularly useful and promoted vocabulary learning when participants engaged in both L1 to L2 and L2 to L1 translation tasks. However, more items were learned when participants undertook an L1 to L2 translation task.

#### **4.6. OMT and Translation Ability**

The fourth research question examined whether the use of OMT could positively influence the quality of participants' self-translated texts. The answer to this question could provide insights into the effectiveness of using machine translation in language teaching. To answer this question, two raters from the study context were asked to evaluate the self-translated texts produced in week one (translation pre-test) and week seven (translation post test) correspondingly. Each test required participants to produce self-translated texts from L1 (native language) to L2 (second language) and from L2 to L1, without the use of any external sources such as machine translation apps, mobile devices, or dictionaries. To determine if there was an improvement in participants' self-translated texts, the average scores for the pre-test and post-test were calculated separately for L1 to L2 and L2 to L1 translations. These average scores represent the mean performance of the participants (see Table 8).

**Table 8. Translation pre-post-tests average scores**

	Pre-Test average score	Post-Test average score
L1 to L2 Self-translated texts	3.89	3.93
L2 to L1 Self-translated texts	3.88	3.92

As seen in Table 7, the average scores indicate a slight improvement in participants' translation from the pre-test to the post-test for both L1 to L2 and L2 to L1 tasks. Although this development in performance looks small, it is still significant because data collected previously seems to suggest overreliance on machine translation apps on the side of participants, and the translation pre-post test conditions deprived them of such tools. Thus, this result still suggests that the use of OMT facilitated by Google Translate had a positive influence on participants' ability to produce self-translated texts.

## 5. Discussion

The findings obtained in this study provide insights into perception of the role of OMT in L2 learning and its impact on vocabulary learning and translation ability. The study confirms the widespread use of OMT among participants, with GT being the most popular tool. This aligns with previous literature on the dominance of GT in L2 classrooms (e.g., Ducar & Houk Schocket, 2018; van Lieshout & Cardoso, 2022). Based on the results obtained, such overreliance slowed down the improvement of the translation abilities, which was clear when GT was removed in the pre-post translation tasks. This suggests that the use of GT positively influenced participants' ability to produce self-translated texts. However, it should be noted that the improvement could be modest, considering participants' general reliance on OMT tools during their learning process.

Self-reported data suggested that participants acknowledged the benefits of OMT in bridging gaps between L1 and the target language, supporting comprehension, and facilitating the production of verbal communication. Empirical evidence from the pre-post vocabulary test revealed that GT plays a vital role in vocabulary retention. Therefore, this finding provides indication of the positive impact of GT on vocabulary learning. Participants reported using OMT for unknown words and phrases, resulting in improved vocabulary retention. The findings align with previous research emphasizing the benefits of OMT in vocabulary acquisition (Fredholm, 2019; Lee, 2020; Lo, 2023), but this can be particularly evident when used in combination with other learning strategies and resources.

Here, it is worth mentioning Tang's (1997) explanation that the debate on OMT use in L2 teaching and learning is somewhat different from previous debates about the use of electronic dictionaries in the sense that learners' use of, for instance, electronic dictionaries focused only on lexical gaps, i.e., unknown items, while their OMT use involved the translation of whole texts. Furthermore, participants generally demonstrated some trust in the quality of OMT output, although some concerns were raised. However, qualitative evidence from the participants referred to the recognition of the need for post-editing and acknowledged their role in the translation process, supporting the idea that OMT should be used as a supplementary tool rather than a standalone solution. These findings are in line with the existing literature on learners' perceptions of OMT (Briggs, 2018; Goulet et al., 2017), highlighting the importance of striking a balance between relying on OMT and utilizing one's linguistic resources.

This study suggests that translation has an important role to play in L2 learning. Furthermore, teachers can integrate OMT as a supplementary tool in the language classroom to support vocabulary learning, but they should guide students on how to use such tools effectively and responsibly. This could enable teachers to find middle ground between using OMT for exposure to somewhat authentic language and ensuring accuracy at the same time. Equally important is L2 language proficiency development. Thus, designing learning activities that aim at evaluating machine-translated texts and editing output could be beneficial for developing self-assessment. Overall, the implications of the research suggest that OMT is a valuable tool in second language teaching and learning contexts, but its use should be guided and supplemented with other language learning strategies.

## **6. Conclusions**

This study initially examined the role of OMT in L2 learning and whether L2 learners would value and/or trust OMT output. The study also scrutinised the extent to which vocabulary learning can accrue from integrating OMT in a translation course and whether the quality of self-translated texts would improve as a result. This study provides evidence that online machine translation tools like Google Translate are widely used by language learners and can support vocabulary learning and self-translated text production. However, overreliance on these tools may limit improvements in the translation ability over time. Explicit guidance from instructors on how to effectively use OMT tools is recommended. In other words, The study findings suggested that online machine translation can be beneficially integrated into language teaching and learning, but should be used as a supplementary aid alongside traditional language learning strategies and resources. Learners should be encouraged to view OMT output critically and engage in post-editing activities. While participants acknowledged the benefits of OMT for comprehension and bridging gaps, they also recognized the need for human input and oversight in the translation process. This aligns with the view that OMT should support, not replace, the development of learners' own linguistic skills.

Therefore, the study provided additional evidence that a balanced approach is needed regarding OMT use in language teaching and learning contexts. Instructors should provide guidance on using OMT responsibly while also emphasizing the continued importance of building students'

proficiency and translation abilities independently. The study highlighted the need for further research into effective pedagogical integration of OMT in language teaching and learning. Future studies could examine learning and assessment activities that focus on evaluating and improving OMT output to maximize learning opportunities. Overall, the study underscored that while OMT is a valuable tool in L2 teaching and learning, it should be used judiciously used and complemented with various language learning strategies.

## References

- Alroe, M. J., & Reinders, H. (2015). The role of translation in vocabulary acquisition: A replication study. *Eurasian Journal of Applied Linguistics*, 1(1), 39-58. <https://doi.org/DOI:10.32601/ejal.460588>
- Alsalem, R. (2019). The Effects of the Use of Google Translate on Translation Students' Learning Outcomes. *AWEJ for Translation & Literary Studies*, 3(4), 46-60. <https://doi.org/http://dx.doi.org/10.2139/ssrn.3483771>
- Anderson, D. (1995). Machine Translation as a Tool in Second Language Learning. *CALICO Journal*, 13(1), 68-97. <https://doi.org/https://doi.org/10.1558/cj.v13i1.68-97>
- Artar, P. (2017). *The Role of Translation in Foreign-Language Teaching* Universitat Rovira i Virgili]. <http://hdl.handle.net/10803/461885>
- Atkinson, D. (1987). The Mother Tongue in the Classroom: A Neglected Resource? *ELT Journal: An International Journal for Teachers of English to Speakers of Other Languages*, 41(4), 241-247. <https://doi.org/https://doi.org/10.1093/elt/41.4.241>
- Bahri, H., & Mahadi, T. (2016). Google translate as a supplementary tool for learning Malay: A case study at Universiti Sains Malaysia. *Advances in Language and Literary Studies*, 7(3), 161-167. <https://doi.org/doi:10.7575/aiac.all.v.7n.3p.161>
- Balkan, L. (2001, September 18-22). *Exploiting the WWW for MT teaching* MT Summit VIII Workshop on Teaching Machine Translation, Santiago de Compostela, Spain. <https://aclanthology.org/2001.mtsummit-teach.1>
- Bandyopadhyay, S. (2002). *Teaching MT - An Indian perspective* 6th EAMT Workshop Teaching Machine Translation, Manchester. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/<https://aclanthology.org/2002.eamt-1.2.pdf>
- Barcroft, J. (2009). Strategies and performance in intentional L2 vocabulary learning. *Language Awareness*, 18(1), 74-89. <https://doi.org/https://doi.org/10.1080/09658410802557535>
- Belam, J. (2002). *Teaching MT evaluation by assessed portfolio* 6th EAMT Workshop Teaching Machine Translation, Manchester. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/<https://aclanthology.org/2002.eamt-1.15.pdf>
- Boraie, D., & Shabara, R. (2021). The Oral Standardized English Proficiency Test: Opportunities Provided and Challenges Overcome in an Egyptian Context. In B. Lantaigne, C. Coombe, & J. D. Brown (Eds.), *Language Testing Around the World*. Springer. [https://doi.org/https://doi.org/10.1007/978-981-33-4232-3\\_24](https://doi.org/https://doi.org/10.1007/978-981-33-4232-3_24)
- Bowen, D. J., Madsen, H., & Hilferty, A. (1985). *TESOL techniques and procedures*. Newbury House.

- Bowker, L. (2002). *Why Do Translators Need to Learn about Technology?* University of Ottawa Press. <http://www.jstor.org/stable/j.ctt1ch78kf>
- Bowker, L. (2023). *De- mystifying Translation: Introducing Translation to Non- translators*. Routledge.
- Briggs, N. (2018). Neural machine translation tools in the language learning classroom: Students' use, perceptions, and analyses. *JALT CALL Journal*, 14(1), 2–24.
- Butzkamm W., & J., C. (2009). *The bilingual reform: A paradigm shift in foreign language teaching*. Narr Studienbücher.
- Calis, E., & Dikilitas, K. (2012). The Use of Translation in EFL Classes as L2 Learning Practice. *Procedia - Social and Behavioral Sciences*, 46, 5079-5084. <https://doi.org/https://doi.org/10.1016/j.sbspro.2012.06.389>
- Campbell, S. (1998). *Translation into the Second Language*. Addison Wesley Longman.
- Cancedda, N., Dymetman, M., Foster, G., & Goutte, C. (2009). A statistical machine learning primer. In C. Goutte, Cancedda, N., Dymetman, M. (Ed.), *Learning Machine Translation* (pp. 1–38). MIT Press.
- Cancino, M., & Panes, J. (2021). The impact of Google Translate on L2 writing quality measures: Evidence from Chilean EFL high school learners. *System*, 98, 102464. <https://doi.org/https://doi.org/10.1016/j.system.2021.102464>
- Carreres, Á. (2014). Translation as a means and as an end: reassessing the divide. *The Interpreter and Translator Trainer*, 8(1), 123-135. <https://doi.org/https://doi.org/10.1080/1750399X.2014.908561>
- Cementina, S. (2019). Language Teachers' Digital Mindsets: Links between Everyday Use and Professional Use of Technology. *TESL Canada Journal*, 36(3), 31-54. <https://doi.org/https://doi.org/10.18806/tesl.v36i3.1320>
- Chapelle, C. (2007). Challenges in evaluation of innovation: Observations from technology research. *Innovation in Language Learning and Teaching*, 1(1), 30-45.
- Clark, R. (1994). Computer-Assisted Translation: The State of the Art. In C. D. a. A. Loddegaard (Ed.), *Teaching Translation and Interpreting 2: Insights, Aims, Visions* (pp. 301-308). John Benjamins.
- Clarke, D. (1986). Computer-assisted reading—What can the machine really contribute? *System*, 14(1), 1-13. [https://doi.org/https://doi.org/10.1016/0346-251X\(86\)90045-X](https://doi.org/https://doi.org/10.1016/0346-251X(86)90045-X)
- Cook, G. (2009). Use of translation in language teaching. In S. G. Baker M. (Ed.), *Routledge encyclopedia of translation studies* (pp. 112–115). Routledge.
- Cook, G. (2010). *Translation in language teaching: An argument for reassessment*. Oxford University Press.

- Corness, P. (1985). The ALPS computer-assisted translation system in an academic environment. In C. Picken (Ed.), *Translating and the Computer 7* (pp. 118–127). Aslib.
- Cribb, M. (2000). Machine Translation: The Alternative for the 21st Century? *TESOL Quarterly*, 34(3), 560-569.  
<https://doi.org/https://doi.org/10.2307/3587744>
- Crossley, S. (2018). Technological disruption in foreign language teaching: The rise of simultaneous machine translation. *Language Teaching*, 51(4), 541–552.  
<https://doi.org/https://doi.org/10.1017/S0261444818000253>
- Crystal, D. (1997). *English as a global language*. Cambridge University Press.
- DeCesaris, J. A. (1995). Computerized translation managers as teaching aids. In C. D. a. V. Appel (Ed.), *Teaching Translation and Interpreting 3: New Horizons* (pp. 263–269). John Benjamins.
- deHaan, J., Reed, W. M., & Kuwada, K. (2010). The effect of interactivity with a music video game on second language vocabulary recall. *Language Learning & Technology*, 14(2), 74-94.  
<https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/589059e6-5333-4aef-9547-cda8d3121f66/content>
- Deng, X., & Yu, Z. A. (2022). Systematic Review of Machine-Translation-Assisted Language Learning for Sustainable Education. *Sustainability* 14,(7598). <https://doi.org/https://doi.org/10.3390/su14137598>
- Dornyei, Z. (2007). *Research methods in applied linguistics: Quantitative, qualitative, and mixed methodologies*. Oxford University Press.
- Ducar, C., & Houk Schocket, D. (2018). Machine translation and the L2 classroom: Pedagogical solutions for making peace with Google translate. *Foreign Language Annals*, 51(4), 779-795.  
<https://doi.org/https://doi.org/10.1111/flan.12366>
- Duff, A. (1994). *Translation*. Oxford University Press.
- Fievez, I., Perez, M. M., Cornillie, F., & Desmet, P. (2021). Promoting incidental vocabulary learning through watching a French Netflix series with glossed captions. *Computer Assisted Language Learning*, 36(1-2).  
<https://doi.org/https://doi.org/10.1080/09588221.2021.1899244>
- Forcada, M. (2002). *Explaining real MT to translators: Compositional semantics and word-for-word* 6th EAMT Workshop Teaching Machine Translation, Manchester. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/<https://aclanthology.org/2002.eamt-1.16.pdf>
- Fountain, A., & Fountain, C. (2009). A New Look at Translation: Teaching tools for language and literature. Empowerment through Collaboration: Dimension, San Jose State University.
- Fredholm, K. (2019). Effects of Google Translate on lexical diversity: Vocabulary development among learners of Spanish as a foreign language. *Revista Nebrija de Lingüística Aplicada a la Enseñanza de*

- Las Lenguas*, 13(26), 98–117. <https://doi.org/doi.org/doi:10.26378/rnlael1326300>
- Garcia, I., & Pena, M. (2011). Machine translation-assisted language learning: writing for beginners. *Computer Assisted Language Learning*, 24(5), 471-487. <https://doi.org/https://doi.org/10.1080/09588221.2011.582687>
- Gatenby, E. V. (1948). Translation in the Class-room. *ELT Journal*, II(8), 214–218. <https://doi.org/https://doi.org/10.1093/elt/II.8.214>
- Goulet, M.-J., Simard, M., Parra Escartín, C., & O'Brien, S. (2017). Using machine translation for academic writing in English as a second language: Results of an exploratory study on linguistic quality. *ASp. La Revue Du GERAS*, 72, 5–28. <https://doi.org/doi:10.1108/978-1-78756-721-420191009>
- Gu, Y. (2015). Learning strategies for vocabulary development. *Reflections on English Language Teaching*, 9(2), 105–118. <https://www.researchgate.net/publication/272494641>
- Gurina, T. (1997). Educational Implications of a Machine Translation System. *Machine Translation Review*, 6, 6-8. [www.bcs.org.uk/siggroup/nalatrán/mtreview/mtr-6/nalamt65.htm](http://www.bcs.org.uk/siggroup/nalatrán/mtreview/mtr-6/nalamt65.htm).
- Hitosugi, C. I., Schmidt, M., & Hayashi, K. (2014). Digital game-based learning (DGBL) in the L2 classroom: The impact of the UN's off-the-shelf videogame, Food Force, on learner affect and vocabulary retention. *CALICO Journal*, 31(1), 19-39. <https://doi.org/https://doi.org/10.11139/cj.31.1.19-39>
- Hulstijn, J. H. (2001). Intentional and incidental second-language vocabulary learning: A reappraisal of elaboration, rehearsal and automaticity. In P. Robinson (Ed.), *Cognition and Second Language Instruction* (pp. 258-286). Cambridge University Press.
- Hummel, K. (2010). Translation and short-term L2 vocabulary retention: Hindrance or help? *Language Teaching Research*, 14(1), 61–74. <https://doi.org/10.1177/1362168809346497>
- Jin, L., & Deifell, E. (2013). Foreign language learners' use and perception of online dictionaries: A survey study. *Journal of Online Learning and Teaching*, 9(4), 515-533.
- Johnson, B., & Christensen, L. (2012). *Educational research: Quantitative, qualitative and mixed approaches*. SAGE Publications, Inc.
- Jolley, J. R., & Maimone, L. (2022). Thirty Years of Machine Translation in Language Teaching and Learning: A Review of the Literature. *L2 Journal*, 14(1), 25-44. <https://doi.org/http://dx.doi.org/10.5070/L214151760>
- Karimian, Z., & Talebinejad, M. (2013). Students' Use of Translation as a Learning Strategy in EFL Classroom. *Journal of Language Teaching and Research*, 4(3), 605-610. <https://doi.org/doi:10.4304/jltr.4.3.605-610>

- Károly, A. (2014). Translation in foreign language teaching: A case study from a functional perspective. *Linguistics and Education*, 25, 90-107. <https://doi.org/https://doi.org/10.1016/j.linged.2013.09.009>
- Kelly, N., & Bruen, J. (2015). Translation as a pedagogical tool in the foreign language classroom: A qualitative study of attitudes and behaviours. *Language Teaching Research*, 19, 150–168. <https://doi.org/doi:10.1177/1362168814541720>
- Kliffer, M. (2005, 30th–31st May). *An experiment in MT post-editing by a class of intermediate/advanced French majors*. Proceedings EAMT 10th Annual Conference, Budapest.
- Klimova, B., Pikhart, M., Benites, A. D., Lehr, C., & Sanchez-Stockhammer, C. (2023). Neural machine translation in foreign language teaching and learning: A systematic review. *Education and Information Technologies*, 28(1), 663-682. <https://doi.org/https://doi.org/10.1007/s10639-022-11194-2>
- Koby, G., & James Baer, B. (2003). Task-based instruction and the new technology: Training translators for the modern language industry. In Brian James Baer & G. S. Koby (Eds.), *Beyond the Ivory Tower: Rethinking translation pedagogy* (pp. 211-227). John Benjamins.
- Laviosa, S. (2014). *ranslation and language education: Pedagogic approaches explored*. Routledge.
- Lee, S.-M. (2020). The impact of using machine translation on EFL students' writing. *Computer Assisted Language Learning*, 33(3), 157-175. <https://doi.org/https://doi.org/10.1080/09588221.2018.1553186>
- Lee, S.-M. (2023). The effectiveness of machine translation in foreign language education: a systematic review and meta-analysis. *Computer Assisted Language Learning*, 36(1-2), 103–125. <https://doi.org/https://doi.org/10.1080/09588221.2021.1901745>
- Liao, P. (2006). EFL Learners' Beliefs about and Strategy Use of Translation in English Learning. *RELC Journal*, 37(2), 191–215. <https://doi.org/https://doi.org/10.1177/0033688206067428>
- Lo, S. (2023). Neural machine translation in EFL classrooms: learners' vocabulary improvement, immediate vocabulary retention and delayed vocabulary retention. *Computer Assisted Language Learning*. <https://doi.org/DOI:10.1080/09588221.2023.2207603>
- Loucky, J. P. (2004). Using Computerized Bilingual Dictionaries to Help Maximize English Vocabulary Learning at Japanese Colleges. *CALICO Journal*, 21(1), 105–129. <https://doi.org/https://doi.org/10.1558/cj.v21i1.105-129>
- Loucky, J. P. (2013). Comparing Electronic Dictionary Functions and Use. *CALICO Journal*, 28(1), 156–174. <https://doi.org/https://doi.org/10.11139/cj.28.1.156-174>

- Ma, Q. (2017). Technologies for Teaching and Learning L2 Vocabulary. In Carol A. Chapelle & S. Sauro (Eds.), *The Handbook of Technology and Second Language Teaching and Learning* (pp. 45-61).
- Ma, Q., & Kelly, P. (2006). Computer Assisted Vocabulary Learning: Design and evaluation. *Computer Assisted Language Learning*, 19(1), 15 – 45. <https://doi.org/DOI: 10.1080/09588220600803998>
- Maimone, L., & Jolley, J. (2023). Looks like google to me: Instructor ability to detect machine translation in L2 Spanish writing. *Foreign Language Annals*, 1-18. <https://doi.org/https://doi.org/10.1111/flan.12690>
- Malmkjær, K. (1998). *Translation and Language Teaching: Language Teaching and Translation*. St Jerome.
- McCarthy, B. (2004). Does online Machine Translation spell the end of take-home translation assignments? *CALL-EJ Online*, 6(1), 26-39. <http://callej.org/journal/6-1.html>
- Myers, M. (2000). Voice recognition software and a hand-held translation machine for second-language learning. *Computer Assisted Language Learning*, 13, 29–41.
- Nakata, T. (2011). Computer-assisted second language vocabulary learning in a paired-associate paradigm: a critical investigation of flashcard software. *Computer Assisted Language Learning*, 24(1), 17-38. <https://doi.org/DOI: 10.1080/09588221.2010.520675>
- Navidinia, H., Akar, M., & Hendevalan, J. (2019). Using Translation in Language Teaching: Exploring Advantages and Disadvantages from Linguistic, Humanistic and Practical Perspectives. *International Journal of English Language & Translation Studies*, 7(2), 12-18. <https://eltsjournal.org/archive/value%20issue2/2-7-2-19.pdf>
- Nelson, B. (1999). WordAce! for Spanish: Talking Translation Dictionary Version 1.5. *CALICO Journal*, 16(2), 220-224. <https://doi.org/https://doi.org/10.1558/cj.32439>
- Niño, A. (2008). Evaluating the use of machine translation post-editing in the foreign language class. *Computer Assisted Language Learning*, 21(1), 29–49. <https://doi.org/doi:10.1080/09588220701865482>
- Niño, A. (2009). Machine translation in foreign language learning: Language learners' and tutors' perceptions of its advantages and disadvantages. *ReCALL*, 21(2), 241-258. <https://doi.org/10.1017/S0958344009000172>
- Niño, N. (2020). Exploring the use of online machine translation for independent language learning. *Research in Learning Technology (RLT)*, 28, 1-32. <https://doi.org/https://doi.org/10.25304/rlt.v28.2402>
- O'Neill, E. (2016). Measuring the impact of online translation on FL writing scores. *The IALLT Journal*, 46(2), 1–39. <https://doi.org/doi:10.17161/iallt.v46i2.8560>
- Omar, L. (2021). The Use and Abuse of Machine Translation in Vocabulary Acquisition among L2 Arabic-Speaking Learners. *AWEJ for Translation*

- & *Literary Studies*, 5(1), 82-98.  
<https://doi.org/http://dx.doi.org/10.2139/ssrn.3802949>
- Pardo-Ballester, C. (2022). A case study: A technological insight on teaching translation. *Foreign Language Annals*, 55(3), 894-913.  
<https://doi.org/https://doi.org/10.1111/flan.12640>
- Pekkanli, I. (2012). Translation and the Contemporary Language Teacher. *Procedia - Social and Behavioral Sciences*, 46, 955-959.  
<https://doi.org/https://doi.org/10.1016/j.sbspro.2012.05.230>
- Pennycook, A. (2008). English as a language always in translation. *European Journal of English Studies*, 12(1), 33-47.
- Perscheid, M. (1985). Computer-aided Translation at WCC. *CALICO Journal*, 3(3). <https://doi.org/https://doi.org/10.1558/cj.v3i1.22-24>
- Popescu, T. (2013). Developing English Linguistics Students' Translation Competence through the Language Learning Process. *Procedia - Social and Behavioral Sciences*, 93, 1075-1079.  
<https://doi.org/https://doi.org/10.1016/j.sbspro.2013.09.333>
- Ranathunga, S., Lee, E.-S., Skenduli, M., Shekhar, R., Alam, M., & Kaur, R. (2023). Neural Machine Translation for Low-resource Languages: A Survey. *ACM Computing Surveys*, 55(11), 1-37.  
<https://doi.org/10.1145/3567592>
- Rogers, M. (1996). Beyond the dictionary: the translator, the l2 learner and the computer. In G. Anderman & M. Rogers (Eds.), *Words, words, words: the translator and the language learner* (pp. 69–95). Multilingual Matters.
- Sakamoto, A. (2022). Translation and Technology. In K. Malmkjær (Ed.), *The Cambridge Handbook of Translation* (pp. 55-74). Cambridge University. <https://doi.org/10.1017/9781108616119>
- Shabara, R. (2014). *The impact of Egyptian EFL in-service teachers' beliefs about language teaching and learning on their classroom practices and students' achievement: A mixed-methods study* Ain Shams University, Egypt].
- Slocum, J. (1985). A survey of machine translation: its history, current status, and future prospects. *Computational Linguistics*, 11(1), 1-17.
- Somers, H. (2001). *Three Perspectives on MT in the Classroom* MT Summit VIII Workshop on Teaching Machine Translation, Santiago de Compostela, Spain.
- Stapleton, P., & Ka Kin, B. (2019). Assessing the accuracy and teachers' impressions of Google Translate: A study of primary L2 writers in Hong Kong. *English for Specific Purposes*, 56, 18-34.  
<https://doi.org/https://doi.org/10.1016/j.esp.2019.07.001>
- Sun, P., & Bing, M. (2022). Modeling preservice Chinese-as-a-second/foreign-language teachers' adoption of educational technology: a technology acceptance perspective. *Computer Assisted Language Learning*, 35(4), 816-839. <https://doi.org/https://doi.org/10.1080/09588221.2020.1750430>

- Tang, G. (1997). Pocket electronic dictionaries for second language learning: help of hindrance. *TESL Canada Journal*, 15(1), 39–57. <https://doi.org/doi:10.18806/tesl.v15il.691>
- Tsai, P.-S., & Liao, H.-C. (2021). Students' progressive behavioral learning patterns in using machine translation systems – A structural equation modeling analysis. *System*, 101, 102594. <https://doi.org/https://doi.org/10.1016/j.system.2021.102594>
- Tseng, W., & Schmitt, N. (2008). Toward a Model of Motivated Vocabulary Learning: A Structural Equation Modeling Approach. *Language Learning*, 58(2), 357-400. <https://doi.org/https://doi.org/10.1111/j.1467-9922.2008.00444.x>
- Urlaub, P., & Dessen, E. (2022). Machine translation and foreign language education. *Front Artif Intell.*, 1-5. <https://doi.org/10.3389/frai.2022.936111>
- Valijärvi, R. L., & Tarsoly, E. (2019). Language students as critical users of google translate: pitfalls and possibilities. *Practitioner Research in Higher Education Journal*, 12(1), 61–74.
- van Lieshout, C., & Cardoso, W. (2022). Google Translate as a Tool for Self-Directed Language Learning. *Language Learning & Technology*, 26(1), 1–19. <https://doi.org/http://hdl.handle.net/10125/73460>
- Van Praag, B., & Sanchez, H. (2015). Mobile technology in second language classrooms: Insights into its uses, pedagogical implications, and teacher beliefs. *ReCALL*, 27(3), 288-303. <https://doi.org/doi:10.1017/S0958344015000075>
- White, K., & Heidrich, E. (2013). Our policies, their text: German language students' strategies with and beliefs about web-based machine translation. *Teaching German*, 46(2), 230–250. <https://doi.org/doi:10.1111/tger.10143>
- Yuste, E. (2002). *MT and the Swiss language service providers: An analysis and training perspective* 6th EAMT Workshop Teaching Machine Translation, Manchester.