Machine Translation
An Enduring Chasm between Language Students and Teachers

Amanda Brown
Associate Professor of Linguistics
Advisor, M.A. Linguistic Studies
Coordinator, CAS Language Teaching: TESOL/TLOTE; Minor TESOL
Dr Caroline Bennett
Dr Gail Bulman
Dr Stefano Giannini
Dr Rania Habib
Dr Emma Ticio Quesada
Dept. of Languages, Literatures, and Linguistics
340 H.B. Crouse Hall, Syracuse University
Syracuse, NY 13244, USA

Syracuse University

Abstract

The COVID-19 pandemic has elevated focus on educational technologies (Elaish, et al., 2021). One area of sustained controversy in this domain centers around machine translation (MT), where language teachers and students have historically disagreed (Lee, 2020). While research has demonstrated the benefits of MT (e.g. Benda, 2013; Chon et al. 2021; Correa, 2014; Dziemianko, 2017; Enkin & Mejías-Bikandi, 2016; Garcia & Pena, 2011; Lee, 2020; Lee & Briggs, 2021) and studies have consistently reported frequent student usage of MT (e.g. Alhaisoni & Alhaysony, 2017) Clifford, Merschel, & Munné, 2013; Jin & Diefell, 2013; Tsai, 2019; Yang & Wang, 2019), teacher views have traditionally been negative (e.g. Case; 2015; Clifford, Merschel, & Munné, 2013; Niño, 2009; Stapleton & Leung Ka Kin, 2019). Given that recent research on MT has targeted ESOL (e.g. Lee, 2020; Murphy Odo, 2019; Tsai, 2019), that MT itself has evolved considerably since 2016 (Yang & Wang, 2019), and that teacher beliefs can be influenced by

professional development and context (Borg, 2015), this study examined (1) contemporary attitudes toward and practices around MT among students (n=75) and teachers (n=25) of diverse languages, and (2) changes in instructor views after high impact pedagogical events: (a) a professional development seminar specifically on MT and (b) the "crisis-prompted [shift to] remote language teaching" (Gacs et al, 2020) as a result of the global COVID-19 pandemic. Results from four surveys indicate a wide, enduring chasm between students, who increasingly use and feel positively towards MT but are varied in their understanding of implications of its use for academic integrity, and teachers, most of whom make no instructional use of MT, feel negatively about it, have clearer reviews on its relationship to academic integrity, and maintain their views after specific professional development and broad and far-reaching contextual events related to technology. Implications for practice, especially in the context of a surge in academic integrity violations related to MT during the COVID-19 pandemic (Çelik & Lancaster, 2021), will be discussed. [326]

Key words: machine translation; Google Translate; teacher beliefs; teaching practice; student beliefs; diverse L2; higher education; COVID-19; professional development; academic integrity

Machine Translation: An Enduring Chasm between Language Students and Teachers

Introduction

The COVID-19 pandemic and its "crisis-prompted remote language teaching" (Gacs et al, 2020) has elevated focus on educational technologies (Elaish, et al., 2021). One area of sustained controversy in this domain centers around machine translation (MT), where language teachers and students have historically disagreed (Lee, 2020). While research has demonstrated benefits of MT (e.g. Benda, 2013; Chon et al. 2021; Correa, 2014; Dziemianko, 2017; Enkin & Mejías-Bikandi, 2016; Garcia and Pena, 2011; Lee, 2020), and students report frequent usage (e.g. Alhaisoni & Alhaysony, 2017) Clifford, Merschel, & Munné, 2013; Jin & Diefell, 2013; Tsai, 2019; Yang & Wang, 2019), teacher views have traditionally been negative (e.g. Case; 2015; Clifford, Merschel, & Munné, 2013; Niño, 2009; Stapleton & Leung Ka Kin, 2019). Given that recent MT-related research has focused on ESOL (e.g. Lee, 2020; Murphy Odo, 2019; Tsai, 2019) and that MT itself has evolved considerably since 2016 (Yang & Wang, 2019), this study first compared contemporary attitudes and practices towards MT from students and teachers of diverse languages. Second, given that professional coursework and contextual factors can both constitute key influences on teacher beliefs (Borg, 2015), we also examined the potential for change in instructor views after high impact pedagogical events: (a) a professional development (PD) seminar specifically on MT and (b) the switch to online instruction due to the global COVID-19 pandemic. Results from four surveys indicate that the current chasm between students and instructors is wide and persists beyond both professional development and a far reaching global event.

2.   Background

Definitions and History

Machine translation (MT) refers to input text in one language translated into output text of another language without human intervention. Stemming from a 1954 small-scale military experiment

(Hutchins, 2004), today's MT use is widespread "because of its convenience, multilingualism, immediacy, efficiency, and free cost" (Lee, 2020, p.1-2). MT has cycled through different models. *Statistical Machine Translation (SMT)* is trained with human translations to create statistical paradigms calculating most likely translations (Moorkens, 2018). SMT was effective for technical texts and with repetitive phrases common in daily life (Lin & Chien, 2009). However, less common and more context-bound texts created poor output text (van Rensburg et al., 2012). The most widely used practical implication of SMT systems (Wu et al., 2016), *Phrase-based Statistical Machine Translation (PBSMT)*, translates word/phrase chunks from input sentences (Le & Schuster 2016). Because each chunk still triggers many possible translations, context is to a degree lost. Introduced in 2006, Google Translate (GT) used PBSMT. The most recent innovation, *Neural Machine Translation (NMT),* takes entire sentences as input units, learning the mapping between input sentences and output sentences directly through Recurrent Neural Networks (RNNs). Upon release in 2016 of the Google Neural Machine Translation (GNMT), weaknesses were noted (slow training, issues with translating infrequent words, and failure to translate all words), resulting in lesser performance as compared to PBSMT (Wu et al., 2016). Advances by the Google Brain Team addressed the weaknesses (Le & Schuster, 2016), and the system boasted a 60% reduction in prior errors (Castelvecchi, 2016; Wu et al., 2016). The quality scores of NMT have steadily improved over time in comparison to SMT (Sánchez-Gijón et al., 2019), though continued improvements are needed to rectify missing words, errors with proper nouns, and insufficient consideration of context (Le & Schuster, 2016; see also Chon et al. 2021).

Student Attitudes Towards MT

Given critical technological advances over time, it is illuminating to consider research on student attitudes towards MT chronologically. Kliffer (2005) introduced MT to 11 third-year university students through post-editing (i.e. editing after initial translation) French-to-English translations. Two thirds of students reported the activity as relatively useful, while the remainder were split between positive and negative extremes. A subsequent large-scale survey of university-level

English language learners in Taiwan found an overwhelmingly agreed-upon belief that translating was helpful for language acquisition, despite some concerns, and common use of a wide array of translation strategies employing MT (Liao, 2006).

By 2009, Niño's survey of 16 advanced-level students of Spanish found three-quarters believing MT to be useful, with most claiming contributions to improved L2 abilities and increased confidence in L2 writing. Similarly, in their survey of perceptions of MT among 16 beginning/intermediate-level language learners, Garcia and Pena (2011) found that participants overwhelmingly felt that MT helped them better express themselves in L2 writing. The intermediate-level students, however, expressed concern that a dependency on MT could have negative, long-term outcomes. In their 2013 large-scale surveys of US-based university learners of various languages/levels of proficiency, Clifford, Merschel, and Munné reported 89% of learners of Spanish asserting the utility of MT, with 78% judging it at least somewhat accurate. Among learners of French, 81% reported using MT, for translating into French (96%), accessing vocabulary (91%), individual words (89%), phrases (62%), full sentences (16%), and short paragraphs (7%) in writing (43%) and pre-writing (42%). Results also indicated MT use to translate into L1: for reading (60%), understanding instructions (55%), double-checking self-produced text (51%), and understanding audio/video (14%). Students described some limitations, and most (63%) described it being helpful only sometimes. The researchers also examined the evolution of students' MT use, finding 50% reported no change throughout their study, and very few reported increased use. Similar levels and types of MT use were reported in Jin and Diefell's (2013) large-scale investigation of learners of 18 foreign languages in contexts across the US.

In recent studies, student attitudes are somewhat mixed. Alhaisoni and Alhaysony's (2017) survey of 92 Saudi university-level English majors found that almost all students reported using GT (57% always/often), most frequently for vocabulary, writing, and reading, because of its free cost, easy access, and speed of translation. Regarding accuracy, 75% of students felt that GT could be used at least somewhat effectively to translate individual words, whereas a similar

percentage considered it ineffective for translating paragraphs or full texts. Bahri and Mahadi's (2016) study of 16 international students learning Bahasa Malaysia found that while most students disagreed with using GT to develop grammar, listening, or speaking skills, most at least partially agreed with using GT to develop reading, writing and vocabulary skills. Brigg's (2018) survey of 80 Korean university-level EFL students found 41% describing MT outputs as untrustworthy, 63% feeling confident in their ability to detect inaccuracies, and only 34% using it for assignments. However, approximately 50% felt that MT was valuable as a language learning tool and that its use should be permitted in class.

In Moorkens's (2018) comparison of SMT versus NMT, 93% of students were impressed by the accuracy of NMT, though also reported an awareness of possible errors. In Tsai (2019), 64% of EFL students in one Chinese context reported that GT was helpful for L2 writing, but just over a quarter thought it needed improvement regarding grammar and syntax. The 17 Korean EFL learners surveyed in Murphy Odo (2019) reported that MT use helped them improve and feel more confident in their writing abilities, noting speed and zero-cost advantages but also limitations of incorrect or awkward translations, limited long-term retention of MT-learned terms, and the danger of dependence on MT tools. In Yang and Wang's (2019) study of 109 university-level EFL learners in China, all students reported using MT sometimes or often, many noting its simplicity and utility. Finally, in Lee's (2020) study of 34 university-level EFL learners in Korea, students initially expressed skepticism about MT, but after comparing student-translated versus MT texts, their expectations of the utility and accuracy of MT were exceeded.

Teacher Attitudes towards MT

In a 2009 survey of 30 international, university-level foreign language tutors' attitudes towards MT, Niño (2009) noted that while 70% of tutors reported using MT for their own purposes, only 23% reported instructional use; 30% reported a desire to try it, and 30% reported that they would not use it. Although tutors noted a number of advantages, including potential for error detection,

user friendliness, and speed of performance, they also noted disadvantages, many related to perceived accuracy.

In Clifford, Merschel, and Munné's (2013) survey of 43 US-based university-level instructors of French, Italian, Portuguese and Spanish, 42% equated MT use to cheating, with 37% undecided. The majority (77%) disapproved of student use, with the remainder only being neutral. Most (72%) reported having an in-class discussion or instruction relevant to MT use only once per semester, with 9% never doing so. Ultimately, only 7% believed MT was useful for language learning while 33% reported MT not being useful at all.

Case (2015) investigated instructor attitudes towards MT before and during PD within a technology-mediated, higher-education context in Sweden. Of the 35 instructors of various languages surveyed, 69% used MT themselves but 63% believed that student MT use was cheating to some degree. Upon discussing the survey results during PD, instructors did not reiterate responses, but instead discussed the inevitability of MT use and a need to develop requisite MT skills. Additional contradictions emerged in discussion of the context-dependent nature of whether MT constituted cheating since despite the importance of context, most teachers did not instruct their students on (in)appropriate contexts for MT use.

Stapleton and Leung Ka Kin's (2019) study asked teachers to grade a series of compositions in English, half having been translated from the L1 (Chinese) into English by Google Translate. Both Cantonese-speaking and native English-speaking teachers graded non-GT scripts lower on average for grammar and vocabulary, though not comprehensibility. After being informed about the GT-generated texts, instructors were "surprised," "amazed," and "shocked." Errors were noted in all texts, but determining the source to be GT was challenging. Further, while nine of the 12 teachers were not against MT/GT as a learning tool, all 12 teachers expressed disapproval of student use at the sentence level or above. Some teachers suggested they should provide training for students on MT/GT for best educational practices, but two thirds believed that GT is too inaccurate to be considered trustworthy. Strikingly, after learning that they were unable

to detect the use of GT in texts, some teachers did reassess their views, but most maintained their original views.

The literature cited has documented increasingly frequent student use and often positive student views toward MT, though some recent studies focused on EFL contexts have reported mixed attitudes. While instructors make personal use of MT tools, they have generally expressed negative views towards student MT use, especially beyond the word level. However, with the introduction of NMT, MT has advanced, and the popular GNMT has evolved considerably since 2016. Thus, this study first examined contemporary attitudes toward and practices around MT among students and teachers of a range of languages. Second, given that teacher attitudes towards MT have been historically negative but beliefs can be transformed by professional coursework or contextual factors (Borg, 2015), we re-surveyed subgroups of teachers after a professional development seminar specifically focused on MT and then one final time after the switch to online instruction during the COVID-19 global pandemic, which increased the use of instructional technologies to an unprecedented level.

Method

Participants

First, seventy-five university-level language learners of varied first (English, French, Hungarian, Portuguese, Spanish, Tagalog) and second languages (Arabic, ASL, Chinese, English, French, German, Hebrew, Italian, Korean, Latin, Russian, Spanish, Tagalog, Thai) and proficiencies participated in the survey of student attitudes and practices towards MT. Second, a parallel survey was administered to 25 university-level language instructors with varying levels of professional experience (pre-service to 40 years) of teaching diverse languages (Ancient Greek, Arabic, Chinese, English, French, German, Hebrew, Italian, Japanese, Latin, Russian, Spanish, Ukrainian) and proficiencies. Third, a sub-group of eight instructors participated in a PD roundtable on MT with an associated survey completed after the session. Finally, a sub-group of

15 instructors was surveyed to determine changes in attitudes after the transition to online teaching during the COVID-19 pandemic.

Materials

Surveys - The student survey contained questions targeting L1/2 backgrounds; experience, frequency, and level of confidence in MT use for language study; MT platform used (e.g. Babylon, Bing Microsoft Translator, Google Translate); type of activity (e.g. translation of individual words versus sentences); targeted skill in MT use (e.g. reading, listening); areas of study for MT use (e.g. spelling, pronunciation, location of synonyms); opinion of MT in terms of accuracy, effectiveness, and limitations; experiences of classroom/academic integrity policies/guidelines and observations of instructor comments and practices regarding MT; and views of academic integrity as it relates to MT.

The first instructor survey replicated the student survey, with additional questions eliciting languages and proficiency levels taught; level of professional experience; institutional, classroom and homework policies and guidelines on use of technology and MT and related policies on academic integrity; and views about and levels of confidence in use and detection of use of MT. Two subsequent instructor surveys were implemented to elicit any change in attitudes towards MT after potentially transformative events noted by Borg (2015) as key influencers on teacher beliefs: 'professional coursework' operationalized as a PD seminar (see below), and 'contextual factors,' operationalized as the transition to online teaching as a result of the COVID-19 pandemic.

Professional Development Session - A 1.5-hour PD roundtable began with a brief presentation covering some MT tools, e.g. Babylon, Microsoft Bing, Google Translate, with an overview of how such systems work. Some advantages of MT and specifically GT were provided, for example, its speed, accuracy, zero cost, as well as disadvantages, including inaccuracies in grammar and style, variation in accuracy across languages, and potential for breaches of confidentiality. The presenters reviewed some common student uses that could be perceived favorably by instructors (e.g. facilitation of reading comprehension and editing writing), and closed with some empirical

research findings presented on MT and academic integrity (e.g. McCarthy, 2004), and the benefits of MT, especially in writing and at lower levels of proficiency (e.g. Garcia & Pena, 2011; Kliffer, 2005; Niño, 2009). PD attendees also shared their experiences and observations, discussing differences between MT tools and online dictionaries. Some expressed awareness of student MT use despite classroom policies, and others desired knowledge on how to incorporate MT tools into teaching practices in order to harness advantages and counteract disadvantages. The majority of discussion time was taken with instructors voicing concerns, citing issues such as perceptions of the detrimental effects on learner motivation of MT use, the ability to process text in cursive, and the potential for academic integrity violations.

Results

Student and Instructor Attitudes Towards and Practices Around MT

We first juxtapose student versus instructor behaviors and attitudes based on the first and second surveys.

Frequency of personal and instructional MT use **-** Almost all students (96%) reported using some form of MT for personal language study, as compared to 83% of teachers, though some teachers noted that MT did not exist when they began language study. Figure 1 illustrates a more frequent use among students as compared to instructors for self-study.
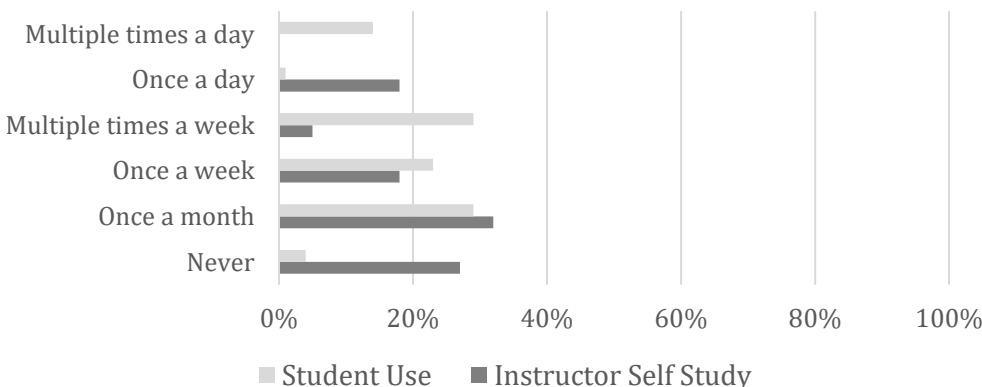

Fig. 1: *Frequency of personal use of MT for language student/instructor*

However, in contrast to personal use, no instructors reported incorporating MT into their instruction, matched by only 10% of students reported perceiving some use by instructors.

Types of MT used: A majority of students (94%) and instructors (79%) reported using Google Translate, though some (27% of students; 17% of instructors) alternatively/additionally mentioned other tools for self-study.

Functions of MT use: As shown in Figure 2, students and instructors reported bidirectional MT translations. However, differences existed in the length of translations, with 25% more instructors than students translating at the word level, and many students translating segments at and above the word level.
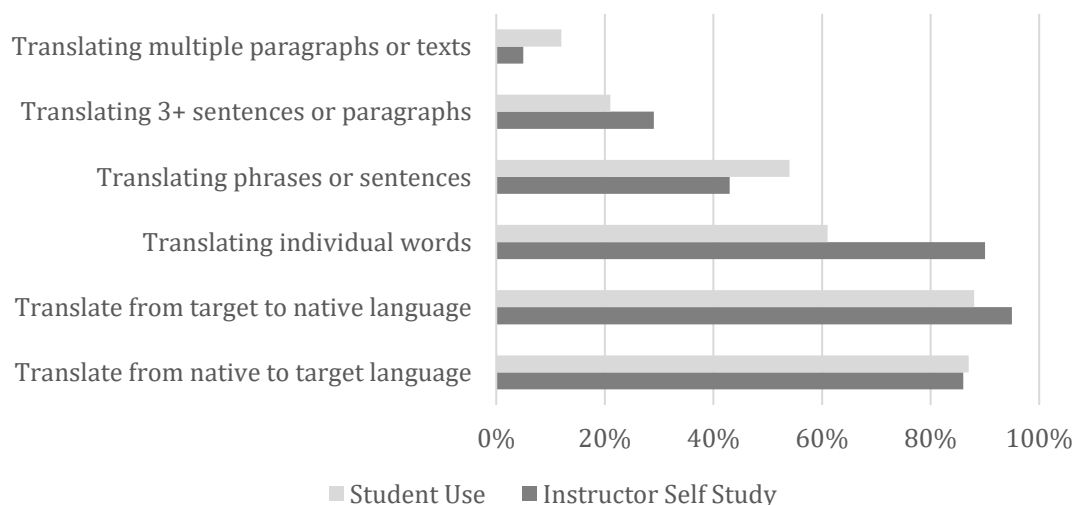

Fig. 2: *Functions of MT use in student/instructor self-study*

Groups also detailed MT usage in their own L2 reading, writing, speaking, and listening, with results shown in Table 1.

Table 1: *MT usage in L2 reading, writing, speaking, and listening for student/instructor self-study*

	Students		Instructors	
	% MT use	Type of use	% MT use	Type of use
L2 Reading	91%	As a dictionary to access meaning/pronunciation of unknown words, phrases, or	40%	As an online dictionary for

		above from target to native languages.		accessing unknown words.
L2 Writing	97%	As a dictionary for accessing unknown words or phrases, generally from native to target languages. As a tool to check spelling, grammar, and sentence structure for editing.	53%	To access word meaning.
L2 Speaking	61%	To check pronunciation or to locate an unknown/forgotten lexical item.	25%	To check pronunciation.
L2 Listening	55%	To translate recorded texts e.g. lectures.	5%	To check understanding.

Attitudes towards MT: Figure 3 reveals that more than three quarters of students versus fewer than half of their instructors reported believing that MT tools provided accurate translations. Comparable proportions of students and instructors disagreed/strongly disagreed with the assertion of MT accuracy, but more than ten times the proportion of teachers to students were neutral.
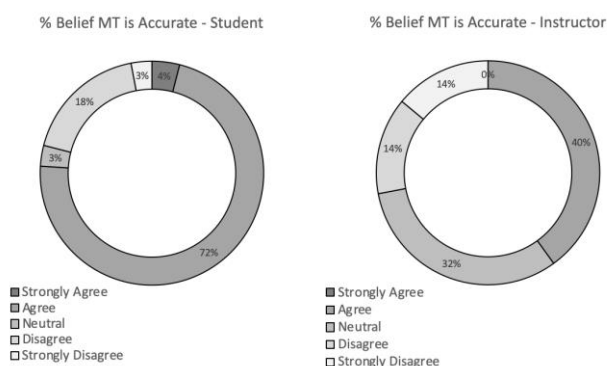

Fig. 3: *Level of agreement with "MT is accurate" among students/instructors*

Figure 4 shows that two thirds of students agreed/strongly agreed that MT tools were effective for language learning, as compared to roughly a third of instructors. Again, almost the same proportions of students and instructors disagreed/strongly disagreed, and nearly five times the proportion of instructors as students were neutral.
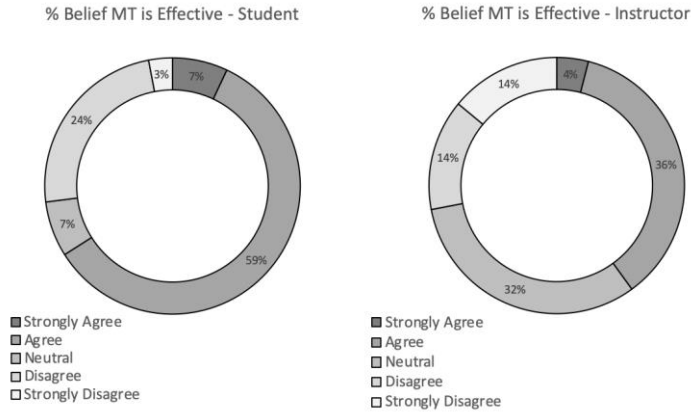
% Belief MT is Effective - Student

% Belief MT is Effective - Instructor

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Fig. 4: *Level of agreement with "MT is effective for language learning" among students/instructors*

Student and instructor confidence in their ability to use MT effectively for language learning was fairly parallel (Fig. 5), with most reporting being confident/very confident. A higher percentage of instructors than students reported no confidence, though these responses were overall few in number and the difference in sample sizes should be remembered.
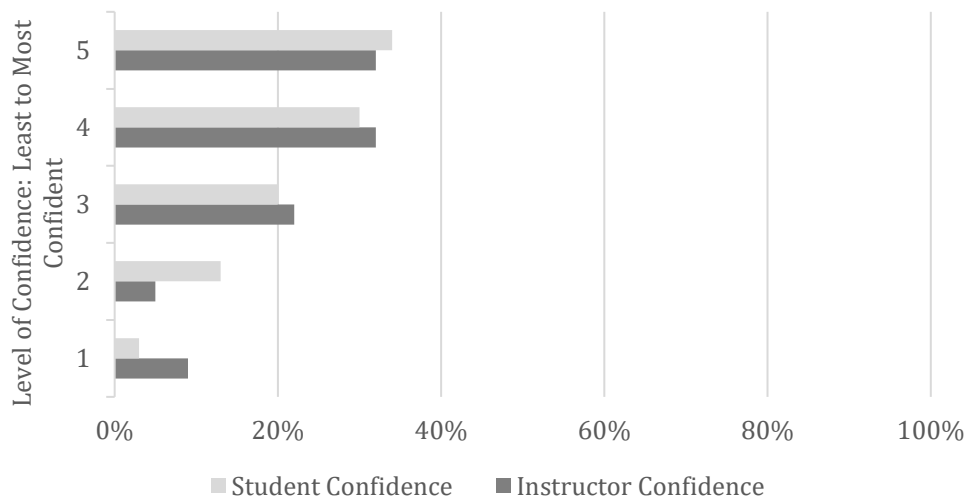

Fig. 5: *Level of student/instructor self confidence in effective MT use*

Both populations commented on perceived limitations of MT, with a number relating comments to GT specifically. The vast majority of students focused on inaccuracies in general or specific types of language such as idioms, slang, and highly context-dependent language. Students also questioned the accuracy of grammatical productions especially with morphology and with longer texts. Some students noted MT's limitations for single word translations,

complicated by synonyms. Only two students specifically noted limitations of MT for language learning. More than half of the instructor comments also focused on inaccuracy, noting issues such as insufficient consideration of context, especially register, and weaknesses with specific linguistic features. Instructors also described the lack of effectiveness or even perceived detrimental effects of MT use for language learning.

MT use and academic integrity: Figure 6 illustrates that almost half of the instructors reported prohibiting MT for in-class work; just under one quarter reported allowing unqualified use, and just over one quarter reported allowing qualified use, e.g. accessing word meaning, especially in cases where the instructor could not provide a translation, and late-stage editing, though not for graded in-class assignments. Slightly fewer instructors reported prohibiting MT use for homework; fewer than a quarter reported unqualified permission for use, and closer to half reported qualified permission for use, e.g. for single word translations especially items not covered in class, as input for oral but not translation assignments, and required revision of MT output before incorporation. One instructor reported not addressing MT use with students in relation to in-class/homework.
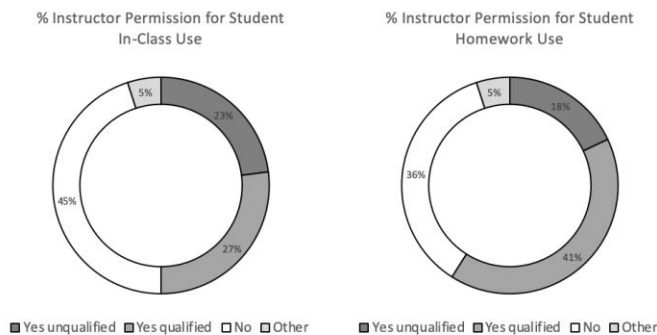

Fig. 6: *Instructor permission for student MT use for in-class work and homework*

Given the focus on MT and academic integrity in prior research, instructors were surveyed on whether they included MT tools in their classroom guidelines/policies. Half of instructors stated that their technology guidelines featured (in)appropriate MT use. Such guidelines most commonly appeared on the syllabus and/or were incorporated in teacher announcements. Roughly one third

discussed MT use in relation to academic integrity outside of technology guidelines, sometimes featuring (in)appropriate MT use as part of a lesson.

From the student perspective, only about one third recalled instructor mention of (in)appropriate MT use as part of academic integrity discussions; a quarter said it was not discussed at all, and just under one half could not recall (Fig. 7). Almost none recalled receiving training by instructors on appropriate MT use for classroom-based language learning, and almost two thirds admitted to using MT tools even after being instructed not to do so by their teachers.
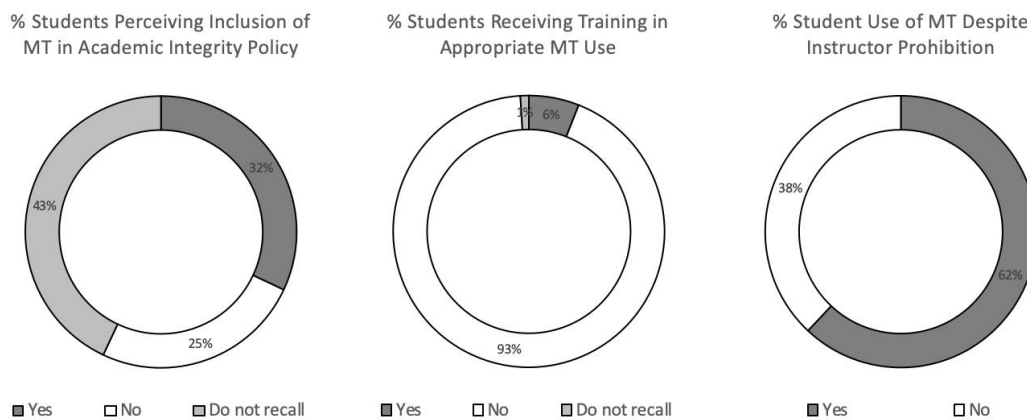

% Students Perceiving Inclusion of MT in Academic Integrity Policy
32% — 25% — 43%
■ Yes □ No ■ Do not recall

% Students Receiving Training in Appropriate MT Use
1% — 6% — 93%
■ Yes □ No ■ Do not recall

% Student Use of MT Despite Instructor Prohibition
38% — 62%
■ Yes □ No

Fig. 7: *Student perceptions on featuring of MT tools in academic integrity policies, training on appropriate MT use, and prohibited MT use*

Regarding the types of MT uses considered violations of academic integrity, Figure 8 reveals fairly uniform instructor responses, with length of translation positively relating to perceptions of violation. However, student perceptions were much more varied. Some felt that checking their grammar/spelling, translating assignment instructions/questions, or translating individual words constituted integrity violations, but no instructors shared such views. Conversely, many fewer students than instructors felt that translating three sentences or above constituted academic integrity violations, while instructors unanimously felt that these were clear cut cases. Regarding "other" responses, some students did not consider any MT uses to constitute academic integrity violations, while one reported that only MT use during an exam would be a violation,

whereas instructor selections of "other" were qualified with statements that MT use without attribution would be considered a violation.
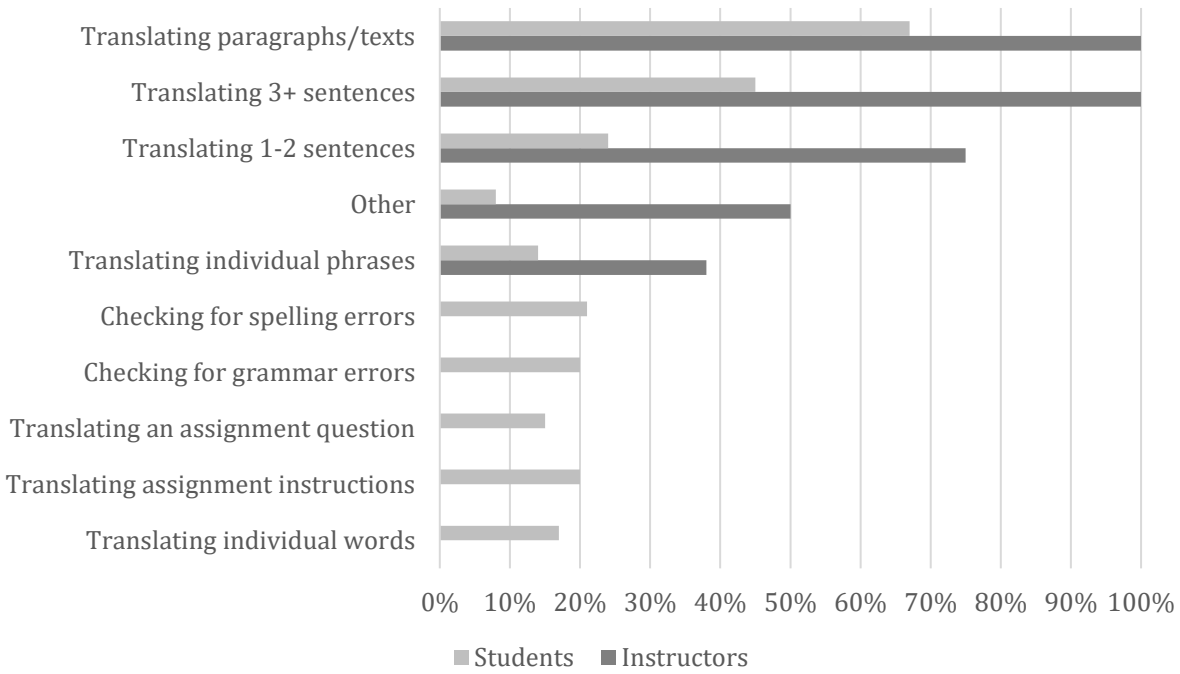

Fig. 8: *Student/instructor perceptions of types of MT use constituting academic integrity violations*

In statements about penalties appropriate for academic integrity violations, most students (72%) thought a one-on-one meeting with the instructor would be appropriate, while 52% of instructors thought the same. One third of students stated that they thought a failing grade for an assignment would be appropriate, while almost half of instructors thought the same. A smaller proportion of students (13%) and instructors (22%) felt that officially reporting the violation would be appropriate; however, all instructors stated that reporting should not be done with a first offense. A small proportion of students (12%) selected other options, including not responding at all, asking the student to redo the assignment, and offering the student tutoring. Almost half of the instructors (48%) selected other options, which mostly involved specifying the order of the aforementioned strategies, e.g. a one-on-one meeting for a first offense, and zero grade or

reporting for a second offense. One instructor noted that it was hard to prove academic integrity violations and another reported emphasizing available instructional help.

Finally, most instructors reported being confident/very confident they would be able to detect student MT use in class/homework (Fig 9). This can be juxtaposed against the low levels of student concern about this issue.

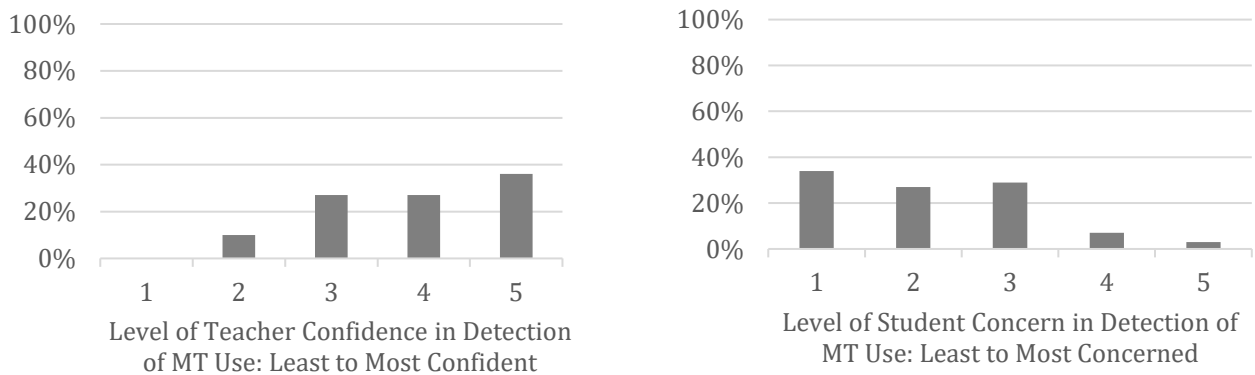Fig. 9: *Levels of teacher confidence and student concern in detection of student MT use*

Instructor Attitudes Toward MT After PD

A subset of eight instructors, diverse in languages and levels of experience, were additionally surveyed to detect changes in their attitudes towards MT after taking part in a PD roundtable discussion on MT. Results from the two surveys are shown in Table 2.

Table 2: *Instructor attitudes and behaviors around MT in initial (items 1-9) and post-PD (items 10-11) surveys*

Instructor	1	2	3	4	5	6	7	8
1 Language taught	Mandarin Chinese, English	English	Mandarin Chinese, English	Arabic, English	English	Spanish	English	Spanish
2 Amount of teaching experience	15 years	Pre-service	5 years	20 years	2 years	25 years	1 year	20 years
3 Frequency of personal MT use	Daily	Daily	Daily	Occasional	Infrequent	None	Frequent	Frequent
4 Confidence in personal MT use	Confident	Confident	Confident	Confident	Somewhat confident	No confidence	Confident	Somewhat confident
5 MT is accurate	Neutral	Neutral	Neutral	Agree	Neutral	Neutral	Agree	Agree
6 MT is useful for language learning	Neutral	Agree	Agree	Disagree	Disagree	Disagree	Agree	Neutral
7 Allow MT for in-class work	Allow	Allow	Prohibit	Prohibit	Allow with restrictions	Prohibit	Encourage	Prohibit
8 Allow MT for homework	Allow	Allow	Prohibit	Prohibit	Allow with restrictions	Prohibit	Encourage	Prohibit
9 MT use constitutes violation of academic integrity	Translation at sentence level and beyond	Translation at sentence level and beyond	Translation at sentence level and beyond	Translation at sentence level and beyond	Translation of multiple paragraphs and beyond	Translation at sentence level and beyond	Translation at sentence level and beyond	Translation at sentence level and beyond
10 Change in attitudes after PD	No change	No change	Minimal change	No change	No change	No change	No change	No change
11 Additiona	Stated MT can	Stated MT tools are	Stated MT tools could	Stated MT tools	Stated MT tools	Expressed a desire	Remained very	Expressed positive

I Comments	be helpful if used in moderation.	useful, but can distract students and should not be relied upon.	be used to indicate pronunciation but should not replace paper dictionaries.	have become better but are detrimental to language learning in some contexts such as the learning of Arabic.	inhibit cognitive processing	to conduct or access more research on MT in order to "*harness the value and benefit*."	positive attitudes towards MT and wished that colleagues felt the same.	attitudes about personal use in translation work but reservations about student use for language learning.

In summary, after a 1.5 hour PD session on MT, only one instructor out of eight minimally changed their attitudes towards MT, newly seeing its value though only in one constrained context (pronunciation). Of the seven remaining instructors, five continued to express varying levels of concern about MT use among students, one desired more information, and one remained positive. Thus, the effects of this specific instance of PD, at least as measured in change of attitudes, were almost non-existent, with almost no instructors changing their views and the majority maintaining somewhat negative attitudes towards student MT use. This is striking given that PD attendees were a self-selected group, presumably interested enough in MT to attend.

Instructor Attitudes Toward MT After Transition to Online Instruction

Finally, given the massive increase in focus on and use of educational technologies after the transition to online teaching as a result of the global COVID-19 pandemic, a subset of 15 instructors were additionally surveyed to detect any changes in their attitudes towards MT post-online transition. Due to the significant burdens on instructors at that challenging time, the new survey contained only one open-ended question. 73% of the instructors surveyed reported that their attitudes towards MT had not changed since the transition to online teaching. All but one of those instructors had previously reported prohibiting MT use for in-class/homework and continued this practice, sometimes with additional safeguards, e.g. asking students to submit an initial handwritten piece, completed under proctoring, to compare with later typed pieces. One instructor

permitted MT use prior to the transition and continued to feel positively about its use after the transition. The remaining 27% of instructors reported that they had changed their views to some extent. Three instructors, who had previously not allowed MT for in-class/homework, later reported a change of feelings, but largely because they perceived that the online medium had reduced their level of instructional control or had overburdened students. Those instructors additionally stated continued concern about MT, with one saying that MT is not used by students "*who want to learn the language*", and another bemoaning the lack of "*thoughtful exercises created using* [MT] *that help with language learning."* A final instructor allowed students to use MT before the transition, and after became more positive, citing its increased importance in the context of diminishing contact with instructors during remote instruction.

Discussion

Results from surveys of student versus instructor MT-related practices/attitudes for language teaching/learning revealed some points of similarity, but more difference. Regarding common ground, from the outset before the COVID-19 pandemic and associated transition to online instruction, both students and instructors reported using MT, mainly GT, for their own language learning, at varying levels of frequency, and most with good levels of self-confidence. Both groups reported bidirectional MT use (L1-L2/L2-L1), translations of differing lengths, with word-level preferences, and more frequent use for L2 reading and writing than listening and speaking, results in line with others published (Alhaisoni & Alhaysony, 2017; Bahri & Mahadi, 2016; Clifford, Merschel, & Munné, 2013; Garcia & Pena, 2011; Jin & Diefell, 2013). No instructors reported making instructional use of MT in their own language teaching, and few students reported observing instructional use of MT in their language classes. Both groups also agreed that some uses of MT would constitute violations of academic integrity with consequent penalties. Finally, somewhat less than found elsewhere (Alhaisoni & Alhaysony, 2017; Briggs, 2018; Stapleton & Leung Ka Kin, 2019), roughly one quarter of students and instructors disagreed with the

assertions that MT tools were accurate and effective for language learning, citing similar limitations around register/dialectal variation and grammatical inaccuracies (see also e.g. Murphy Odo, 2019). Like Jin and Diefell (2013), these findings were consistent across diverse L2s.

Students were generally more extreme in the responses above. A smaller proportion of students than instructors reported a lack of confidence in their ability to use MT, and a higher proportion reported translating at the sentence level and beyond. A higher proportion of students than instructors reported frequent use of MT and use for all skills, while a smaller proportion reported never using it, all in line with other research (e.g. Alhaisoni & Alhaysony, 2017; Clifford, Merschel, and Munné, 2013; Jin & Diefell, 2013). Other early findings (e.g. Niño, 2009) that while teachers use MT personally, most do not incorporate MT into their language instruction were also strongly supported in the current study.

Other differences between the groups were more prominent. Instructors reported MT use primarily at the word level, with considerable student use reported at/above the word level (see also Clifford et al., 2013; Murphy Odo, 2019). A much larger proportion of students than instructors felt that MT tools were accurate and effective for language learning (see Clifford et al., 2013), whereas a larger proportion of instructors were neutral on these issues. Reported types of MT use are notable alongside instructional policies around MT use and perceptions of academic integrity violations. Fewer than a quarter of instructors permitted free student MT use, with many actively prohibiting it, but two thirds of students admitted to using MT despite prohibitions. Instructors were often unanimous in views on MT-related academic integrity violations, while students were mixed, with some more conservative than instructors. Furthermore, opposing patterns were found in faculty confidence in detection of student MT use - overall high - and student concern about faculty detection of student MT use - overall low, noteworthy given that teachers may be unable to detect MT texts (Stapleton & Leung Ka Kin, 2019).

Related to student training in academic integrity, only half of the instructors reported that technology guidelines presented to students mentioned MT and academic integrity, and only a

third reported other avenues for such discussions. A minority of students recalled seeing such guidelines, and almost all reported receiving no training in (in)appropriate uses of MT (see also Case, 2015; Clifford et al., 2013). If instructors provide little/no training in technology as related to academic integrity, that may explain students' inconsistent and inaccurate perceptions of (in)appropriate MT use. These findings could further trigger the lack of student concern for instructor discovery of MT use, although that might also be explained by the perceptions of low-stakes consequences (e.g. one-on-one meetings) shared by both groups. Future research should examine the frequency and circumstances (e.g. MT versus others) under which instructors issue high stakes consequences, e.g. official reporting, for academic integrity violations.

Research has sought to understand what motivates negative teacher attitudes towards MT. Crossley (2018) noted that concerns lie not with MT simply replacing teachers, but with MT rendering language learning unnecessary. Thus, underlying the absence of training for learners on effective MT use may be a fear of accelerating the demise of the language teaching and learning enterprise. How well-founded these concerns are is unknown. Groves and Mundt (2015) compared the addition of MT to language classrooms to the addition of the electronic calculator to mathematics classrooms: "The calculator did not remove the need for the teaching of maths - instead it allowed students to go further, quicker" (p. 120). Further, Briggs' (2018) survey of 80 English language learners in Korea found that 91% of respondents disagreed that MT negates "the need to engage in the process of learning to write in English" (p. 12).

A major finding in this study was the overwhelming lack of change in instructor attitudes towards MT after events noted by Borg (2015) as key influencers on teacher beliefs: 'professional coursework' operationalized as a PD seminar specifically on MT, and 'contextual factors,' operationalized as the transition to online teaching resulting from the COVID-19 pandemic. During PD, instructors expressed awareness of student MT use despite prohibitions and a need to determine effective MT uses (see also Case, 2015). However, in post-PD surveys, initially-held views remained. Thus, while in both Case (2015) and here, instructors reported somewhat

contradictory information in initial surveys versus PD discussions (see Borg, 2015, for contradictory teacher beliefs elicited though different formats), the additional post-PD survey conducted here ultimately revealed no change in reported attitudes, striking given the self-selected nature of the PD group. These contradictions underscore the need to re-evaluate instructor views after PD.

The transition to online instruction during the COVID-19 pandemic and the consequent unprecedented increase in instructional technology use presented an unplanned but invaluable opportunity to revisit instructor attitudes towards MT. This monumental global event prompted only a quarter of instructors to change their attitudes. Moreover, reported changes generally involved a surrendering of prohibitions as opposed to active inclusion of MT. The latter findings contrast somewhat with Gao and Xhang (2020), whose case study found that active, autonomous learning of technology helped teachers adapt to the transition online, though only three teachers were examined and the scope of their professional development was much broader than that examined here. The resistance to change in instructor beliefs specifically towards MT noted here was also observed in Stapleton and Leung Ka Kin's (2019) study also on MT. These findings align with work on language teacher beliefs more broadly (see discussion in Borg, 2011), and potentially reflect a more general trend among teachers (Richardson, 2003, though see Skott, 2015, for challenges in researching teacher beliefs, and Borg, 2015, for the lack of longitudinal studies from which to measure change).

Several implications arise from the dissonance between teachers and students revealed in the current study. One area of critical importance is the relationship between MT and academic integrity. From the outset, perceptions of this relationship markedly differed between teachers and students. In addition, students reported a lack of instructional attention to the issue. The sharp rise in academic integrity violations during the pandemic including in language teaching and learning and especially involving MT (Çelik & Lancaster, 2021) has elevated the problem to almost crisis proportions. Thus, immediately and at the very least, instructors should explicitly and

repeatedly spend instructional time explaining and motivating their MT-related policies and expectations.

Furthermore, student attitudes/behaviors around MT have clearly not been reversed simply by persistent negative instructor attitudes/practices. In addressing the validity of their entrenched beliefs and preparing to engage in a more "nuanced" (Çelik & Lancaster, 2021) discussion of MT with students in our (post-)pandemic world, instructors should evaluate existing research on effects of MT on learning outcomes. For example, through analyzing task output, Garcia and Pena (2011) determined that the less proficient a learner is, the more helpful MT can be for increasing text length and writing quality and reducing errors, which may push acquisition. Similarly, Chon et al. (2021) showed that MT use can help lower-level writers lessen proficiency gaps and enrich L2 writing lexically (see also Benda, 2013, for benefits in pre/post-editing. Lee and Briggs (2021) described beneficial effects of MT on self-correction of errors in specific areas of grammar for all learners, but especially those at higher levels of proficiency. Further, Enkin and Mejías-Bikandi (2016) illustrated how MT can raise metalinguistic awareness of L1 and L2 (proposed in Correa, 2014) in order to aid L2 learning (supported in Lee, 2020). And Dziemianko (2017) found that retention after electronic dictionary use exceeded that after paper dictionary use. Teachers can replicate such studies as instructional activities (see Chon et al., 2021), engaging students in discussion of practices, and conduct their own action research (Groves & Mundt, 2016). These processes should start ideally during teacher education given the early formation of teacher beliefs (Borg, 2015).

In interpreting the current findings, we must remember that reported differences between student/instructor personal MT uses could have arisen because teachers may not consider themselves active language learners and may be at different/higher proficiencies than the students surveyed. In addition, the sample sizes included here, especially for teachers, were relatively modest. Furthermore, self-reported data must be interpreted with caution. Moreover, while it was possible to re-survey instructors, it was not possible to recontact students to

determine possible changes in attitudes/behaviors after the transition to online instruction during COVID-19. Student attitudes/behaviors were closer to ceiling than those of instructors, which would make changes less visible in our surveys, but we do know from other emerging research that student behaviors were affected by COVOID-19 pandemic, e.g. the increase in academic violations related to MT (Çelik & Lancaster, 2021). With some caveats, the take-home message from a snapshot of student MT-related behaviors/attitudes in language learning contrasted with instructor behaviors/attitudes before and after events with transformative potential indicate that the chasm between students and instructors is now gaping with high stakes implications, prompting a pressing need for actions that will help to establish common ground between the two groups of stakeholders.

REFERENCES

Alhaisoni, E., & Alhaysony, M. (2017). An investigation of Saudi EFL university students' attitudes towards the use of Google Translate. *International Journal of English Language Education*, 5, 72–82. DOI:https://doi.org/10.5296/ijele.v5i1.10696

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, 161–167. DOI:https://doi.org/10.7575/aiac.alls.v.7n.3p.161

Benda, J. (2013). Google translate in the EFL classroom taboo or teaching tool? *Writing & Pedagogy*, 5, 317. DOI:https://doi.org/10.1558/wap.v5i2.317

Borg, S. (2011). The impact of in-service teacher education on language teachers' beliefs*. System*, 39, 370-380. DOI:https://doi.org/10.1016/j.system.2011.07.009

Borg, S. (2015). *Teacher Cognition and Language Education: Research and Practice.* London, England: Bloomsbury.

Briggs, N. (2018). Neural machine translation tools in the language learning classroom: Students' use, perceptions, and analyses. *JALT CALL Journal*, 14, 3-24. DOI:https://doi.org/10.29140/jaltcall.v14n1.221

Case, M. (2015). Machine translation and the disruption of foreign language learning activities. *eLearning Papers*, 45, 4–16.

Castelvecchi, D. (2016). Deep learning boosts Google Translate tool. *Nature*. Retrieved from https://www.nature.com/news/deep-learning-boosts-google-translate-tool-1.20696

Çelik, Ö. & Lancaster, T. (2021). Violations of and threats to academic integrity in online English language teaching . The Literacy Trek , 7, 34-54 . DOI:10.47216/literacytrek.932316

Chon, Y. V., Shin, D., & Kim G. E. (2021). Comparing L2 learners' writing against parallel machine- translated texts: Raters' assessment, linguistic complexity and errors. *System,* 96. DOI:https://doi.org/10.1016/j.system.2020.102408

Clifford, J., Merschel, L., & Munné, J. (2013). Surveying the landscape: What is the role of machine translation in language learning? *Revista d'innovació Educativa*, 10, 108-121. DOI:https://doi.org/10.7203/attic.10.2228

Correa, M. (2011). Academic dishonesty in the second language classroom: Instructors' perspectives. *Modern Journal of Language Teaching Methods*, 1, 65–79.

Crossley, S. A. (2018). Technological disruption in foreign language teaching: The rise of simultaneous machine translation. *Language Teaching*, 51, 541-552. DOI:https://doi.org/10.1017/s0261444818000253

Dziemianko, A. (2017). Dictionary form in decoding, encoding and retention: Further insights. *ReCALL: The Journal of EUROCALL*, 29, 335-356. DOI:https://doi.org/10.1017/s0958344017000131

Enkin, E., & Mejías-Bikandi, E. (2016). Using online translators in the second language classroom: Ideas for advanced level Spanish. *Latin American Journal of Content and Language Integrated Learning*, 9, 138–158. DOI:https://doi.org/10.5294/laclil.2016.9.1.6

Gacs A, Goertler S, & Spasova S. (2020). Planned online language education versus crisis-prompted online language teaching: Lessons for the future. *Foreign Language Annals*, 53, 380–392. DOI:https://doi.org/10.1111/flan.12460.

Gao, L. X. & Zhang, L. J. (2020) Teacher learning in difficult times: Examining foreign language teachers' cognitions about online teaching to tide over COVID-19. *Frontiers in Psychology*, 11, 2396. DOI:https://doi.org/10.3389/fpsyg.2020.549653

García, I., & Pena, M. (2011). Machine translation-assisted language learning: Writing for beginners. *Computer Assisted Language Learning*, 24, 471–487. DOI:https://doi.org/10.1080/09588221.2011.582687

Groves, M., & Mundt, K. (2016). A double-edged sword: the merits and the policy implications of Google Translate in higher education. *European Journal of Higher Education*, 6, 387-401. DOI:https://doi.org/10.1080/21568235.2016.1172248

Hutchins W.J. (2004) The Georgetown-IBM experiment demonstrated in January 1954. In R. E.
Frederking & K. B. Taylor (eds), *Machine Translation: From Real Users to Research. AMTA
2004. Lecture Notes in Computer Science*, 3265 (pp. 102-114). Springer: Berlin/Heidelberg.
DOI:https://doi.org/10.1007/978-3-540-30194-3_12

Jin, L., & Deifell, E. (2013). Foreign language learners' use and perception of online dictionaries:
A survey study. *Journal of Online Learning & Teaching*, 9, 515–533.

Kliffer, M. (2005). An experiment on MT post-editing by a class of intermediate/advanced French
majors. In *Proceedings of EAMT, 10th Annual Conference* (May), Budapest, Hungary.

Le, Q. V., & Schuster, M. (2016). A neural network for machine translation, at production scale.
Retrieved from https://ai.googleblog.com/2016/09/a-neural-network-for-machine.html

Lee, S. M. (2020). The impact of using machine translation on EFL students' writing. *Computer
Assisted Language Learning*, 33, 157-175.
DOI:https://doi.org/10.1080/09588221.2018.1553186

Lee, S.-M. & Briggs, N. (2021). Effects of using machine translation to mediate the revision
process of Korean university students' academic writing. ReCALL, 33, 18–33.
DOI:https://doi.org/10.1017/S0958344020000191

Liao, P. (2006). EFL learners' beliefs about and strategy use of translation in English learning.
RELC, 37, 191-215. DOI:https://doi.org/10.1177/0033688206067428

Lin, G. H-C., & Chien, P. S. C. (2009). Machine translation for academic purposes. *Proceedings
of the International Conference on TESOL and Translation*, (Dec), 133–148.

McCarthy, B. (2004). Does online machine translation spell the end of take-home translation
assignments? *CALL-EJ Online*, 6. Retrieved from: http://callej.org/journal/6-1/mccarthy.html.

Elaish, M. M., Shuib, L., Hwang G-J., Ghani, N. A., Yadegaridehkordi, E., & Zainuddin, S. Z.
(2021): Mobile English language learning: A systematic review of group size, duration, and
assessment methods. *Computer Assisted Language Learning*.
DOI:10.1080/09588221.2021.1931341.

Moorkens, J. (2018). What to expect from Neural Machine Translation: A practical in-class translation evaluation exercise. *The Interpreter and Translator Trainer*, 12, 375-387. DOI:https://doi.org/10.1080/1750399x.2018.1501639

Murphy Odo, D. (2019). Learner perceptions of using machine translation tools in the EFL classroom. *The SNY Journal of Education Research*, 28, 63-83.

Niño, A. (2009). Machine translation in foreign language learning: Language learners' and tutors' perceptions of its advantages and disadvantages. *ReCALL*, 21, 241–258. DOI:https://doi.org/10.1017/s0958344009000172

Richardson, V. (2003). Preservice teachers' beliefs. In J. Raths, & A. R. McAninch (Eds.), *Teacher Beliefs and Classroom Performance: The Impact of Teacher Education* (pp. 1-22). Greenwich, CT: Information Age Publishing.

Sánchez-Gijón, P., Moorkens, J. & Way, A. (2019). Post-editing neural machine translation versus translation memory segments. *Machine Translation*, 33, 31-59. DOI:https://doi.org/10.1007/s10590-019-09232-x

Skott, J. (2015). The promises, problems, and prospects of research on teachers' beliefs. In H. Fives & M. G. Gill (Eds), *International handbook of research on teachers' beliefs* (pp. 37-54). New York: Routledge.

Stapleton, P. & Leung 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. DOI:https://doi.org/10.1016/j.esp.2019.07.001

Tsai, S. (2019). Using Google Translate in EFL drafts: A preliminary investigation. *Computer Assisted Language Learning*, 32, 510-526. DOI:https://doi.org/10.1080/09588221.2018.1527361

van Rensburg, A., Snyman, C., & Lotz, S. (2012). Applying Google Translate in a higher education environment: Translation products assessed. *Southern African Linguistics and Applied Language Studies*, 30, 511-524. DOI:https://doi.org/10.2989/16073614.2012.750824

Wu, Y., Schuster, M., Chen, Z., Le, Q. V., & Norouzi, M. (2016). Google's neural machine translation system: Bridging the gap between human and machine translation. *Computation and Language,* arXiv:1609.08144.

Yang, Y. & Wang X. (2019). Modeling the intention to use machine translation for student translators: An extension of Technology Acceptance Model. *Computers & Education*, 133, 116-126. DOI:https://doi.org/10.1016/j.compedu.2019.01.015