

Machine translation literacy instruction for international business students



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Abstract

As the number of non-Anglophone students studying business through the medium of English continues to increase, there is a growing interest in the potential of machine translation for helping these students with English-language writing. Language instructors recognize the futility of trying to ban the use of such tools, but they are apprehensive about their use. Academic librarians already deliver various forms of digital literacy instruction, and this article describes the design and delivery of a machine translation literacy workshop for international business students and their language instructors. Feedback was largely positive, but it may be helpful to customize future **workshops** for specific language groups. The target audience could also be expanded to include non-Anglophone faculty as well as students since the former are under increasing pressure to publish in English. The overall experience points to the benefit of collaboration between librarians and other experts in order to adapt to the changing needs of the campus community and to offer meaningful services and support in this period of rapid change.

Keywords: Business English; international students; librarian-faculty collaboration; machine translation; machine translation literacy

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Introduction

English continues to entrench itself as a key language for education (e.g., Carvajal, 2007), research (e.g., Montgomery, 2013), and international business (e.g., Neeley, 2012). Accordingly, non-English speaking countries are introducing more and more English-taught university programs. In continental Europe, for instance, Wächter and Maiworm (2014) report that there were 725 English-taught programs in 2002; however, this number had jumped to 8089 by 2014, representing an increase of over 1000%. Meanwhile, over the past decade, English-speaking countries have seen substantial growth in the number of international students who come to study at their post-secondary institutions, as illustrated in Table 1.

Page 2

Table 1. Increase in number of international students studying in English-speaking countries over a ten-year period.

Country and source	# of international students in 2008*	# of international students in 2018*	% increase over 10 years
Australia (Ferguson & Sherrell, 2019)	202,581	398,563	97%
Canada (IRCC, 2017) <i>*For Canada only, the dates are 2007 to 2017</i>	179,146	492,533	175%
United Kingdom (HESA, 2019)	368,970	485,645	31%
United States (IIE, 2019)	671,616	1,095,299	63%

With regard to field of study, business-related subjects are highly popular among international students. Wächter and Maiworm (2014) report that among the English-taught programs in continental Europe, 42% of bachelor's programs and 34% of master's programs are in the subject area "Social sciences, business and law". Meanwhile, business-related programs are also sought after by international students who study in English-speaking countries, as demonstrated by the following examples:

- **Australia:** in 2016, 49% of international students were studying management and commerce, making this the most popular field of study ahead of engineering (TEQSA, 2018).
- **Canada:** in 2010, 23% of international students were studying business, management, and public administration, making this the most popular field of study ahead of engineering (Association of Universities and Colleges of Canada, 2011).
- **United Kingdom:** in 2018, 27% of international students were studying business and administrative studies, making this the most popular field of study ahead of engineering (Universities UK International, 2019).
- **United States:** in 2018, 17% of international students were studying business and management, making this the second-most popular field of study after engineering (Institute of International Education (IIE), 2019).

It therefore seems clear that a considerable number of students around the world who are studying business-related subjects through the medium of English are not native speakers of this language. What's more, international students may be looking to machine translation tools (e.g., Google Translate) to help them with their academic work (e.g., Stapleton, 2019). Can business librarians play a role in helping to set these students up for success? In the article, we introduce the concept of machine translation literacy and describe a pilot project to offer machine translation literacy instruction to international business students and their language teachers at

a Canadian university. We first give a short introduction to machine translation, explaining why this artificial intelligence-based technology is now being used more often by students, and why there is a need for a new type of digital literacy which we refer to as machine translation literacy. Next we present a brief literature survey of various efforts made by business librarians – sometimes in collaboration with other university employees – to support international students, and we explain why business librarians are good candidates for working with language teachers to offer machine translation literacy instruction to international business students. Finally, we discuss the results of the pilot project in which we offered a machine translation literacy information session and workshop to instructors of a Business English course and to international business students at Concordia University. Although this pilot study was conducted at only one university, the statistics presented above, coupled with evidence from the literature presented below, demonstrate a clear need for support for international business students on a much broader scale; therefore, the results of this pilot study will be of interest and relevance to business librarians at universities across the globe.

Machine translation

In the period following the Second World War, the first machine translation systems were programed to try to process language using bilingual dictionaries and grammar rules; however, this approach had limited success because language is inherently

ambiguous. For instance, the English word “bank” can refer to a financial institution or to the side of a river, and its translation into French as either “*banque*” or “*rive*” depends on knowing the intending meaning; however, computers do not have the same type of real-world knowledge that people use to interpret language (Hutchins & Somers, 1992). As large amounts of data became increasingly available, researchers moved away from linguistic approaches to machine translation and began to investigate data-driven or corpus-based approaches instead, such as statistical machine translation (Koehn, 2010). This approach essentially worked by feeding the machine translation system with many previously translated texts and their translations, which the computer could use as examples to calculate the probability that a phrase in a new text will be translated in the same way that it was translated previously. This explanation is greatly simplified, but overall, statistical approaches to machine translation produced higher quality translations than did the former linguistic approaches. Nevertheless, the translations were still very noticeably imperfect. They sometimes contained meaning and grammar errors, and they almost certainly contained passages that sounded awkward or overly

Page 4

literal. However, with the introduction of artificial intelligence techniques such as machine learning, the quality of machine translated texts has gone up once more. Known as neural machine translation because it incorporates artificial neural networks, this approach also relies on a large collection of previously translated texts and their translations which are used to “train” the system so that it can “learn” to translate new texts (Forcada, 2017). Whereas the output of older machine translation systems typically sounded clunky and was of lower quality, the output of neural machine translation systems is much more fluid and can often represent a viable first draft that students can take as a starting point. A more detailed description of machine translation technology is beyond the scope of this article; however, additional explanations of rule-based, statistical and neural approaches to machine translation can be found in Way (2020).

Given that neural machine translation output can now offer a solid starting point for preparing a text in another language, international students are one user group who are showing a marked interest in this technology (e.g., Bowker & Buitrago-Ciro, 2019; Stapleton, 2019). However, just because the technology is easy to use – often just copy, paste and click – this does not mean that students inherently adopt a critical mindset when using it. In order to become informed and critical users of machine translation tools, students need to develop a new subset of digital literacy skills which we refer to as *machine translation literacy*. Martin (2006) describes digital literacy as the awareness, attitude and ability of individuals to appropriately use digital tools to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, communicate with others, and to reflect upon this process. This definition emphasizes that critical thinking, rather than technical competence, is the core skill of digital literacy. As a type of digital literacy, machine translation literacy is also chiefly a cognitive concern, rather than a techno-procedural one. Using machine translation is easy; using it *critically* requires some thought.

When international students are faced with free, online machine translation, it is important for them to develop good judgment about *whether*, *when*, and *why* to use this technology. With regard to *how*, we have already seen that the “how to” question is very straightforward, so a more useful framing of this question is one of human-computer interaction: how can users interact with this tool in order to improve the usefulness of its output? By asking such questions, international students can become informed and critical users of machine translation tools, rather than being people who simply copy, paste, or click, in an unthinking way. With specific regard to international business students, the next section explores why business librarians are well positioned to help them to develop their machine translation literacy skills.

Page 5

Business librarians and international business students: a brief literature review

Business librarians have long sought to find ways that they can better support international students. For instance, Song (2004b) conducted a survey of 143 international business students at the University of Illinois at Urbana-Champaign (UIUC) to learn more about which library services are important to them and to assess their use of electronic resources. The results

showed that a high percentage of international business students had no prior experience with electronic resources in their home countries, thus challenging librarians to find ways to motivate these students to use a type of resource they have never used before and to design instruction for this group accordingly. Twelve Some years later, Michalik and Rysavy (2018) deployed Song's survey once again, this time to international business students at Goldey-Beacom College in Delaware, where they received 149 responses. The students in Delaware were asked to rate their perceived importance of five library services: personal study areas, public computers, electronic resources, group meeting space, and virtual reference. Overall, students rated personal study areas as being the most important library service, while virtual reference was ranked as the least important. Song (2004a) also conducted another survey in order to compare the information-seeking behaviors of 30 domestic and 54 international business students at UIUC to assess the comparative effectiveness of library instruction sessions for the two groups. The results of Song's second survey revealed that the two groups had profoundly different library use patterns, with the domestic students being more likely to use library resources (including a heavy use of electronic resources), whereas the international students were more likely to use library spaces. Globally, the results of these three surveys suggest that international business students may benefit from increased efforts by librarians to raise awareness about the value of technology-related resources and services, as well as efforts to promote or enhance digital literacy skills among this group.

Meanwhile, Lahlafi, Allen, and Bull (2013) carried out a survey to determine how business librarians across the United Kingdom can provide a positive experience for international students; their survey was distributed to all 118 institutions that were members of the British Business Librarians Association, and responses were received from 65 (55%) member institutions. This survey by Lahlafi et al. (2013) revealed a number of business library initiatives targeted at supporting the particular needs of international business students, including a library contribution to pre-sessional 'English for international students' programs, a targeted collection of materials on academic writing, and training or courses run by the library and designed for international students on topics such as digital literacy,

information literacy, and academic integrity. However, to the best of our knowledge, no academic business library has thus far experimented with offering training specifically dedicated to machine translation literacy.

In addition to the above-mentioned surveys of both international business students and business librarians, there are examples of collaborative efforts between business librarians and other university employees undertaken to benefit international students. For instance, Rushton and Lahlafi (2013) recount a joint initiative undertaken by a business librarian and a faculty member at a business school in the United Kingdom to develop a program that would allow a group of 91 international business students from Malaysia to develop their information and academic literacy skills. Meanwhile, Kenney and Li (2016) observe that some universities are establishing dual-degree business programs (e.g., the Master of Business Administration (MBA) between Cornell University in the US and the Tsinghua School of Finance in China), which disrupt traditional models of education and require a rethinking of structures and roles in the context of global education. For instance, having a strong East Asia collection does not necessarily make the library a strong partner for a dual-degree MBA program in China, just as having a strong business librarian does not automatically guarantee effective outreach to Chinese students:

In large research libraries, curators and area studies librarians have served as the library's front line in acclimating international students and faculty across disciplines to the campus, often thanks to their language skills. They may be ill-equipped, however, to respond to the specific disciplinary needs of international students and faculty and may be unfamiliar with what the library's subject liaisons can provide. Subject liaisons, on the other hand, typically lack the cultural knowledge or language skills to support international students to the fullest by themselves. (Kenney & Li, 2016, p. 14)

With this in mind, Kenney and Li (2016) argue that a joint team pairing disciplinary expertise and language/cultural knowledge can make a significant difference in the success of international business students.

Given the demonstrated openness of business librarians to seeking ways to support international business students, as well as their proven willingness to collaborate with other university employees, we undertook a pilot study to offer a library information session and workshop on machine translation literacy to both Business English instructors and international

business students.

Institutional profile

At Concordia University's John Molson School of Business, international students who have insufficient English-language skills may be eligible for conditional admission provided that they meet all other admission

Page 7

requirements. With a conditional offer of admission, students begin their studies by registering for the Intensive English Language Program, where they will develop the language skills needed to enter the business program.

Concordia Continuing Education is responsible for offering the Intensive English Language Program, which includes six levels of English-language courses. Globally, the ten-week intensive program is intended to prepare students to enter English-language colleges or universities and to offer language training to business people or professionals who need a high level of competency in English. In the most advanced course, students are encouraged to develop their critical thinking skills and to gain confidence and independence in their academic abilities. With this in mind, advanced students undertake activities that include conducting library research, writing a research paper, and making a formal presentation to the class. Academic librarians have traditionally collaborated with the language instructors to support the students with the library research portion of the course, as well as with referencing and citation practices. However, for this pilot project, we proposed to take the collaboration further by having the library offer machine translation literacy instruction in order to support non-Anglophone students who wish to make use of machine translation as an aid for writing a research paper in English.

After consulting the director of programs at Concordia Continuing Education, we proposed a machine translation literacy workshop aimed at students in the most advanced English course who were about to begin the unit on conducting library research and writing a research paper. Upon successful completion of this course, the students could then begin their studies in one of Concordia University's business programs.

Before delivering the workshop to the students, however, the director asked if we would be willing to first provide an information session for the English language instructors as a sort of professional development opportunity. The director indicated that when she had discussed the student-oriented workshop with her colleagues, several of them had shared their feelings of apprehension about machine translation tools, which were linked in part to their lack of understanding about how these tools worked, as well as to their fear that students would use the tools inappropriately and that this could harm their language learning and overall academic experience. Therefore, the director thought it would be helpful if not only the students but also the language instructors had an opportunity to learn about machine translation literacy. In this way, the language instructors might be better able to support the students and to reinforce the workshop content in the remainder of the language course. Additionally, we saw this as a good opportunity to get some advance feedback about the workshop

Page 8

content so that we could modify it if necessary before delivering it to the students.

Machine translation literacy information session for language instructors

A total of twenty-four Continuing Education staff attended the machine translation literacy information session held at the end of October 2019. The language instructors were anxious to discuss machine translation and many expressed worries about the newest form of this technology (i.e., neural machine translation). A key concern was that the technology had become so good that it would allow students who are not native speakers of English to write their assignments in their native language and then submit machine translated versions in English, thus potentially circumventing the need to learn to read and write in English.

This led to a brief debate among the instructors about the usefulness of machine translation as a pedagogical tool in the language learning classroom – a topic that has already received attention in the language learning literature. There is a general consensus that the older approaches to machine translation (e.g., rule-based and statistical approaches) produced texts that

were noticeably problematic (e.g., van Rensburg, Snyman, & Lotz, 2012). In the past, some instructors found that these poor translations could be usefully held up as bad models (i.e., what *not* to do when writing in English) or used as texts to be corrected by students. Niño (2008), for instance, found this approach to be beneficial when using older machine translation systems because the types of errors they produced were similar to those that a language learner could make. However, as pointed out by Yamada (2020), this view was not universally held among language instructors, with others suggesting that focusing on poor translations may serve to reinforce unwanted language habits in learners. In another study, Garcia and Pena (2011) found that using machine translation to help with second-language writing helped beginner language learners to increase both the quantity and the quality of their communication in a second language. Returning to the participants at our machine translation literacy information session, regardless of their personal opinions about the pedagogical value of using the output of older machine translation systems in the past, the language instructors recognized that the situation has changed significantly in the age of neural machine translation (NMT). As summarized by Yamada (2020, p. 194):

From an educational standpoint, post-editing of NMT may be more difficult for language learners because NMT's language proficiency is above the level of most college students' L2 [second language] proficiency. Hence a decision to use NMT plus post-editing even among advanced learners would require careful consideration.

Page 9

In addition, there was a clear recognition among the information session participants that, whether or not they personally or collectively approved of machine translation as a language learning tool, students are definitely using this technology – an observation has been confirmed in the literature also (e.g., Lee, 2020; Nurminen & Papula, 2018). For instance, O'Neill (2019) reported that in a survey of 310 language students, 87.7% claimed to have used online machine translation systems for their course work and graded assignments, even though the use of such tools has been prohibited at their institution. The information session participants agreed that attempting to ban machine translation use was not likely to work, and that a better approach could be to introduce machine translation literacy instruction because this knowledge could help the students to make informed decisions about when using machine translation could be a good choice, and when it might not be.

This led into a discussion about the importance of considering the learning objectives of different types of courses. For instance, in a language course, an objective is to become a more proficient user of the language. In contrast, in a business course, an objective could be to demonstrate an understanding of the core concepts of a particular subfield of business. The information session participants agreed that the difference in the learning objectives of these two types of courses could allow for a different view of whether or not machine translation use was suitable in these two scenarios. A student in a business course may indeed have a solid grasp of the key concepts because their passive knowledge of English is strong, thus allowing them to understand the professor or the readings. However, they may struggle to demonstrate their understanding because their active command of English is still under development. In the latter case, a student may be able to articulate their subject matter knowledge more fully with the help of a machine translation tool. The language instructors felt that it was very important that students be able to distinguish between the different types of learning objectives presented by different courses, and they echoed the existing literature that students should not seek to use machine translation to circumvent the language learning process in language courses. They therefore requested that information on this topic (i.e., different learning objectives of different courses) be integrated into the machine translation literacy workshop for students.

A related issue that the language instructors also wished to see addressed in a machine translation literacy workshop for students is the question of academic integrity. This issue, too, is beginning to emerge in the literature. For instance, Mundt and Groves (2016) note that those in higher education who assess student assignments or evaluate academic misconduct cases may have concerns about the unethical use of machine translation to aid

Page 10

plagiarism. Though some plagiarism detection software attempts to detect plagiarism in translated texts, this functionality remains limited at the present time. Participants in the machine translation literacy information session therefore strongly favored the inclusion of a clear reminder to students that just because an idea taken from another source is re-expressed using

words in another language, this does not remove the need to properly cite and reference the original source of the idea.

The language instructors expressed some initial reserve about the proposed section of the workshop that focused on translation-friendly writing. Translation-friendly writing involves writing the original text (i.e., the text to be translated) in a clear and unambiguous way so that it will be easier for a machine translation system to process. For instance, a translation-friendly writing style could include using short sentences, using the active voice, using terminology consistently, avoiding abbreviated forms, repeating nouns instead of using pronouns, and avoiding idiomatic expressions, humor or culture-bound references (Bowker & Buitrago-Ciro, 2019). However, the language instructors were concerned that by focusing on producing a clear text in their native language, the students might not see the point of investing time and effort in learning English vocabulary and grammar. This notion has been raised in the literature also, where studies have shown that conscious translation-friendly writing (sometimes referred to as *pre-editing* because it involves editing the original text before sending through a machine translation system), can raise the students' awareness of the differences between their native language and the target language (e.g., Shei, 2002). The language instructors at the information session acknowledged that they do sometimes incorporate contrastive linguistic analyses in their teaching, and so perhaps translation-friendly writing could indeed be viewed as a technique that could support foreign language learning. While they continued to harbor some reservations about this portion of the proposed workshop for students, they were less apprehensive and more open to it at the end of the information session than they had been at the beginning.

At the end of the information session, participants agreed that they found the session to be valuable because it helped them to better understand how machine translation systems work, as well as how to better advise students about the potential risks and benefits associated with the use of this technology in an academic context. The participants emphasized that while they appreciated the library's efforts to prepare and deliver the workshop to international business students, they also saw a clear role for themselves in helping to reinforce students' machine translation literacy skills. A collaborative approach with a two-pronged delivery was seen as being most beneficial overall. On the one hand, the library could first offer

machine translation literacy instruction to the language instructors (i.e., "training the trainers"), who could in turn offer direct support to their students. A considerable advantage of this approach is that all students who take an English-as-a-second language course would receive at least some basic machine translation literacy instruction. On the other hand, the library could also offer workshops directly to students, which could serve to reach international students in any discipline who may not have been required to take a language course but who are still interested in learning how machine translation could be used in an academic setting.

Taking on board the feedback and recommendations received during the information session for language instructors, we modified and expanded the contents of the machine translation literacy workshop for students as described in the following section.

Machine translation literacy workshop for students

In mid-November, a one-and-a-half hour machine translation literacy workshop was delivered to a group of twenty-three international business students at Concordia University who were following an advanced English course offered as part of the Intensive English Language Program. Owing to space constraints, it is not possible to provide an extensive description of the workshop contents; however, the six key elements that are covered as part of the workshop are outlined below.

1. **Privacy/confidentiality:** Information **pasted** **entered** into a free online machine translation does not disappear when the window is closed. Instead, companies that own the systems can keep the data and use **it** for other purposes. Sensitive information should not be entered into free online machine translation systems.
2. **Academic integrity:** Using machine translation for coursework may not be acceptable if it is contrary to the learning objectives of the course (e.g., language learning). When using machine translation to translate

academic works, it is still essential to cite and reference the original ideas that are borrowed, even if these are being presented in another language.

3. **Potential for algorithmic bias:** Machine translation systems 'learn' from the training material that is provided to them. If this material contains biases, then the tool may perpetuate them. For instance, there are reports that Google Translate generally skews toward male pronouns for words like 'strong' or 'doctor' and female pronouns for 'beautiful' and 'nurse' (Vanmassenhove, Hardmeier, & Way, 2018).

Page 12

4. **Awareness of different tools:** Google Translate is a well-known free online machine translation system, but it is not the only one. Since each system is trained using a different corpus, the various systems may not produce identical results. In addition, the systems are 'learning' all the time, so their results may improve. It is a good idea to try different systems, and to refrain from writing a system off altogether because it performs poorly on one occasion.
5. **Awareness of different translation tasks:** Translation can be undertaken for different reasons. Using raw machine translation to help understand texts can be a good use of this tool, whereas machine translated texts may first need to be revised before being distributed more widely. Likewise, a machine translation system that has been trained using scientific documents may not do a good job translating business texts. It is important to consider the purpose, content and audience of the translation and to conduct a sort of risk assessment (e.g., Nurminen, 2019) before deciding whether machine translation is a good option.
6. **Improving the output by changing the input:** The biggest challenge for machine translation is the inherent ambiguity of natural language. One main way to improve machine translation output is to ensure that the input text is written in a very clear way with little ambiguity (e.g., using the active voice, short sentences, and consistent terminology).

At the end of the workshop, the students were asked to complete a short workshop evaluation. Some key results from this evaluation are summarized in [Table 2](#).

Table 2. International business students' responses to the end-of-workshop evaluation.

Statements on end-of-workshop evaluation	% who agree or strongly agree with the statement
I learned new things about machine translation at this workshop.	87%
I feel confident that I can now use machine translation more effectively for my academic work.	74%
I feel confident that I can improve machine translation quality using translation-friendly writing techniques learned at this workshop.	65%
I intend to increase my use of machine translation in my academic work after this workshop.	74%
I will recommend this workshop to a friend.	91%
I would like to attend a more advanced follow-up workshop on machine translation.	52%

On the whole, students seemed to enjoy the workshop; they were engaged and asked lots of questions about machine translation and how to make better use of it. It was clear from the in-workshop discussions that all students use machine translation regularly, but none had received any prior instruction on its use, and many did not believe that they were using it in

the most effective way possible. The end-of-workshop evaluation revealed

that the vast majority (87%) of students believed that they had gained new knowledge and skills at the workshop, and nearly three-quarters felt more confident that they would be able to make more effective use of machine translation for their studies moving forward.

Students were very intrigued by the idea of translation-friendly writing; however, it became clear that the translation-friendly writing tips that work well for one language (e.g., French) are not necessarily the same tips that are most suitable for another language (e.g., Mandarin). Therefore, in future, it might be constructive to have customized workshops (or breakout sessions) for different language groups and to invite specialists in those languages (e.g., instructors from a modern languages department) to collaborate as well.

Over 90% of participants said that they would recommend the workshop to a friend, while just over half expressed an interest in attending a more advanced follow-up workshop. This suggests that students perhaps felt that they were able to get what they needed from the workshop; however, perhaps having the material reinforced by language instructors in their language courses, as well as having more time to practice translation-friendly writing and post-editing of machine translation output will eventually allow them to increase their confidence levels. Overall, we consider the initial delivery of the machine translation literacy workshop to international business students to have been a successful pilot project, and we intend to repeat it again in the future.

Future work

Although the present study focused on international students, several Concordia University faculty members expressed interest in learning about using machine translation as a writing aid. Just as the student body at many universities is becoming increasingly international, so is the faculty. For instance, Universities UK International (2019, p. 10) reports that in 2017/2018, about 15% of university faculty were international, while in business and administrative studies specifically, 36% of faculty in the UK were international.

Even business faculty who do not work in an English-speaking country may need help to publish in English. For example, to raise their visibility, many non-English business journals now require English-language abstracts to accompany articles published in other languages (e.g., Meneses Benavides, 2013; Piqué-Noguera, 2013). In many other cases, business faculty must go beyond English-language abstracts and publish full articles. Mur Dueñas (2012-, 2013) traces the efforts of finance professors in Spain as they try to publish in English-language journals and finds that only 50% of the

papers initially submitted are eventually published, and only after repeated rounds of revisions focusing largely on language-related challenges. Li (2014) interviews scholars at business schools in China, noting that they are under increasing pressure to publish in high-ranking English-language journals to secure tenure or promotion. Meanwhile, Li and Hu (2017) compare “overseas trained” management scholars to those who have been “home-trained” in China and find that the latter to be less successful at publishing in English. Finally, Tietze (2008) and Tietze and Dick (2009) highlight just how prevalent this situation is in the management academy. Tietze (2008) recounts the experiences of non-Anglophone management faculty in 14 different non-English countries who report that their career advancement is strongly bound to their ability to publish in English. Tietze (2008) goes on to describe a range of coping strategies used by these academics (e.g., engaging professional or nonprofessional translators or editors, conducting joint projects with English speakers).

Although the aforementioned literature does not discuss the potential of machine translation for helping non-Anglophone business faculty to publish in English, Parra Escartín, O’Brien, Simard, and Goulet (2017) conducted a study with five Spanish-speaking medical experts to see if they could use machine translation as a writing aid in English. The experts were able to work with machine translation to increase the quality of their English-language texts; however, there was still additional room for improvement. Nonetheless, this small experiment suggests that it might be worth helping faculty members to improve

their machine translation literacy so that they can leverage translation tools as a partial solution to the need to publish in English. Although Parra Escartín et al. (2017) worked with medical experts, the previously mentioned literature demonstrates a clear need for better English writing support for academics in business-related fields also. Therefore, this represents an opportunity for business librarians to offer machine translation literacy instruction not only to international students but also to non-Anglophone faculty members or other researchers (e.g., post-doctoral researchers).

Concluding remarks

In summary, the overall purpose of this article was to introduce the notion of machine translation literacy and to present a pilot project in which the Concordia University Library worked with Concordia Continuing Education to offer a machine translation literacy information session to language instructors, as well as a workshop on this same topic to international business students in the advanced level of the Intensive English Language Program. Like other forms of digital literacy, machine translation

Page 15

literacy is primarily about developing critical thinking skills in regard to technology use. The information session and workshop provided participants with an opportunity to reflect on whether, when and why machine translation could be a good option for helping international business students to produce texts in English. Participants also learned some translation-friendly writing techniques that could be used to improve the quality of machine translated text.

Language instructors expressed appreciation for the machine translation literacy information session, noting that it helped to alleviate some of their concerns about students using this technology, while also equipping them with information that they could use to better support their students with second-language writing. In particular, the language instructors emphasized the benefit of approaching machine translation literacy training in a collaborative way, with both the Library and the language instructors having important complementary roles. We feel that it is important to point out that, in this particular instance, the library representative delivering the machine translation literacy information session and workshop also had a background in the field of translation and machine translation, which is not the case for every librarian. Therefore, collaborations at other institutions might involve not only librarians and language instructors but also (machine) translation experts. Of course, librarians may also take the initiative to educate themselves about machine translation in order to be prepared to teach machine translation information literacy. This is beginning to happen in other areas, such as Artificial Intelligence (AI) literacy, where we see librarians stepping up to help educate their patrons about AI (e.g., Hervieux & Wheatley, forthcoming2021). In a recent research position paper from the Online Computer Library Center (OCLC), Padilla 2019, p. 20) observes that integrating AI with library research support and pedagogy presents multiple opportunities, noting specifically that “potential afforded by technologies and methods is about enhancing the value of an existing service or presenting an opportunity to fill a gap.”

In that spirit, we hope that this account of our initiative to develop and deliver a machine translation literacy information session and workshop to language instructors and international business students represents one example of filling such a gap. Although student feedback was positive on the whole, future workshops could potentially be more helpful if they were customized for specific language groups. This points to the benefit of collaboration between librarians and other experts in order to adapt to the changing needs of the campus community and to offer meaningful services and support in this period of rapid change. Finally, there is scope to expand the target audience of the machine translation literacy workshop to include non-Anglophone researchers in the field of business (as well as

Page 16

other fields) since the former are under increasing pressure to publish their findings in English.

References

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Author Query

- Query:** AQ0: Please review the table of contributors below and confirm that the first and last names are structured correctly and that the authors are listed in the correct order of contribution. This check is to ensure that your names will appear correctly online and when the article is indexed.

Sequence	Prefix	Given name(s)	Surname	Suffix
1		Lynne	Bowker	

Response [Author - lbowker@uottawa.ca]: Ok ↑

- Query:** AQ1: Please check and confirm whether the author affiliations and corresponding details have been set correctly.

Response [Author - lbowker@uottawa.ca]: The last digit in the postal code is not correct. Please change the 4 to 5. The correct postal code is K1N 6N5 ↑

- Query:** AQ2: Please provide complete details for (Yamada 2020) in the reference list or delete the citation from the text.

Response [Author - lbowker@uottawa.ca]: Yamada, M. (2020). Language Learners and Non Professional Translators as Users. In M. O'Hagan (Ed.), *The Routledge Handbook of Translation Technology* (pp. 183–199). London: Routledge. ↑

- Query:** AQ4: Please provide the year.

Response [Author - lbowker@uottawa.ca]: It's currently in production and will be published in 2021. ↑

- Query:** AQ5: The year of publication has been changed as per Crossref details both in the list and in the text for this reference. Please check.

Response [Author - lbowker@uottawa.ca]: Ok ↑

- Query:** AQ6: The year of publication has been changed as per Crossref details both in the list and in the text for this reference. Please check.

Response [Author - lbowker@uottawa.ca]: Ok ↑

- Query:** AQ8: Please note that the ORCID section has been created from information supplied with your manuscript submission/CATS. Please correct if this is inaccurate.

Response [Author - lbowker@uottawa.ca]: Ok ↑


- Query:** AQ3: There is no mention of (O'Brien et al. 2018 and Government of Canada 2017) in the text. Please insert a citation in the text or delete the reference as appropriate.

Response [Author - lbowker@uottawa.ca]: Answered within text ↑

- Query:** AQ7: The year of publication has been changed as per Crossref details both in the list and in the text for this reference. Please check.

Response [Author - lbowker@uottawa.ca]: Ok, but now this means that there are two references called Song (2004), so I guess that one of them needs to be changed to Song (2004a) and the other to Song (2004b)? I have made the appropriate additions of a or b in both in the list of references and in the text. ↑

Comments

1. **Comments [Author - 7/28/2020 9:25:00 PM]:** This should appear in the Acknowledgements section. Should there be a subheading called "Acknowledgements" at the beginning of this section? The first few words "the Concordia University Library" should be deleted. 

2. **Comments [Author - 7/28/2020 9:51:32 PM]:** The following four words should be added to the end of the title so that it more accurately describes the contents of the article: "and business English instructors". The complete title should therefore read: "Machine translation literacy instruction for international business students and business English instructors" 