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# Technology Preparedness and Translator Training: Implications for Pedagogy

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## Abstract

With increasing acknowledgement of enhanced quality now achievable by Machine Translation, new possibilities have emerged in translation, both vis-à-vis division of labour between human and machine in the translation process and acceptability of lower quality of language in exchange for efficiency. This paper presents surveys of four cohorts of post-graduate students of translation from the University of Macau to see if perceived trainee awareness and preparedness has kept pace with these possibilities. It is found that trainees across the years generally lack confidence in their perceived awareness, are hesitant in employing MT, and show definite reservations when reconsidering issues such as quality and division of labour. While the size of respondents is small, it is interesting to note that the awareness and preparedness mentioned above are found to be similar across the four years. The implication for training is that technology be fully integrated into the translation process in order to provide trainees with a template/framework to handle diverse situations, particularly those that require offering translations of a lower quality with a short turnaround time. The focus here is on Chinese-English translation, but the discussion may find resonance with other language pairs.

## 1. Introduction

For much of its history the ultimate goal of achieving Fully Automatic High-Quality Translation remained out of reach for Machine Translation (Hutchins and Somers 1997, 148). However, with the emergence of Statistical Machine Translation (SMT) implementations around 2006, the quality of raw MT output became greatly enhanced compared to the former Rule Based Machine Translation (RBMT). University programmes in translation too began incorporating “Computer-Assisted Translation” (CAT, including TM and SBMT) in their curricula around this time (Kenny and Doherty 2014, 276).

In the case of English-Chinese translation, with the advent of SMT systems Cui predicted that Post-Editing (PE) was expected to play an increasingly important role in meeting the demands of the language services market efficiently (Cui 2014). This resonated with assessments elsewhere that reported gains in quality independent of factors such as language, text or translator ability (Garcia 2011). Cui also went on to suggest that PE, Human Translation (HT) and Project Management would have to come together to fully tap into the possibilities brought about by Machine Translation and meet the ever-increasing demand for translation (Cui 2014, 72–73). A study in Europe the same year echoed this by declaring that “the time is ripe to develop and publish an up-to-date holistic syllabus in SMT for trainee translators.” (Kenny and Doherty 2014, 288). It also emphasized the need for integration of SMT in translation in order to ensure continued relevance of training, one that ensures

“ownership, critical understanding and a good deal of control” (Kenny and Doherty 2014, 290) on the part of translators. The statement is reflective of concerns both for continued relevance of training and also for the role of human translators.

With the emergence of Neural Machine Translation (NMT) systems that became available to users around 2016 (Y. Wu et al. 2016) it may be said that MT has come of age, where in case of language pairs such as English and Chinese there have even been bold claims of achieving parity with Human Translation (HT) (Hassan et al. 2018), though evidence to the contrary has also been provided (Läubli, Sennrich, and Volk 2018). Qin (2018) identifies persisting issues with Neural Machine Translation (NMT) between English and Chinese at lexical and syntactic and discourse levels and concludes that MT will not replace HT. Nevertheless, Qin yet calls for reconsidering division of labour, exploring possibilities brought about by PE and including MT, CAT and Translation Management Systems in teaching curricula (Qin 2018, 55–56). There has been increasing acknowledgement of the role that MT and post-editing MT output can play at least in certain domains of translation in case of other language pairs as well (Mellinger 2017; Massey and Ehrensberger-Dow 2017).

The higher quality of raw MT output has also brought about new possibilities, including that of variable efficiency and quality. There is much interest now in exploring post-editing and revision, and issues of variable quality in translation research (Drugan 2013; Way 2018; Bittner 2020; Kontinen, Salmi, and Koponen 2020). The quality achieved by raw MT output is such that there are even studies considering the role Machine Translation could play in making academic research in different languages globally available and enable global communication (Doherty 2016; Bowker and Ciro 2019; Escartín and Goulet 2020).

Citing an early survey of language service requirements in enterprises in China, Wang points out that 77.30% of enterprises prioritized familiarity with translation technology and aids in employees (H. Wang 2013, 23). Suggesting parallels in the case of language pairs in Europe, a study reports to have found that “only 10 % of all companies surveyed were operating without them” and that these competences were considered essential by employers (Rodríguez de Céspedes, 2019, p. 107, 111). Against this background it becomes pertinent to ask if trainees (at least at the postgraduate level) are prepared to respond to demands for higher efficiency in translation. This study examines perceived awareness towards technology among postgraduate trainees at one institution, and if it has changed over four years as use of MT becomes normalized. Importantly, it also explores if postgraduate students of translation find themselves prepared to offer lower quality in exchange for higher efficiency.

Accordingly, this study set out to explore the following questions:

- How do post-graduate trainees of translation perceive their awareness and preparedness towards MT, does this perception change over the years?
- Across the four years, how prepared are trainees to consider quality of translation as variable and a reduced or editing role for human translators in some contexts?
- What, if any, are the implications of the above for translator training.

## 2. The Surveys

Surveys were conducted over four consecutive years with four successive cohorts (2018-2021). The purpose behind this was to examine if there are significant temporal variations in perceptions of awareness and preparedness across the years. Given the increasingly widespread use of MT in translation, it may be reasonable to expect that more recent respondents might be more aware and likely to use MT, and also be more willing to consider modes of working that integrate MT in translation to achieve efficiency.

The respondents of these surveys were 2<sup>nd</sup> year postgraduate students of a two-year MA in Translation Studies (English-Chinese) programme at the University of Macau. Each cohort of students has roughly 25-30 students, of which 16-20 took the survey. The students of this programme include those from across the Greater China Region, of whom roughly half have Cantonese as their first language (hailing from Hong Kong, Macao and southern China), and slightly more than half have Modern Standard Chinese (*Putonghua*) as their first language (from various parts of China, including Taiwan). The students admitted to the programme include but are not limited to those who have majored in translation during their undergraduate studies. All candidates are subject to a rigorous assessment, including minimum IELTS / CET (College English Test) / TEM (Test for English Majors) scores and interviews to establish competence preparedness for a career in translation. In terms of age, all respondents reported themselves as falling between 20 and 30 years of age, except 3 from the 2018 cohort, 1 from 2019 and 2 from 2021 who reported their age as 30-40 years.

The survey was conducted after the candidates had completed one year of study in translation but before taking any courses that specifically addressed translation technology. Given that these are students of translation with at least one year of formal training at the postgraduate level, it may be expected that they are generally aware of quality now achievable by MT and willing to employ it.

The questionnaire employed for the survey is reproduced in Appendix 1. The questionnaire was piloted in fall 2016 and 2017 with two cohorts of students (not included in the data presented herein) and the questions were adjusted for clarity based on feedback. In the data presented below 0-4 points are assigned in the order that the choices are presented in the questionnaire.

The questionnaire is divided into three sets, exploring two main questions identified above. The purpose of the first set (Q1-Q4) was to understand how trainees perceive their awareness of the quality now achievable by Machine Translation (Q1-Q2) and how willing they were to use Machine Translation in actual translation (Q3-Q4). The second set looks at how prepared trainees are towards reconsidering quality in certain contexts (Q5-Q6) and how they viewed the changing role of human beings in translation (Q7-8). Mean scores and standard deviations for responses to each question are presented below.

## 2.1 Results

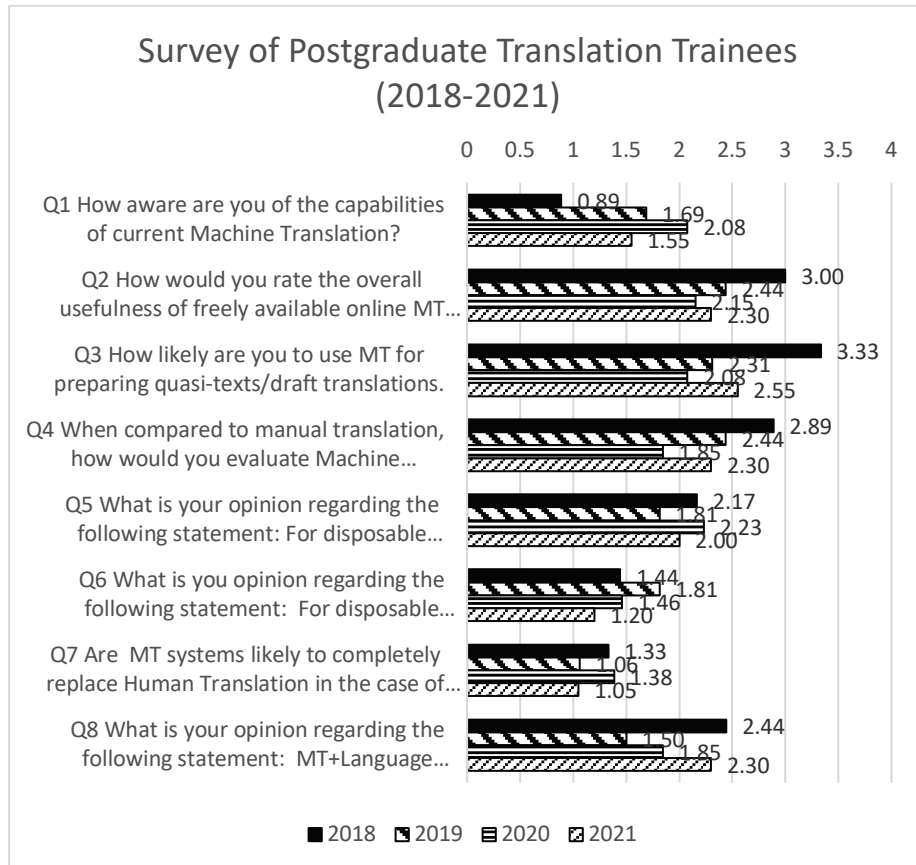


Fig. 1 Mean scores for each year (2018-2021)

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
2018	0.758395	1.283378	0.840168	0.963382	1.043185	1.096638	1.283378	1.247219
2019	1.014479	0.963933	1.195478	1.093542	0.655108	0.910586	1.062623	1.21106
2020	0.954074	0.898717	1.497862	0.987096	0.83205	0.77625	1.043908	1.405119
2021	0.825578	0.656947	1.145931	1.031095	0.917663	0.767772	1.099043	0.864505

Fig. 2 Standard deviation in responses to each question (2018-21)

### 2.1.1 Awareness of Machine Translation:

In general respondents across the years seem modest in how they perceive their awareness towards current capabilities (quality) achieved by raw MT output in case of informative texts. Even respondents from 2020 who are the most confident in their awareness of MT reach a little over 2 points on average, which is equivalent to being 'aware' but not 'quite aware', leave alone 'fully aware', while the respondents from 2018 seem to be the most modest

about their understanding (Q1) and paradoxically also the most positive towards integrating available it in translation (Q2, Q3).

Respondents from 2020 express most confidence in their awareness of current capabilities but are much more conservative when it comes to the usefulness of MT and likeliness of using it in translation ('likely' but not 'quite likely'). In each case respondents from 2019 and 2021 seem to fall roughly in the middle. The responses to Q2-Q4 show strong similarities of a decrease in favourable appraisal of technology between 2018-2020, which is contrary to what would be expected with passing years. The trend somewhat reverses in 2021 but does not reach the same level as 2018.

Fig. 2 shows the Standard Deviation in responses. The SD shows a variance of roughly 1 point in most cases and reaches a high of  $\pm 1.4$ - $1.5$  for Q3 and Q8 in case of the 2020 cohort. This indicates a variance that results in responses generally spanning three choices. For instance, in case of awareness the mean score of the 2018 cohort of 0.89 indicates that they are 'somewhat aware' of current capabilities of MT. However, a SD of  $\pm 0.75$  reveals that responses ranged from 'not aware' to 'aware'. In case of 2019, 2020 and 2021 the responses similarly ranged from 'somewhat aware' to 'quite aware', 'somewhat aware' to 'quite aware' and 'somewhat aware' to 'aware' respectively.

In case of usefulness barring 2018 (1.28), all three cohorts show a deviation less than 1 point. This indicates that in case of the 2018 cohort responses varied from 'useful' to 'very useful'. Q3 asked respondents how likely they were to use MT and this question shows the most deviation among all, particularly with students from 2020 (1.49) who on average (2.15) seem 'likely' but given the deviation actually swing across the spectrum from 'somewhat likely' to 'very likely'. As for the comparison between HT and MT (Q4) the deviation observed was less than 1 in case of 2018 and 2020 and slightly more than 1 for others, who considered MT and HT to be 'roughly the same' on average ranged from 'somewhat fast and inferior' to 'fast and acceptable'.

Overall, it seems that between 2018 and 2020 awareness and appraisal increased and decreased respectively, while trending in the opposite direction starting 2021, yet not reaching the same level as 2018.

### **2.1.2 Preparedness in integrating MT into workflow and attitude towards future prospects:**

Q5 and Q6 were intended to gauge how open respondents were to the idea that quality could be adjusted in exchange for higher efficiency (Q5) and if they believed that errors/inaccuracies may be tolerated in case of highly disposable content (Q6) (See Venkatesan 2021, 666 for a detailed discussion). On this question the 2019 cohort remained the most conservative, falling on an average between 'disagree' and 'neutral' while responses from 2020 ranged from 'neutral' to 'agree' and those from 2018 were similar but tilted even more towards 'neutral'. The respondents from 2021 on the other hand on an average disagreed (though tending towards being neutral) that high-quality is unnecessary and also generally disagreed on the following question (Q6) of allowing errors to remain. On Q6, respondents from 2018 and 2020 fell roughly between 'disagree' and 'neutral' with the 2019 cohort tending more towards being 'neutral'. As seen in Fig. 2 the responses for Q5 and Q6 show deviations less than 1 point except for 2018 that is slightly over 1, with most responses ranging between 'disagree' and 'agree'.

It is evident that respondents are generally uncomfortable with the idea of varying qualities of translation (Q5) and even more so with allowing errors in translation (Q6). However, it also shows that they are not strongly opposed to reconsidering the issue of quality based on considerations such as the nature of text being translated, purpose, efficiency etc. However, the general reticence shown in responses to Q5 in spite of responses to Q2 that seem to suggest that MT is viewed generally as useful may indicate a potential site for training and scaffolding on the part of trainers.

With regard to future prospects, respondents from 2018 remained most positive on average in their attitude towards MT. However, based on the mean scores all four cohorts on average believe that MT is only 'somewhat likely' to completely replace Human Translation even in the case of non-literary texts (Q7). Respondents from 2020 were slightly more inclined to believe that this would be possible, in comparison to those from 2021 and 2018, while those from 2019 remained most conservative. When the question was modified to ask if MT+Language Editors (it was explained that this referred to monolingual TL editors) could replace Human Translation (Q8) respondents from all four years seem more likely to agree, with those 2019 expressing least optimism. Respondents from 2018 and 2021 on an average fell between 'neutral' and 'agree' while others fell between 'disagree' and 'neutral'.

Q7 showed deviations of more than 1 across the years, with responses ranging between 'unlikely' and 'neutral' indicating relatively strong reservations towards the idea. The responses to Q8 show deviations above 1.2 for 2018-2020, but there seems to be broad consensus in the cohort from 2021 between 'neutral' and 'agree'. The responses from 2020 show maximum deviation of 1.4 with responses widely ranging from 'strongly disagree' to 'agree'. 2018 and 2019 on the other hand show deviations of 1.2 with responses ranging from 'disagree' to 'agree' and 'strongly disagree' to 'neutral'.

In summary, respondents are somewhat willing to view the issue of quality in translation as variable but have strong reservations towards any suggestion of permitting errors or believing that HT could be replaced even in case of non-creative texts. The response to Q8 however suggests that respondents are willing to consider the possibility that MT+PE could replace HT in case of non-creative texts.

## **2.2 Discussion**

The results of the survey may seem paradoxical. With the advent of Neural Machine Translation in 2016 the quality of translation produced by MT has shown tremendous improvement. The annual report on the language service industry in China by the Translators Association of China in 2020 points out that there is increasing recognition by the industry of the role played by translation technology in enhancing efficiency, finding that 5.6% of respondents from language service providers reported that they always used MT while 36.8% reported frequent use. The numbers were 11.6% and 28.3% when it came to actual translators (Qu 2020).

Against such a background, it may be reasonable to expect at least postgraduate students of translation to be more aware of quality achievable by MT and open to using Machine Translation. However, it is seen that even the most positive respondents from 2018 are found to be quite modest in their awareness of current capabilities. On the other hand, students from 2019-2021 report being relatively more aware and yet appear less likely to use MT even for preparing draft translations, leave alone believing that MT or at least MT+Post-

Editing (PE) could replace human translation for non-creative/literary texts. This attitude contrasts with studies that demonstrate that post-editing output from NMT reduces technical and cognitive effort (Jia, Carl, and Wang 2019) even though productivity gains may vary across languages and domains (Sarti et al. 2022). This gap between respondents' appraisal of usefulness and willingness to use MT for draft translations may be indicative of lack of formal training in this mode of working.

The unwillingness to consider the possibility of allowing errors for disposable information (Q6) and even lower quality (Q5) seems to resonate with the traditional understanding of translation that "the human translator must always produce consistent high quality" (Pym, 2012, p. 146). The survey shows that while respondents are not entirely against the idea of concessions in quality in exchange for efficiency in the case of certain texts, there is much discomfort with any idea that involves not doing the "best". However, given the demands for rapid everyday exchange of information, particularly in multilingual communities, using MT to reduce effort when producing disposable texts would enable translators to adapt to the diverse requirements of the information age (Venkatesan 2021, 667) .

Respondents are generally unwilling to concede that human translation could ever be replaced (Q7), even for non-creative or purely technical/informative texts. Even when asked when such replacement could be conceivable in case of MT+Language Editors (Q8) the highest mean in all four years is 2.4 (between neutral and agree) while the lowest is 1.5 (between disagree and neutral). This reluctance could indicate a lack of awareness towards current developments and perhaps also some degree of insecurity as the possibility may be perceived as threatening the very purpose behind working towards a postgraduate degree in translation. This concern is shared by evaluations of MT as well, that frequently return to the theme of whether MT will replace HT (Qin 2018; Kenny and Doherty 2014). However, while the developments may threaten the traditional role of translators, they also point towards a new editing role that trainees must prepare for in order to remain relevant. This could be a direction for training by teachers in translation courses.

In summary, while there are variations in responses over the years, they do not lend credence to any suggestion that students are progressively more aware and/or willing to use technology with each passing year. The problem confronting translator training seems to be a tendency, even among trainers, to prioritize "bilingual and translation knowledge sub-competences" out of seven sub-competences that include the understanding of and ability to use technology (D. Wu, Zhang, and Wei 2019). Resonating with this, a survey of teachers covering 205 institutions and students from 143 students in China that was published in 2019 found the following:

The objective of MTI [Masters in Translation and Interpreting] programs is narrowly focused on training "professional interpreters and translators," which does not meet the wider demand of the language service market for translators and interpreters, and skills in transcreation, transediting, localization, translation project management, technical communication, translation technology, and sales and marketing (Cui 2019b, 47).

The survey employed in the study also noted that teachers generally “do not understand technical communication, translation technology (such as machine translation, computer-assisted translation, etc.), translation project management, and other emerging areas of translation, which affects the quality of the MTI teaching they offer.” (Cui 2019b, 48). Cui identifies lopsided emphasis on research over practice by employers in academic institutions in China as the primary cause behind this. This is also confirmed by Xu and You in a more recent study where they state that “most translation teachers in China have little or no experience working as full-time or even part-time translators in translation or language service companies.” (Xu and You 2021, 347). Parallels have been suggested in the case of European languages as well (Kornacki 2018).”

As studies show, the consequences of training that fails to integrate technology are that “among the 107 employers who were surveyed, 48 (44.86%) employers chose the response “lack of professional knowledge,” and 35 (32.71%) chose “lack of internships and practice” to describe MTI graduates” (Cui 2019a, 63).

A gap between evolving technology and curricula is also reported in Taiwan where there were 7 research institutes 6 had courses that included translation technology, but 35 ordinary universities only 5 used Trados, Google Translate, corpora etc (Chang, Yang, and Wang 2019, 134).

In summary, studies show that while the industry requires translators to be able to work with new and evolving technologies, translator training remains largely traditional with more emphasis on linguistic proficiency. However, at least in the context of Chinese-English translation, a gap between curricular content and actual needs is highlighted.

Even where technology is introduced the standalone approach dominates translation curricula. Calling instead for curriculum-wide implementation of technology Mellinger says:

By integrating and embedding machine translation across the curriculum, trainers can model expert behaviour and encourage students to engage in best practices, which will position them well for current industry practices (Mellinger 2017, 284).

By providing operational frameworks, standards and ethics for the use of technology, such a training would result in students being more willing to adopt and confident in using technology and also in employing it dynamically to respond to different requirements. This idea of integration resonates with the survey mentioned above that recommends that CAT tools be taught in a more practical manner rather than the predominant standalone treatment (Zhang and Nunes Vieira 2021, 119).

The general lack of training and standalone treatments may result in reluctance towards using MT and inability to respond to non-traditional contexts. An example here would be the ability to carry out post-editing of raw MT output that would be adequate for the purpose at hand. Drugan cites the predicament of a translator in this situation:



“This might seem standard practice in the industry already, but in research, translators recognized they struggled to produce different, particularly lower, quality levels. Those who accepted occasional jobs out of the mother tongue or agreed to post-edit MT output for less than their standard rate found such work ‘really frustrating’, even impossible: ‘I ended up doing it to my usual standard. It took so long I was being paid less than the minimum wage (Drugan 2013, 180).”

The effect of absence of training that would allow the respondent above to do just what was required is notable. Training that integrates MT into translation could allow it to be seen as an opportunity to enhance both efficiency and quality, rather than a threat to what was exclusively the province of trained translators. With the maturing of Machine Translation, even where errors and deficiencies in MT output are found, the Post-Editing (PE) effort required is still justified given the overall savings in time and effort as would be required of Human Translation (HT) (X. Wang et al. 2021). This training may offer a hybrid model of working that goes beyond the either/or formulation of MT vs HT that has impeded wider integration of technology. This would in turn enable future translators to respond to varying requirements of efficiency and quality in translation.

### **3. Implications for Translator Training**

1. There is a need for curricula to include increased interaction with available technology, with training in translation methods/techniques equally focused on enabling trainees to act as effective post-editors of raw MT output.
2. It is important to provide trainees with clear frameworks to adjust time/effort and offer varying qualities of translation that may be adequate for a given purpose.

In the following ideas for activities to integrate technology in translator training are discussed to address lacunae identified above.

#### **3.1 Integrating Machine Translation into the Translation Process**

Take the example of a course on translation of business writings. Such a course would be expected to include: a comparison of genre characteristics in the languages concerned; an introduction to appropriate register and style; a discussion of translation methods and oft employed techniques; and common errors observed in translation resulting from linguistic, stylistic or cultural differences. This could be followed and/or preceded by translation practice involving sample texts that allow students to gain experience in handling texts of the said genre.

In courses integrating Machine Translation, after foundational grounding in the above, students may be engaged in post-editing translations of sample business texts produced by available MT systems.

The training would have two learning outcomes: First, students would be able to apply the knowledge gained in the preceding part of the course to post-editing (MT output where it fails to conform with genre characteristics or contains errors in syntax and context); Second, Students will be enabled to achieve rapid production of translation by learning to devote time and effort to bringing texts to shape instead of producing initial drafts.

It may well be this “value-addition” that may serve to highlight the role of trained translators - who are capable of producing rapid yet high-quality translation, unlike amateur translators who may also use available technology to generate translations.

### **3.2 Customization (Varying Qualities)**

It is imperative that students are trained in post-editing that attains different quality standards. In such cases, trainees need to be trained in a framework that defines minimum standards to be achieved in the case of each type of text. The ability to do this is identified as one among three sub-competences under revision and post-editing competence (Kontinen, Salmi, and Koponen 2020, 194). The TAUS guidelines for Post-Editing suggests building a “a clear matrix of post-editing productivity, quality, turnaround time and pricing discount expectations based on the results of your analysis” (Massardo et al. 2016, 12) and offers operational guidelines to achieve “Good Enough” Quality and “Human Translation Quality”(Massardo et al. 2016, 17–18). However, clearly defined standards and methods to attain and verify them would be crucial for training.

One framework that may help students identify the level of editing required and learn to do no more than required is examining disposability. Under this framework, translated texts may be classified as Disposable, Reusable and Documentary, each with pre-defined levels of translation to be attained and methods to be used (Venkatesan 2021, 670). In order to train students to offer varying qualities, informative texts may be taken up for translation and trainees may be asked to translate in groups collaboratively, treating the same text variously as a disposable, reusable and documentary and producing different qualities within time constraints. This may be followed by a discussion to examine if each translation attained the minimum requirements of quality based on the framework. The core aspect of the training here would be to guide trainees to do no more than required.

## **4. Summary**

The surveys presented in this study show perceived lack of awareness and preparedness towards leveraging existing technology among respondents. The attitudes reported do not change significantly over the years, pointing towards possible causes such as absence of systematic training in integrating technology into the process of translation. Lack of training that integrates technology into the translation process and provides a framework by which variable qualities of translation may be attained may be among the reasons why trainees are hesitant to respond to such requirements.

Based on the above, it is suggested that translation technology be integrated across curricula in practical translation courses that provide a framework of reference for production of rapid and customized translation. The ability of translators to produce rapid, customized and localized translation through the use of technology may well be the key to the continued relevance of translator training and trained translators.

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## Appendix 1

# Computer-Assisted Translation

A survey of opinions on available technology.

\* Required

1. How aware are you of the capabilities of current Machine Translation?

\* *Mark only one oval.*

- Not aware  
 Somewhat aware  
 Aware  
 Quite aware  
 Fully aware

2. How would you rate the overall usefulness of freely available online MT systems?

\* *Mark only one oval.*

- Useless  
 Somewhat useful  
 Useful  
 Quite useful  
 Very useful

3. How likely are you to use MT for preparing quasi-texts/draft translations in the future?

*\*Mark only one oval.*

/

Unlikely

Somewhat likely

~~Likely~~

Quite likely

Very likely

4. When compared to manual translation, how would you evaluate Machine

~~Translation+Post~~ Editing?

*\*Mark only one oval.*

Slow and inaccurate

Somewhat faster but inferior

Roughly the same

Fast and acceptable

Efficient and superior



5. What is your opinion regarding the following statement: For disposable information, spending much time to achieve high-quality is not required.

*\* Mark only one oval.*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

6. What is you opinion regarding the following statement: For disposable information, it is alright if the translation contains errors or inaccuracies.

*\* Mark only one oval.*

- Strongly disagree
- ~~Disagree~~
- Neutral
- Agree
- Strongly agree

7. Are MT systems likely to completely replace Human Translation in the case of non-creative/literary texts?

*\*Mark only one oval.*

- Unlikely
- Somewhat likely
- Likely
- Quite likely
- Very likely

8. What is your opinion regarding the following statement: MT+Language Editors can replace Human Translation in the case of non-creative/literary texts

*\* Mark only one oval.*

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