

Neural machine translation and the evolution of the localisation sector:

Implications for training

Sharon O'Brien & Alessandra Rossetti

N.B. This is a pre-publication draft. For the final paper, please refer to:

O'Brien, Sharon and Alessandra Rossetti (2021) Neural machine translation and evolution of the localisation sector, Implications for training, *Journal of Internationalization and Localization* 7:1/2, 95-121.

Abstract

The localisation sector is highly technologized and evolves rapidly. Though significant consideration has been given to third-level training in localisation for Translation Studies students, the nature of the industry is such that this topic demands regular attention. Our objective was to survey employees and executive managers to understand what impact recent technological developments, including but not limited to neural machine translation (NMT), might have on future skills and training requirements for localisation linguists. Our findings are that linguists in localisation take up a variety of roles, including transcreation, data mining, project and vendor management. NMT is considered an important advancement, and its introduction has emphasised the need for a critical use of technology, while opening new career pathways, such as data curation and annotation. Domain specialisation is recommended for those who translate, and transferable soft skills are more essential than ever. Increased industry and interdisciplinary collaborations in training are also considered valuable.

Keywords

Localisation, training, employability, translation graduate skills

1. Introduction

Localisation has traditionally been a rapidly evolving sector (Folaron 2020). Technological advances and market disruptors have been influencing the role of linguists in localisation, such as their working conditions, daily tasks, and skills required in order to meet demands from employers and customers (Rodríguez-Castro 2016). Employability is a growing concern in Higher Education Institutions in general (Salmon 2019), as well as within the academic discipline of Translation Studies specifically (Rodríguez de Céspedes et al. 2017). Therefore, it is useful to take stock of the rapidly moving localisation industry at regular intervals (Gaspari et al. 2015), especially considering the speed with which neural machine translation (NMT) and other artificial intelligence (AI) applications are developing and shaping the localisation sector (Wang et al. 2019). NMT in particular has been embraced as a game changer for the industry.¹ Such claims require attention from the discipline of Translation Studies and that has indeed begun to happen (Ginovart Cid et al. 2020).

To contribute to this ongoing discussion, and with a particular interest on employability in localisation, we conducted an investigation through: (1) a survey targeting employees in localisation, focusing in particular on those who have a linguistic role or background; and (2) a set of interviews with executive managers in localisation companies. We sought to understand what impact recent technological developments, including but not limited to NMT, might have had on future skills and training requirements for linguists in localisation.

First, some terminological clarifications are needed. Various terms are used to describe people who contribute to the production of multilingual content in localisation, e.g. *(freelance) translator, language professional, language lead, linguist*. For the purpose of this study, and when discussing our survey and interview findings in particular, we will use the broad term

linguist to describe employees who play an active role in the production of translated/localised content (McDonough 2007). The simplification is not ideal but does allow us to report on the views of those working in localisation in a broadly language-related role—i.e. not just in translation—in the game changing era of NMT. Note that when we report related work, we generally use the terms used by the original authors. With regard to translation and localisation, the boundaries between the two activities are blurred (Jiménez Crespo 2018). Localisation is generally defined as the process of linguistically and culturally adapting digital content to the target markets (or locales) (O’Hagan 2006). Therefore, while language translation might represent the core of localisation, the latter also has a strong technological component (*ibid.*). Nowadays, translation in general is highly technologised. However, the localisation sector occupies that part of the spectrum that is intensely tech-heavy. For instance, a linguist is sometimes expected to be familiar with programming languages, or at least to use regular expressions to search for strings and replace them, needs to be able to recreate the design of products and tools to make them usable for end users, ideally knows about search engine optimisation, and should be able to extract translatable strings from a website or a program (Sánchez Ramos 2019; Torres del Rey 2019). The tasks and demands often go beyond those required of a *translator* who mainly works in a computer-aided translation environment. Consequently, we hold that a focus on *localisation* as encompassing a broader scope than translation is still (for the time being) legitimate.

This paper is organised as follows: Section 2 reviews previous research, including relevant literature on translation and translator training, especially in relation to localisation. In Section 3, we describe the methodology adopted. Section 4 presents the findings from our survey and our interviews. These findings are then discussed in Section 5, along with their implications and limitations.

2. Related Work

A significant body of work exists on translator training in general and also on training for localisation. This section does not claim to be a systematic review of that literature but focuses on the main relevant work for our current objective (Section 1).

The inclusion of localisation in academic training programmes varies around the globe. For instance, localisation tends to be overlooked in translation programmes in the Middle East and the North African region, even though it represents a significant component of the current market (Al-Batineh and Bilali 2017).

In order to prepare graduates for the job market, translation and localisation training have relied on tasks that mimic those of the industry (Baños and Toto 2013; Sánchez Ramos 2019). For example, Massey (2019) reports on how his university has been simulating real-life translation projects through collaborations with direct clients. Translation training programmes and placement schemes have undergone evaluations through an employability lens (Astley and Torres Hostench 2017; Rodríguez de Céspedes 2017). Scholars in Translation Studies have investigated various pedagogical approaches such as project-based learning (Király 2005) and problem-based learning (Mellinger 2018), although these do not focus on localisation specifically.

Researchers have asked employers and linguists to describe the skills and competences needed to navigate the translation and localisation job market, as well as their opinions on the appropriateness of university degrees (Olohan 2007; Valero Garcés and Toudic 2015). Focusing on the Spanish context, Schnell and Rodríguez (2017) found that specialised domain knowledge and job placements were particularly appreciated by their responding employers. Specialised domain knowledge—especially finance and law—is also in high demand in the

translation job market in the Middle East and North Africa, along with the ability to use translation technologies and to conduct research (Al-Batineh and Bilali 2017). In line with these findings, King (2017) advocates for combining translation courses with others such as law and international relations, so as to equip students with specialised knowledge. Based on data from the 300 in-house translators and revisers surveyed by Lafeber (2012), translators are expected to have not only language skills, but also analytical, research, technological, interpersonal, and organisation skills. Through their survey of linguists and employers in Spain, Álvarez-Álvarez and Arnáiz-Uzquiza (2017) found that the former would welcome the introduction of university training on invoicing, project management, and taxes, while the latter underlined the importance of technical competences, including the use of translation technologies.

The importance of technology for the translation and localisation profession is not surprising. Several approaches have been put forward for the integration of technologies in the curriculum of translators and localisers (e.g. Marshman and Bowker 2012; O'Brien 2012, p. 113; Kenny and Doherty 2014; Mellinger 2017), including efforts to empower students in their adoption of MT (Moorkens 2018). However, Shreve (2020) argues that technology makes the language industry so dynamic that job descriptions can only be used as a starting point to find out the skills sought by employers. Unsurprisingly, translation technology training is also an important component of the continuous professional development of linguists, along with specialised domain knowledge (European Union Association of Translation Companies 2019; LeBlanc 2017). Despite the growing importance of translation technologies, professional translators have shown mixed feelings towards them—particularly towards MT—depending, for instance, on their involvement in the development of the technologies (Cadwell et al. 2018), and on business practices (Vieira 2020).

Various attempts have been made at defining and developing competence models for translators and localisers (e.g. European Master's in Translation [EMT] 2017; Schäffner 2020). For instance, Jiménez Crespo and Tercedor (2011) developed a model of localisation competence seen as subordinate to the broader translation competence. However, Pym (2014) questions the existence of a localisation competence since localisation processes traditionally involve the division of tasks among different people in industry, and what employers expect from localisers is a set of different skills.

3. Methodology

Our study involved two cohorts of respondents from the localisation sector, i.e. employees who completed a survey, and executive managers who took part in interviews. We included both in order to see if there was agreement of opinion among those who carry out the hands-on work of localisation and more senior level managers. Prior to data gathering, we received ethical approval from the Dublin City University Ethics Committee (DCUREC/2019/233).

3.1 Survey with Employees

Our survey contained a combination of close-ended and open-ended questions, all of which ensured the anonymity of respondents.² The survey was advertised via word of mouth, email, and social media platforms (such as LinkedIn and Twitter) in the period between February and March 2020. The first part of the survey contained questions on the demographics and background of respondents (e.g. their roles and areas of specialisation). The second part contained questions which broadly revolved around: (1) general observed disruptions in the working context; (2) changes in the role, skills, and competences of the linguist, especially considering NMT; (3) response of universities to changes; (4) future prospects for the linguist in localisation. We constructed the questions in such a way as to gather opinions expressly

related to the objectives of the research project, as expressed in Section 1. We received responses from a total of 77 respondents. Responses from seven of these were removed due to various issues with the data (e.g. some reported working as lecturers in the academic sector, so they were not part of our target group). Data from 70 respondents remained valid and were included in the analysis.

3.2 Interviews with Executive Managers

The purpose of the interviews was to ascertain if the opinions from executive managers aligned with those expressed by employees in the survey. We also aimed at capturing potentially higher-level, strategic opinions from people who had been working in the localisation industry for significant periods of time and who had, consequently, seen a lot of change. To gather data from executive managers in localisation, we conducted a series of semi-structured interviews, which allowed us to prepare a set of topics to be discussed, while also flexibly adjusting the questions to the answers provided during the interviews (Matthews and Ross 2010). We adopted a convenience sampling approach, which has drawbacks, of course, in that it limits the extent and reach of possible respondents, but this approach enabled us to avail of our personal networks in the field of localisation. The first part of the interview aimed at building a profile of the participant and their company. In line with the survey questions, the second part of the interview focused on the following main topics: (1) observed disruptions in the working context; (2) changes in the role, skills, and competences of the linguist, especially considering NMT; (3) response of universities to changes; (4) future prospects for the linguist in localisation.

Six managers agreed to be interviewed in the period between February and March 2020. As the managers were spread around Europe and we were experiencing an international lockdown

due to the COVID-19 outbreak, four of the interviews were conducted in person but two had to be conducted online (through a video call). The interviews took approximately one hour each and were carried out with a semi-structured approach. The researchers identified a list of questions to be used for the interviews that were motivated by the aims of the research and these were followed for all. As is usual for a semi-structured approach, the interviews were organic; if an interviewee brought up a topic that was addressed in one of our later questions, we followed the natural flow of the conversation. In general, however, all interviewees were asked the same questions more or less in the same order. After the interviews, the respondents were provided with a transcript of their interview data and a summary of how they characterised their companies, so they would have the opportunity to comment on these. We offered them various levels of anonymity. Since one interviewee opted for complete anonymisation of both name and company, we opted for fully anonymising all interviewees and companies to be consistent.

3.3 Coding and Analysis

An inductive coding approach was adopted for the qualitative data in the survey as well as in the interviews. The short answers to the open-ended questions in the survey were manually coded by one of the researchers with the aim of identifying important units of meaning. Regarding the interviews, their transcriptions generated about 42,000 words of data. Using the qualitative data analysis program NVivo, the researchers followed a six-phase thematic analytical strategy as detailed in Braun and Clarke (2006). First of all, each of the researchers independently familiarised themselves with the data (phase 1) and produced individual codes by assigning labels to the content of the data (phase 2). Subsequently, the researchers jointly discussed the codes identified to reach an agreement on: (i) which codes were the most salient and the most representative of the collected data; (ii) whether and how the codes clustered

around specific themes; and (iii) differences and similarities between codes in the survey data and codes in the interview data (phase 3). Phase 4 of the analysis involved the revision of the themes and specifically checking whether the themes were supported by enough data in the interviews and in the survey, whether they had internal coherence, and whether they provided an accurate picture of the data. In phase 5, the researchers reached an agreement on the names for the five themes identified (namely, *Market*, *Profession*, *Skills and competences*, *Training*, and *Technological advances*) and on the boundaries between the themes. In addition to these five themes being mentioned in all six interviews, the researchers agreed that they were representative of major patterns present in the transcript data, as well as in the survey data. The last phase of the analysis (i.e. phase 6) involved developing a narrative for each theme and ensuring that all the themes combined were telling a coherent story about the data (as shown in Section 4.2).

4. Results

In this section, we start by presenting the demographic characteristics and background of our research participants (survey respondents and interviewees). Subsequently, we delve into the discussion of our participants' answers to the key topics in our survey and interview questions, mainly guided by the five themes identified in Section 3.3.

4.1 Demographic Profile and Background

4.1.1 Survey Respondents

There was a balance between male (N=34) and female survey respondents (N=34)—two respondents did not disclose their sex. In terms of age, respondents ranged from 18 to 72 (Figure 1), with most of them (i.e. 47%) reporting being between 29 and 39 years of age. We gathered data on the perspectives of a broad range of employees, from novices to people with

decades of experience, as shown in Figure 2 (responses from 14 respondents were omitted from Figure 2 because their time in the localisation sector was unclear). The majority of survey respondents had been working in localisation for more than eight years.

INSERT FIG 1 HERE

Figure 1. Age range of survey respondents

INSERT FIG 2 HERE

Figure 2. Survey respondents' years of experience in localisation

Our survey respondents worked in various roles in the localisation sector (see Figure 3). The five most common positions were: (1) project or program manager; (2) freelance linguist; (3) quality manager or specialist; (4) in-house linguist; and (5) engineer or developer. Freelance linguists represented a larger percentage of our respondents compared with in-house linguists, but this result reflects the structure of the industry in general, where outsourcing of linguistic services is the norm. Two responses are missing from Figure 3, due to skipping of the question or a lack of clarity in the response.

INSERT FIG 3 HERE

Figure 3. Survey respondents' roles in the localisation sector

These are loose labels that could overlap in terms of actual tasks. However, the purpose here was not to define job titles precisely, but to get a general idea of how the respondents would describe their functions.

The following question concerned the language directions with which respondents usually worked. As would be expected, this question was irrelevant for respondents who did not have a strictly linguistic role in their companies (such as engineers, vendors, or project managers). Therefore, our analysis focused on the answers provided solely by the 18 respondents (26% of the total) who self-identified as linguists (either freelance or in-house). We have separated the source languages (Figure 4) from the target languages (Figure 5). English, followed by German, was the most common source language, as also emerged from the interviews with executive managers (Section 4.1.2). With regard to target languages, the three most common were Spanish, Italian, and English. A second comment is necessary here: the majority of target languages are European, probably due to the limited reach of our survey, which was circulated widely online but relied on the researchers' contacts, who are mainly based in Europe. Consequently, we do not claim generalisability of the results from this survey, but it provides a snapshot in time of the opinions of 70 localisation professionals.

INSERT FIG 4 HERE

Figure 4. Source languages reported by the linguists in localisation

INSERT FIG 5 HERE

Figure 5. Target languages reported by the linguists in localisation

Regarding areas of specialisation, again, we reported only the answers provided by freelance and in-house linguists, summarised in Figure 6. Specialisations are varied, with information technology (IT) being the most common, followed by the legal domain, finance, and technical documentation. Interestingly, only two linguists did not indicate any area of specialisation. This

result supports the opinions expressed in the interviews that linguists should specialise in a specific sector. This specialisation appears to be seen as something of value over and above the ability to translate general content (Section 4.2). Data in Figure 6 also emphasise that localisation covers a very broad range of sectors and specialisms, as also emerged from the interviews (Section 4.1.2).

INSERT FIG 6 HERE

Figure 6. Areas of specialisation of linguists in localisation

The language-related daily tasks mentioned by our survey respondents mainly included: the assessment and management of translation quality; translation and localisation; editing, revision, and proofreading; post-editing (PE); and management and development of linguistic resources, such as glossaries. Furthermore, there was a combination of mechanical tasks (e.g. transcription, and file preparation) and creative tasks, such as content creation and transcreation (Figure 7). Of note here especially is that PE accounts for only 8% of the language-related daily tasks. This was a surprisingly low number, given the aforementioned increase in technologisation, and the claims that NMT is a game changer. It could be surmised that NMT is *such* a game changer that PE is not really required. However, studies have shown that, despite some improvements in productivity with NMT, PE is still required (Sánchez-Gijón et al. 2019; Toral et al. 2018).

INSERT FIG 7 HERE

Figure 7. Daily tasks conducted by linguists in localisation

Two of our interviewees were women and four were men. Although they were working from Europe as a base, their companies were active worldwide. Experience in years in the localisation industry ranged between 5 and 40 (mean=25). All were executive-level managers but had different roles in their companies, namely managing director, director and chief technology officer, vice president of sales, director of linguistic services, and director of machine translation. Some of them had a predominantly customer-facing role, others focused on on-the-job training and internal supervision, while the rest mainly worked on technology development. Some worked in large, long-established translation and localisation companies, while others in relatively new and smaller companies.

Similar to the survey respondents, there was a wide range of specialisations within the companies of the interviewees (Section 4.1.1), including e-commerce, machinery, travel and hospitality, medical devices, aerospace and defence, customer support, retail, and gaming. Our interview data also confirmed English as the main source language, followed by other source languages such as German, French, and Chinese. The interviewees noted a rise in diversity of target languages, which was linked with an increasing focus on globalisation for their clients. They mentioned Asia in particular as a growth area for both target and source languages.

4.2 Evolution of the Localisation Sector and Implications for Training

The interviewees and the majority of survey respondents (N=47) agreed there had been major changes or disruptions in localisation in the past years. In this section, we delve into their descriptions of these changes and their impact, guided by the five themes identified (i.e. market, profession, technological advances, skills and competences, and training). To distinguish answers of survey respondents from answers given by interviewees, the former are marked with *S* (e.g. S05), while the latter with *I* (e.g. I03).

4.2.1 Market

Both survey respondents and interview participants discussed how the market is changing in terms of business goals, business practices, trends, products, and customers' needs and requirements, with some of these changes being perceived as disruptive.

Often part of the initial business conversation is the fact that more companies and more diverse sectors are localising into more locales, and the clients are increasingly knowledgeable about localisation. The breadth and depth of what is on offer is also changing. Translation and localisation companies have moved away from selling *pure* translation or localisation to selling expertise and services that have a perceived higher value. One interviewee and one survey participant summed this up as follows:

I05: It kind of turns the thing on its head. So, as opposed to saying 'We're a translation company', you say 'What we're going to do is ensure that your multilingual communications do what you need them to do'. And it takes it into a whole different headspace in terms of who you're talking to at that company. You're no longer talking to procurement, right? You're talking to people higher up who are trying to do things on a more strategic level.

S27: L10n professionals are more often considered key stakeholders in software companies. In the past internal L10n teams were often seen as a pure service organisation.

Decreasing timeframes and increasing volumes were two aspects of the market that were emphasised as significant changes in the past decade. They were linked to a changeover to agile development and the continuous localisation model (Dunne 2011), with the impact for the linguist being made clear, particularly in terms of tasks and remuneration:

I04: You have to be faster. You have to figure out portions of things as opposed to whole projects because of the move to continuous and agile development.

S66: No disruptions, just changes in the way how localisation is processed. We have more projects but smaller, with a tighter deadline and decrease of the sell rate.

Unsurprisingly, this model based on quick turnaround has some implications in terms of the quality expected from the customer, where “sometimes there is a requirement to be just about acceptable” (I01), but other times “good enough isn’t good enough” (I02), as also highlighted in previous research (Castilho and O'Brien 2016). The comment from one survey participant establishes an explicit link between quality, timeframe, and remuneration:

S49: Less time to deliver a project, lower rates for translators, less care for quality from the client and more interested in receiving the final product quickly and cheaper [sic].

4.2.2 Technological Advances

A recurring theme in the answers of survey respondents and interviewees was technological advancement, mentioned by 30 survey respondents. The localisation sector has become highly technologised, which means that linguists need to be tech-savvy, and have a deeper knowledge of software applications in general. There are also more file formats at play, as well as technologies for communication and management:

I01: So, you know, in the old days, 'Here is the 15 Word files'. Or 'Here's 100 Word files'. Now you have 'Okay, here's 50 XLS and 30 XLIFF files and, by the way, here's a couple of texts that need translate [sic]. And there's a video on top of that', right.... And you do the SRT file... And it's like... So, you get this sort of boom.

As would be expected, survey respondents and interviewees made several references to (N)MT, PE, and computer-assisted-translation (CAT) tools. In particular, the shift from the rule-based, to the statistical, to the neural paradigm in MT introduced new challenges and requirements, considering the fluency that characterises the NMT output (Castilho et al. 2017). The increasing reliance on MT means that linguists are involved in PE, as well as in efforts to improve the MT engines:

I05: Curation, curation. So, so finding data, making sure it's, it's high-quality data.

And it depends what the task is that we're trying to help train for, right?

In line with market changes (Section 4.2.1), MT is having an impact on costs and on the amount of content that can be translated/localised, for example using a "blended approach" (I01) of human translation and MT:

I01: And that's one other thing that the technology is doing. Technology is opening the market. Some people think that machine translation is going to kill the translation market. At the moment, I would disagree with that.

I03: Because with customers, where we're introducing, say, more MT on certain products, you know, they're probably giving us the balance of that revenue. We've saved the money. They're giving us the balance of that revenue into other areas.

There is, however, clear awareness that MT is not the appropriate solution for all translation and localisation tasks, with more creative and specialised tasks requiring substantial human input:

S32: It depends on the type of content being localised. If you want general support documentation localised, it can go through machine translation and then post-

editing. There are some area [sic] such as UI translation, marketing and legal that really require human translation given the nature of the content involved.

4.2.3 Profession

Our respondents described how the role of the linguist in localisation has been changing in terms of status, tasks, expectations, remuneration, and future prospects.

First of all, the number of survey respondents who noticed a decrease in the number of in-house linguists in localisation (N=28) was double the number of those who noticed an increase (N=14). This result is in line with previous research showing that linguists are increasingly employed on a freelance basis (Moorkens and O'Brien 2017). Furthermore, the vast majority of respondents (N=49) answered that, in their opinion, the role of the linguist had changed within the past decade. There was some evidence in our interviews that linguists hired on a freelance basis tend to mainly focus on translation, while in-house linguists have experienced growth in the diversity of daily tasks (e.g. project management, terminology work, quality assurance, and vendor management), and this variety seems to be appreciated by employees:

S59: I would tell a young person interested in studying translation that they are unlikely to work as a translator but rather in another role within the industry. These other roles can be rewarding and enjoyable but it's something a lot of young people probably don't think about.

Unsurprisingly, the companies' expectations of the linguist are also evolving as a result of market changes and technologisation. For example, most survey respondents (N=45) agreed that, with the reported advancements in NMT, the role of the linguist will change in the near future. The increased deployment of MT has brought about new requirements, such as the

ability to work with large data sets, including curation, evaluation, analysis, annotation and cleaning of those data sets:

I05: But we create a lot of data sets for various specific things that require glossaries, require, well, terminology work in general, require data mining capabilities and things like that.

S30: The role of the language professional might be more involved in the management, quality control side of things.

Against this highly technologised environment, linguists are increasingly expected to demonstrate their added value, e.g. by specialising in a particular domain (e.g. finance or legal) and by showing their ability with more creative tasks (such as transcreation and copywriting):

S60: It is no longer enough to only be a linguist, people need to have a second and even a third area of knowledge and specialisation as well as a good understanding of the industry and business acumen.

Knowledge of the market and of end users have also emerged as important components of the profession, as businesses have become more global.

I03: We get a lot of, a lot more queries these days where people are looking for the broader, broader linguistic input. So, things like user experience or interaction with specific types of technology and... In a, in a, in a country region or helping customers to validate assumptions about a product being in a locale, you know, all of those kinds of higher-level types of things that they would, they would rather find, otherwise find very difficult.

Regarding remuneration, interviewees recognised that ‘just’ translating is not economically rewarding and that the persistent downward pressure on prices is problematic, especially in high-cost geographic locations, such as Dublin, a stronghold of localisation services. These concerns were also shared by survey respondents:

S49: In-house linguists used to be very well paid whereas now most companies rely on freelance translators with or without experience as long as the rates are low and [sic] delivers on time.

A tentative suggestion of moving to a productivity-based pay model was made, but this was clearly something that would require a major shake-up within the industry:

I05: I think all translators have to move away from the idea of getting paid per word... Getting away from a piecemeal way of thinking about their time in terms of how many words and what they're getting paid per word, because I can guarantee you, two years from now, they're going to be getting paid less per word.

With regard to the future of the profession, overall, our survey respondents held optimistic views—Figure 8 shows that the majority of them selected the options "Very positive: I think that language professionals will continue to play an essential role in localisation in the future" or "Positive: They will play an important role, but some of their duties will be replaced by technology". Furthermore, most of our survey respondents reported that they would encourage young people to study translation or localisation (Figure 9).

INSERT FIG 8 HERE

Figure 8. Survey respondents’ opinions on the future prospects for linguists in localisation

INSERT FIG 9 HERE

Figure 9. Survey respondents' opinions on encouraging young people to become linguists

Interviewees expressed positive views on the need for skilled linguists in the localisation sector in the future, which is not surprising given that the industry fundamentally hinges on language, even if this is sometimes overlooked given the technical nature of localisation. Yet, when asked if they would encourage a young person to study translation/localisation at university, there was a noticeable hesitation, which contrasts somewhat with our survey respondents who reported that they would encourage young people to study translation or localisation. The interviewees replied in the positive, but all of them qualified their response, as shown in the example below:

I05: I would not encourage anybody to just study translation. The same way I wouldn't encourage anybody to just study business, because, in the business degree, you learn about doing stuff on a very abstract level. But what becomes interesting is when you combine that with an engineering degree... Or something like that. Same thing for somebody with language skills.

4.2.4 Skills and Competences

Respondents both in the survey and interviews discussed the skills and competences that are needed to meet the requirements of the profession (Section 4.2.3) and that are sought-after by employers. Overall, the skills identified can be assigned to the five areas of competence as outlined in the EMT competence framework (2017), namely language and culture, translation, technology, service provision, and personal and interpersonal.

In particular, the skills related to service provision and personal and interpersonal competence seemed to be particularly valued by our interviewees (i.e. executive managers). These skills

included critical and analytical thinking, flexibility, communication, self-confidence, and sense of responsibility. Our interviewees also discussed the ability to deal with specialised content—part of the general translation competence in the EMT framework—as a sought-after skill:

I05: If somebody just comes in and says 'Oh, I've been translating for 20 years from English into French', and we say, 'Well, what's your area of speciality?', 'Oh, I do everything'... That to us is not necessarily a red flag, but it's, but it's an 'Okay, understood. But you're not going to be the person who's checking translations for a given life sciences customer'.

Interestingly, some additional abilities were mentioned by our respondents that could expand the EMT framework. These skills are linked with the technologisation of the profession (4.2.2) and with the various roles that linguists tend to play in the localisation sector (Section 4.2.3). For instance, respondents also mentioned copywriting, transcreation, project management, and programming.

4.2.5 Training

Moving on to how training institutions (i.e. universities) should respond to these changes in the localisation sector, our respondents recommended several strategies. First of all, there was some agreement among our interviewees that a university degree is still needed to provide prospective linguists with basic knowledge, which can then be fostered through on-the-job training. Furthermore, the importance of training mastery of source and target languages still shone through.

As would be expected, both survey respondents and interviewees mentioned the importance of university training on CAT tools, MT, and PE, as well as the need to keep up to date with technological advances. A few respondents mentioned the importance of teaching students how

to approach MT critically and without fear (e.g. by being aware of its benefits and limitations depending on the tasks and the customer's needs), something that is already undertaken in translator training programmes (e.g. Kenny and Doherty 2014). Furthermore, there was some agreement that university programmes should also focus on knowledge and skills related to the development and testing of MT engines—such as machine learning techniques—with a view to empowering current and future linguists in localisation:

S20: If studying translation does not involve new areas related to AI, ML, MT and university lecturers don't have a strategy on how to implement these technologies, there is a risk that the profession will be redefined by technology not by humans working in the field. It's about time to ACTIVELY define / coin how the future of translation should look like. What does make sense and what maybe doesn't.

Other suggestions for training from survey respondents and interviewees involved introducing possibilities for specialisation and for cultivating students' interests:

I04: If you're going into the creative space, get marketing qualifications with your language. If you're going into AI, well, figure out how you will... How language will play a part in the whole world, and then figure out how you can marry a passion for language with something applicable.

S40: I would also encourage students to develop a specialism (e.g. legal, finance, medicine) through further in-depth study.

Industry collaborations and training provided directly by representatives of the industry were also among the recommendations of our research respondents. Stronger links with industry were also seen as an opportunity to increase graduates' employability:

S60: Universities should provide more training with professional [sic] from the industry. The current syllabus is by far too academic and theoretical and lecturers have no hands-on knowledge of the reality of the Loc industry.

Finally, there was some agreement that universities should foster high-level, transferable skills such as those related to personal/interpersonal characteristics and service provision (EMT 2017). These skills were regarded as necessary considering the fast-changing nature of the industry and the different roles that linguists might play in it.

5. Conclusions and Discussion

We set out to understand the recent evolution of the localisation sector and the implications for the employability and the training of linguists from the point of view of employees and executive managers. A particular motivation for the survey and interviews was to ascertain whether there was evidence of NMT being a game changer and to consider what the implications might be. We summarise our findings below.

5.1 Profiling the Localisation Sector

Localisation emerged as a fast-growing and a fast-changing sector. The presence of English as a source language continues to be strong, but interests in new markets (especially in Asia, e.g. Vietnam) are widening the range of target languages on offer. Businesses from various sectors (e.g. tourism, legal, finance, medicine) are becoming increasingly aware of the economic value of using localisation to communicate effectively with their customers. At the same time, customers' expectations are changing—quick turnaround times and increasing volumes are replacing high-quality localised products with products that are fit for purpose (Van Egdom and Pluymaekers 2020). The sector is increasingly technologised, and the deployment of MT is influencing remuneration for translation and localisation, thus demanding a new model for

pricing. In addition to MT, other technologies for management and communication have automated workflows and internal operations.

5.2 What Does It Mean to be a Linguist in Localisation Today?

Linguists in localisation—especially those hired in-house—are conducting a wide array of tasks. While PE is among these tasks, it was not dominant in our data. Linguists are involved in the different stages of the translation and localisation pipeline, such as: management of linguistic resources; training, development, and testing of MT engines; translation and editing; quality assurance for products in specialised markets and target cultures; or copywriting and transcreation, with the latter highlighting the creative freedom of the localiser when dealing with websites, video games, and so on (Torres del Rey 2019). These tasks show the added value of human input in a highly technologised working environment. Furthermore, some linguists eventually move away from a language-centred role, for example to work in vendor management or project management, and some of our respondents clearly recognised a bifurcation in the roles (those who ‘just’ translate and those who do added-value tasks). Success in the workplace seems to rely on an array of transferable, soft skills, such as communication, flexibility, and critical thinking. There is agreement that linguists will continue to play an important role, but how can training institutions adequately prepare students for all the career paths in localisation?

5.3 (N)MT and Implications for Future Training

Torres del Rey (2019) identifies various approaches to localisation training, such as translation-oriented (where the focus is on the textual aspects); techno-centric, which gives prominence to the technical components of localisation; or business-oriented, where project management skills play a key role. The author (*ibid.*) then presents an inclusive approach to the training of localisers which builds on knowledge from other disciplines (e.g. human-computer interaction),

and regards the digital product as a communication-rich artefact with technical, semiotic, and linguistic components. Results from our study provide empirical support for such an inclusive approach to localisation training, whereby students acquire technical knowledge and skills, along with mastery of the language, cultural awareness, and business acumen, among other skills.

Interviewees believed that universities were well placed to train the people they needed for their businesses, even though the opinion of some survey respondents/linguists was that universities lagged behind the times. According to our data, universities are expected to produce graduates with excellent language/translation skills, and knowledge of terminology management, translation technologies, and PE. Furthermore, training institutions should foster the acquisition of domain specialisation (King 2017), knowledge of software applications, copywriting and transcreation experience, project management skills, and programming, among others. Transferable soft skills such as communication, time management, and flexibility should also be fostered. Interdisciplinary contributions (for example, from the business studies domain) and industry collaboration might also help graduates meet the expectations of the job market.

Unsurprisingly, NMT was mentioned by several of our localisation linguists and executive managers. However, rather than having substantially changed the profile of the linguist in localisation, NMT may have brought opportunities for other types of work to the fore, which training institutions should consider. In particular, fostering skills related to 'behind-the-scene' work on data curation and evaluation, and on improvement of MT engines, might increase the employability of graduates. Furthermore, teaching students to critically use NMT for repetitive localisation tasks would allow them to devote more time and energy to creative (and more remunerative) tasks. Finally, domain specialisation seems to be especially necessary with NMT output, in which the high fluency might make accuracy issues more difficult to detect.

To conclude, our sample was relatively small and geographically limited, which is a limitation and does not allow for generalisability. Nonetheless, this study acts as a pulse-taking exercise and might inform the design and update of translation curricula. This type of pulse-taking exercise should be conducted on a regular basis, especially considering the impact of recent disruptive events on the translation and localisation industry.³ Many translator training programmes that we are familiar with are already incorporating the extensive list of topics above. Despite NMT being hailed as a game changer, we conclude that this is the right direction and we should stay the course for the short-term, while also keeping a strict eye on developments.

Funding Acknowledgement

Dr Alessandra Rossetti was funded by Science Foundation Ireland through the SFI Research Centres Programme, cofunded under the European Regional Development Fund through Grant n. 13/RC/2106.

References

Al-Batineh, Mohammed, and Loubna Bilali. 2017. "Translator Training in the Arab World: Are Curricula Aligned with the Language Industry?" *The Interpreter and Translator Trainer* 11 (2-3): 187-203.

Álvarez-Álvarez, Susana, and Verónica Arnáiz-Uzquiza. 2017. "Translation and Interpreting Graduates under Construction: Do Spanish Translation and Interpreting Studies Curricula Answer the Challenges of Employability?" *The Interpreter and Translator Trainer* 11 (2-3): 139-159.

Astley, Helen, and Olga Torres Hostench. 2017. "The European Graduate Placement Scheme: An Integrated Approach to Preparing Master's in Translation Graduates for Employment." *The Interpreter and Translator Trainer* 11 (2-3): 204-222.

Baños, Rocío, and Pier Antonio Toto. 2013. "Challenges and Constraints in Designing a Localisation Module for a Multilingual Cohort." In *Conducting Research in Translation Technologies*, edited by Pilar Sánchez Gijón, Olga Torres Hostench, and Bartolomé Mesa Lao, 185-205. Oxford: Peter Lang.

Braun, Virginia, and Victoria Clarke. 2006. "Using Thematic Analysis in Psychology." *Qualitative Research in Psychology* 3(2): 77-101.

Cadwell, Patrick, Sharon O'Brien, and Carlos Teixeira. 2018. "Resistance and Accommodation: Factors for the (non-)Adoption of Machine Translation among Professional Translators." *Perspectives* 26 (3): 301-321.

Castilho, Sheila, Joss Moorkens, Federico Gaspari, Iacer Calixto, John Tinsley, and Andy Way. 2017. "Is Neural Machine Translation the New State of the Art?" *The Prague Bulletin of Mathematical Linguistics* 108 (1): 109-120.

Castilho, Sheila, and Sharon O'Brien. 2016. "Content Profiling and Translation Scenarios." *The Journal of Internationalization and Localization* 3 (1): 18-37.

Dunne, Kieran. 2011. "From Vicious to Virtuous Cycle: Customer-focused Translation Quality Management Using ISO 9001 Principles and Agile Methods." In *Translation and Localization Project Management: The Art of the Possible*, edited by Kieran Dunne and Elena Dunne, 153-188. Amsterdam: John Benjamins.

European Master's in Translation 2017. *EMT Competence Framework 2017*. https://ec.europa.eu/info/sites/info/files/emt_competence_fwk_2017_en_web.pdf

European Union Association of Translation Companies 2019. *Language Industry Survey – Expectations and Concerns of the European Language Industry*. <https://euatc.org/wp-content/uploads/2019/11/2019-Language-Industry-Survey-Report.pdf>

Folaron, Debbie. 2020. "Technology, Technical Translation, and Localization." In *The Routledge Handbook of Translation and Technology*, edited by Minako O'Hagan. Abingdon, United Kingdom: Routledge.

Gaspari, Federico, Hala Almaghout, and Stephen Doherty. 2015. "A Survey of Machine Translation Competences: Insights for Translation Technology Educators and Practitioners." *Perspectives* 23 (3): 333-358.

Ginovart Cid, Clara, Carme Colominas, and Antoni Oliver. 2020. "Language Industry Views on the Profile of the Post-Editor". *Translation Spaces* (Online). <https://www.jbe-platform.com/content/journals/10.1075/ts.19010.cid>

Jiménez Crespo, Miguel. 2018. "Localisation Research in Translation Studies: Expanding the Limits or Blurring the Lines?" In *Moving Boundaries in Translation Studies*, by Helle Dam, Matilde Brøgger and Karen Zethsen, 26-44. Abingdon: Routledge.

Jiménez Crespo, Miguel and Maribel Tercedor. 2011. "Applying Corpus Data to Define Needs in Web Localization Training." *Meta: Translators' Journal* 56 (4): 998-1021.

Kenny, Dorothy, and Stephen Doherty. 2014. "Statistical Machine Translation in the Translation Curriculum: Overcoming Obstacles and Empowering Translators." *The Interpreter and Translator Trainer* 8 (2): 276-294.

King, Hayley. 2017. "Translator Education Programs & the Translation Labour Market: Linear Career Progression or a Touch of Chaos?" *T and I Review* 7: 133-151.

Kiraly, Don. 2005. "Project-Based Learning: A Case for Situated Translation." *Meta: Translators' Journal* 50 (4): 1098-1111.

Lafeber, Anne. 2012. "Translation Skills and Knowledge—Preliminary Findings of a Survey of Translators and Revisers Working at Inter-Governmental Organizations." *Meta: Translators' Journal* 57 (1): 108-131.

LeBlanc, Matthieu. 2017. "'I Can't Get no Satisfaction!' Should we Blame Translation Technologies or Shifting Business Practices?" In *Human Issues in Translation Technology*, by Dorothy Kenny, 63-80. London: Routledge.

Marshman, Elizabeth, and Lynne Bowker. 2012. "Translation Technologies as Seen through the Eyes of the Educators and Students: Harmonizing Views with the Help of a Centralized Teaching and Learning Resource." In *Global Trends in Translator and Interpreter Training*, edited by Séverine Hubscher-Davidson and Michal Borodo, 69-95. London: Continuum.

Massey, Gary. 2019. "Learning to Learn, Teach and Develop: Co-emergent Perspectives on Translator and Language-mediator Education." *InTRAlinea: Online Translation Journal*. http://www.intralinea.org/specials/article/learning_to_learn_teach_and_develop

Matthews, Bob, and Liz Ross. 2010. *Research Methods: A Practical Guide for the Social Sciences*. New York: Pearson Longman.

McDonough, Julie. 2007. "How do Language Professionals Organize Themselves? An Overview of Translation Networks." *Meta: Translators' Journal* 52 (4): 793-815.

Mellinger, Christopher. 2017. "Translators and Machine Translation: Knowledge and Skills Gaps in Translator Pedagogy." *The Interpreter and Translator Trainer* 11 (4): 280-293.

Mellinger, Christopher. 2018. "Problem-based Learning in Computer-assisted Translation Pedagogy." *HERMES - Journal of Language and Communication in Business* 57: 195-208.

Moorkens, Joss. 2018. "What to Expect from Neural Machine Translation: A Practical In-class Translation Evaluation Exercise." *The Interpreter and Translator Trainer* 12 (4): 375-387.

Moorkens, Joss, and Sharon O'Brien. 2017. "Assessing User Interface Needs of Post-Editors of Machine Translation." In *Human Issues in Translation Technology*, edited by Dorothy Kenny, 109-130. Abingdon: Routledge.

O'Brien, Sharon. 2012. "Translation as Human-Computer Interaction." *Translation Spaces* 1 (1): 101-122.

O'Hagan, Minako. 2006. "Training for Localization (Replies to a Questionnaire)." In *Translation Technology and Its Teaching*, edited by Anthony Pym, Alexander Perekrestenko, and Bram Starink, 39-44. Tarragona, Spain: Intercultural Studies Group Universitat Rovira i Virgili.

Olohan, Maeve. 2007. "Economic Trends and Developments in the Translation Industry: What Relevance for Translator Training?" *The Interpreter and Translator Trainer* 1 (1): 37-63.

Pym, Anthony. 2014. "Localization, Training, and Instrumentalization." In *Translation Research Projects 5*, edited by Esther Torres-Simón and David Orrego-Carmona, 37-50. Tarragona, Spain: Intercultural Studies Group Universitat Rovira i Virgili.

Rodríguez-Castro, Mónica. 2016. "Intrinsic and Extrinsic Sources of Translator Satisfaction: An Empirical Study." *Entreculturas* 7-8: 195-229.

Rodríguez de Céspedes, Begoña. 2017. "Addressing Employability and Enterprise Responsibilities in the Translation Curriculum." *The Interpreter and Translator Trainer* 11 (2-3): 107-122.

Rodríguez de Céspedes Begoña, Akiko Sakamoto, and Sarah Berthaud, eds. 2017. *Employability in the Translator and Interpreter Curriculum. Special Issue of The Interpreter and Translator Trainer* 11 (2-3).

Salmon, Gillie. 2019. "May the Fourth Be with You: Creating Education 4.0." *Journal of Learning for Development* 6 (2): 95-115.

Sánchez Gijón, Pilar, Joss Moorkens, and Andy Way. 2019. "Post-Editing Neural Machine Translation Versus Translation Memory Segments." *Machine Translation* 33: 31-59.

Sánchez Ramos, María del Mar. 2019. "Rethinking Professional Translation Roles: The Localisation of Mobile Applications." *Sendebare* 30: 121-139.

Schäffner, Christina. 2020. "Translators' Roles and Responsibilities". In *The Bloomsbury Companion to Language Industry Studies*, edited by Erik Angelone, Maureen Ehrensberger-Dow, and Gary Massey, 63-90. London: Bloomsbury Academic.

Schnell, Bettina, and Nadia Rodríguez. 2017. "Ivory Tower vs. Workplace Reality: Employability and the T&I Curriculum—balancing Academic Education and Vocational Requirements: A Study from the Employers' Perspective." *The Interpreter and Translator Trainer* 11 (2-3): 160-186.

Shreve, Gregory. 2020. "Professional Translator Development from an Expertise Perspective." In *The Bloomsbury Companion to Language Industry Studies*, edited by Erik Angelone, Maureen Ehrensberger-Dow, and Gary Massey, 153-178. London: Bloomsbury Academic.

Toral, Antonio, Martijn Wieling, and Andy Way. 2018. "Post-Editing Effort of a Novel With Statistical and Neural Machine Translation." *Frontiers in Digital Humanities*. <https://doi.org/10.3389/fdigh.2018.00009#>

Torres del Rey, Jesús. 2019. "The Proper Place of Localization in Translation Curricula: An Inclusive Social, Object-Driven, Semiotic-Communicative Approach." In *The Evolving Curriculum in Interpreter and Translator Education. Stakeholder Perspectives and Voices*, edited by David B. Sawyer, Frank Austerlühl, and Vanessa Enríquez Raído, 229-258. Amsterdam: John Benjamins Publishing Company.

Valero Garcés, Carmen, and Daniel Toudic. 2015. "Technological Innovation and Translation. Training Translators in the EU for the 21st century." *Verbeia*. <https://www.ucjc.edu/wp-content/uploads/11.Carmen-Valero-Garces-y-Daniel-Toudic.pdf>

Van Egdom, Gys-Walt, and Mark Pluymaekers. 2020. "Quality According to Language Service Providers." In *New Empirical Perspectives on Translation and Interpreting*, edited by Lore Vandevoorde, Joke Daems, and Bart Defrancq, 139-156. New York and London: Routledge.

Vieira, Nunes Lucas. 2020. "Automation Anxiety and Translators." *Translation Studies* 13 (1): 1-21.

Wang, Xu, Chunyang Chen, and Zhenchang Xing. 2019. "Domain-specific Machine Translation with Recurrent Neural Network for Software Localization." *Empirical Software Engineering* 24: 3514-3545.

Notes

¹ For just a few examples of such claims, see: <https://bit.ly/34e474f>; <https://bit.ly/2FAm2Ic>; <https://bit.ly/3kRjA02>. Accessed August 20, 2020.

² If you would like a copy of the survey or interview questions, please contact the corresponding author via email.

³The *Reinventing the Translation Industry* virtual conference was held to discuss the impact of the COVID-19 pandemic on the industry: <https://bit.ly/3hedhC6>. Accessed August 20, 2020.