Translation and technology

O'Brien, Sharon; Rodriguez Vazquez, Silvia

How to cite

O'BRIEN, Sharon, RODRIGUEZ VAZQUEZ, Silvia. Translation and technology. In: The Routledge Handbook of Translation and Education. Laviosa, Sara & González-Davies, Maria (Ed.). Oxon, New York : Routledge, 2020. p. 264–277.

This publication URL: https://archive-ouverte.unige.ch/unige:130205

Translation and technology

Sharon O'Brien and Silvia Rodríguez Vázquez

INTRODUCTION

Translation Technology, Translation Tools, Translation Environment Tools (or TEnTs) and Computer-Aided Translation (or CAT) are frequently used as synonyms. In its broadest sense translation technology is understood to include a large array of computer tools that help translators do their jobs, including word processors, spell, style and grammar checkers, the World Wide Web, corpus compilation and analysis tools, terminology management tools, translation memory tools (TM), translation management systems (TMS) and machine translation (MT). Bowker (2002 p. 7) arranges these tools along a continuum from less automated (human translation) to more automated (machine translation), with CAT positioned in the middle. In the human translation rubric, she includes, for example, word processors and spell checkers, and in CAT, translation memory, corpus analysis tools, terminology management systems, data capture tools, localisation and web-page translation tools, and diagnostic tools. The MT rubric includes only machine translation systems. This extensive list is evidence of how technologised the translation profession is. For the sake of clarity throughout this chapter, we refer to translation technology broadly speaking as Computer-Aided Translation – CAT. Where machine translation is specifically meant, we use that term. Likewise, when we want to draw attention to a specific type of tool, we use the exact term, e.g. terminology management tool or translation memory (TM).

Over the last decades, parts of the translation profession have moved from deploying hardly any technology (in the 1980s), to embracing of Translation Memory and Terminology Management (in the 1990s), to the introduction of MT and its convergence with TM tools.

Industry commentators predict a move towards Fully-Automatic Useful Translation – or FAUT – by 2030 (Massardo and van der Meer 2017). Currently, translators are still expected to produce high quality translation and that is often done with the aid of CAT tools. For this reason, it is important that translation technology is firmly embedded in the translator training curriculum. As Bowker (2002) points out, knowledge of CAT increases employability of graduates, but there are additional benefits to the teaching of translation technology: students can become more attuned to their own and to peer approaches to translation, data is created for research into translation, and reflections on the impact of technology on process, product and profession can be generated (ibid).

This chapter will first discuss early considerations on teaching translation technology. We select a subset of examples to give an overview of what these early considerations entailed. A number of formal translator competence models are examined so as to illustrate the place of translation technology in these models. Next, we provide a synopsis of research concerns relating to translation technology. Then, we review the pedagogical approaches adopted these days for CAT teaching before turning to conclusions, where we outline current and future challenges.

HISTORICAL PERSPECTIVES

Kenny (1999) documents some of the first efforts in incorporating computer-aided translation tools into university curricula, mentioning in particular Carnegie Mellon University, the University of Leipzig, Dublin City University, and the University of Saarbrücken. Kenny differentiates between CAT tools, used broadly to include word processors, electronic dictionaries, spell, grammar and style checkers (1999 p. 67), and machine translation. In her description, the primary difference is that CAT tools are seen to exist to assist humans, whereas MT is seen to replace them. At the time of publication of Kenny's article the state of the art in MT meant that what could best be hoped for was Human Assisted Machine

Translation (HAMT) where a human was necessary to aid the machine. It is interesting to note that at our time of writing (two decades on), MT has effectively become a CAT tool, being incorporated into TM environments as an additional aid to the translator. We note, also, that MT is used for other purposes such as gisting, or obtaining the general sense of a text, where the translator does not, at least initially, play a role.

Kenny poses broader questions on the benefits of CAT tools in the curriculum, such as "Can CAT tools be used to better our understanding of translation itself?" (1999 p. 68). Additionally, she asks whether its introduction can open up new areas of research. The exciting possibility of using translation memory tools as a means to longitudinally log and document individual students' acquisition of translation competence over their course of study is mentioned. Yet, to the best of our knowledge, this potential has rarely been harnessed by translator educators, probably due, at least in part, to the logistical issues we discuss in our concluding section. We note some developments toward this goal with the piloting of a tool called TranslationQ to track computer-assisted revision in classroom.[1] On the other hand, the broad success of CAT and MT has led to a burgeoning field of research on the impact of such tools on the product (e.g. Jiménez Crespo 2009) and process (e.g. Dragsted 2005) of translation. The growing research on translation process, and especially the introduction of tools for capturing translation processes such as Inputlog, Translog, screen recording, and eye tracking (see, for example, Göpferich et al. 2008; O'Brien 2010) has not yet had the kind of impact on translator pedagogy that it could have. For example, the potential to use tools like Translog to allow self- and peer-review of the translation process, or to provide examples of expert behaviour, remains relatively untapped in translator pedagogy.

[1] https://www.televic-education.com/en/translationq (Last access: 10 December 2018).

O'Brien published a proposal for course content for post-editing of MT output in 2002. At that time, a renewal of interest in MT was emerging. A combination of increasing translation data, resulting from the use of translation memory tools, and improvements in data science in general led to greater possibilities with data-driven MT. In 2002, very few, if any, translator education programmes were teaching machine translation, let alone post-editing, but this need was firmly on the horizon. O'Brien (2002) reviews the scant literature at the time and documents the skills associated with post-editing. These included skills that overlap with translation (e.g. source and target language skills, subject expertise), but also skills that were not typically associated with translation (e.g. tolerance, predisposition towards MT, knowledge of how to use macros in a word processor). O'Brien then goes on to outline a course structure for teaching post-editing that would include a theoretical component (teaching 'what') and a practical component (teaching 'how'). The proposal included aspects such as an introduction to controlled authoring (relevant at the time since ruled-based MT was still a dominant paradigm and it could therefore be influenced by the input sentence) and even basic programming skills. Almost two decades on, post-editing forms part of many, though not all, translator training programmes. It is sometimes included as a separate course and sometimes incorporated into a translation technology course.

A final topic worth mentioning from a historical perspective is that of localisation. As MT was on the rise, the localisation industry was also growing. Localisation initially involved the translation and adaptation of software to new languages and locales. This included translation of User Interface text, Online Help, Documentation, Packaging and Marketing materials. As the Software as a Service model grew in popularity, and with it cloud-based tools and apps, the industry expanded to include Web apps and Web content. The very first text book explaining the complexity of localisation was written by Bert Esselink in 1998, and revised in 2000. Though not directed at translators or translator trainers per se, this book served as an

excellent introduction to the world of localisation, covering topics that could be adopted in translation technology teaching, such as internationalisation, desktop publishing, graphics localisation, and project management. Esselink (2000) also dedicated an entire chapter to translation technology and terminology, as the localisation sector was an early adopter of these tools.

In parallel with developments in the teaching of CAT, progress was also made in research into the teaching of translation competence in general. Several theoretical models of translator competence and its acquisition have been proposed over the past decades and continue to influence the approach to translator education. In what follows, we briefly examine the most influential models to uncover how they incorporate competence in translation technology specifically.

In PACTE's seminal article (2003), their revised competence model suggests that translation competence consists of five sub-competences, i.e. bilingual, extra-linguistic, knowledge about translation, instrumental and strategic. Furthermore, translation competence is seen to activate a series of psycho-physiological mechanisms (cognitive, attitudinal and psycho-motor mechanisms). In a subsequent article (PACTE 2005), the strategic component is identified as central to all other sub-competences. This component relates to the process of planning, evaluating, problem-solving, and activating different sub-competences.

In our view, two of these sub-competences directly relate to the teaching of translation technology: (1) knowledge about translation, which includes knowledge about translation practice and the work market, and (2) instrumental and strategic competence, which explicitly mentions information and communication technologies. Knowing how to use the technology is important, but knowing how tools are used in the often rapidly changing market is also essential.

Göpferich (2009) highlights that there is no fully accepted model of translation competence, but there is broad agreement that it is composed of three core sub-competences: communicative competence in the source language and the target language, domain competence, and tools and research competence. What is relevant here is that she includes in her model a sub-competence called Tools and Research Competence, described as comprising:

> the ability to use translation-specific conventional and electronic tools, from reference works such as dictionaries and encyclopaedias (either printed or electronic), term banks and other databases, parallel texts, the use of search engines and corpora to the use of word processors, terminology and translation management systems as well as machine translation systems (Göpferich 2009 p. 22).

A different approach to translation competence is taken by Kiraly who deliberately selects not to list sub-competences because "there is no consensus on which ones actually exist" (2013 p. 212). Rather than focusing on the acquisition of competence, Kiraly proposes a model for the emergence over time of translator competence from novice to expert. He points to the complex interplay of competences and to their non-parallel emergence. In relation to technological competence, according to Kiraly's model, this would emerge as students of translation are exposed over time to learning experiences with the tools.

This brief review of influential translator competence models demonstrates that competence in using translation tools (broadly understood) is seen to be a core element. Furthermore, other elements of the reviewed competence models feed into translation tool competence. We summarise these as socio-technical competence (knowing about the market, how tools are deployed), and personal aspects such as perseverance and critical spirit. These aspects are further endorsed by the European Master's in Translation (EMT) competence framework.

The EMT is a network of university Masters' programmes in translation whose aim is to improve the quality of training and to help graduates to integrate smoothly into the translation job market. One of the outputs from the EMT is a competence framework, which was most recently updated in 2017. This competence framework lists five main areas of competence, of which 'technology-based' is one, along with Language and Culture, Translation, Personal and interpersonal, and Service provision. The technology-based competence is described by the EMT Framework as including: "all the knowledge and skills used to implement translation technologies". It also includes basic knowledge of machine translation technologies and the ability to implement machine translation according to potential needs (EMT Network 2017 p. 9). The EMT Framework lists six associated skills. As this competence model provides more explicit information on the competences and skills associated with translation technology, in comparison with that of PACTE, Göpferich or Kiraly, and since these skills would need to be taken into account for teaching purposes (at least in the European context), we reproduce them in full here:

- Use the most relevant IT applications, including the full range of office software, and become familiar with the new IT resources.
- Make use of search engines, corpus-based tools and CAT tools as well as CATA (computer aided text analysis) tools.
- Pre-process, process and manage files and other media/sources as part of the translation, e.g. video and multimedia files, handle web technologies.
- Master the basics of MT and its impact on the translation process.
- Assess the relevance of MT systems in a translation workflow and implement the appropriate MT system where relevant.
- Apply other tools in support of language and translation technology, such as workflow software.

This substantial list not only indicates that what is understood as technology relevant to translating can be very broad, but it also presents challenges for the teaching of translation technologies, which we discuss in our conclusions.

RESEARCH APPROACHES AND KEY FINDINGS

Far from being an exhaustive systematic review of the research work that has been conducted on the topic of CAT training, this section aims at providing an overview of the type of studies that have been carried out to better inform trainers on what to teach in relation to translation technologies and how to do it.

Many of the articles written about CAT training are, in fact, individual teaching accounts by the author(s), reporting on their experiences over the years, where sometimes a course description is included. These are often supported by a theoretical framework, but an empirical approach is rarely adopted. Of the three main didactic objectives proposed by Alcina and Granell (2007) for the acquisition of CAT skills – cognitive, procedural and attitudinal –, the majority of the few empirical studies that exist in the field focus on the last objective. This aims for "the stimulation of positive attitudes towards technology, both recognising the important value that translation technology has for translators, and developing other attitudes, such as observation, perseverance and patience" (2007 p. 231). Much of the current literature on the didactics of CAT pays particular attention to students' perception of translation technologies**.** Data is generally gathered through the questionnaires given to students at two different time intervals, normally at the beginning and at the end of the course. Some examples include the survey conducted by Gaspari (2001) regarding students' attitude to MT, the study conducted by Olalla Soler and Vert Bolaños (2013) with 85 undergraduates and 10 graduates on their opinion about translation and other electronic tools in general, or the questionnaire administered by Mahfouz (2018) to more than 100 students in Egypt. Not

surprisingly, findings in such studies are similar, showing that perception improves as students gain knowledge through practice.

Interestingly, some studies have aimed at measuring the knowledge students believe they have on CAT, rather than the actual knowledge they have acquired: a construct known as self-efficacy. For instance, Doherty et al. (2012) and Doherty and Kenny (2014) relied on both quantitative and qualitative measures (psychometric questionnaire, lecturer logs, focus groups and end-of-course assignments) to measure their students' confidence in their ability to conduct different MT-related tasks. As in the case of the studies referred to above, findings suggest that both time and intensive exposure to technologies have a positive impact.

Although these studies provide interesting insights with regard to the overall effectiveness of the teaching techniques used and the achievement of the learning outcomes, they do not directly examine the appropriateness of the content included in the syllabus.

Studies have also attempted to investigate what to teach in CAT courses. Some researchers propose that we should rely on current industry trends and the suggestions made by professionals concerning what is relevant for future translators. For instance, Rico Pérez (2017a) reviews prior research work conducted with translation professionals to define MT-related competences and learning outcomes. Similarly, Gaspari et al. (2015) conducted a questionnaire with not only translator trainers and academics, but also freelance translators and language service providers (LSPs) to clarify the needs and expectations of the community with regard to MT and post-editing. The idea was for trainers to use results to inform the syllabi of their courses so that they are more in line with current practices. One of their findings was that practitioners were not satisfied with the level of customisation of the MT systems they are required to use, thus suggesting it as a topic worth examining more in depth during translator training. Identifying problems resulting from the use of translation technologies to then decide upon the corresponding skills to be learned is precisely one of the

approaches suggested by Pym (2013) to inform syllabus design. Future research work could also focus on the opposite approach: subjecting CAT syllabi to review by industry stakeholders.

A needs analysis can be also conducted by consulting students directly. An innovative approach is the one proposed by Pym and Torres Simón (2016), who asked translation students what they would like to see answered. Although they did so in the context of a Translation Studies course, a similar approach could be adopted for CAT classes. It is interesting to note that, in their study, which gathered a total of 662 questions put forward by more than 200 students, the authors showed that translation trainees were interested in four main aspects related to translation aids. These are: (i) whether they would replace translators, (ii) which tools were most useful, (iii) what new forms of translation new technologies would encourage, and (iv) what research there was on localisation and machine translation. While this approach can help trainers understand the expectations of students in terms of content, it would be desirable to complement it with other sources of data, as done by Doherty and Kenny (2014) for instance, who, apart from the students' feedback, relied on their observations (as instructors) of the range of interest, existing case studies and published related data.

The definition of course content and the creation of materials can also be informed through indirect methods. Another viable research approach that has also been adopted in prior studies is corpus analysis. Depraetere (2010), for instance, studied a corpus of texts that had been post-edited by 10 students in order to discover which post-editing guidelines she needed to most emphasise during translation training. Along the same lines, and using retrospective interviews with three students as the main data elicitation technique, Flanagan and Christensen (2014) aimed to discover how students interpret TAUS post-editing guidelines, with the ultimate goal of identifying potential competence gaps and address them by adapting

that type of industry material for training purposes. As a result of the study, a new set of guidelines was created, including additional clarifying information to help trainees interpreting them.

Finally, it is worth highlighting the use of research approaches and methods from other fields, such as psychology and Human-Computer Interaction (HCI), to adapt course design. Doherty and Moorkens (2013), for example, used reflective journals in the form of weekly diaries to note observed difficulties and student behaviours during CAT lab sessions which, at the end of the semester, were compared with the results of an online survey administered to students. The triangulation of these data served to introduce improvements in the next academic year. Also, single case studies were used in combination with questionnaires by Rodríguez Vázquez and Mileto (2016) to assess the particular needs of blind students with regard to CAT learning.

PEDAGOGIC APPROACHES AND METHODS

The penetration of technology in the professional translator's workspace and the consideration of technology-based competence as one of the pillars for career success have understandably led to an increase in the number of teaching and learning hours devoted to this area in translator education programmes. CAT seminars are occasionally taught within practical translation classes (Rico Pérez et al. 2018), but over the last years, we have seen the emergence of new full courses and even post-graduate programme offers entirely dedicated to CAT training; for instance, the MSc in Translation Technology, in Dublin City University, or the MA in Multilingual Communication Technology, University of Geneva. From a pedagogic perspective, these more specialised programmes allow students to gain a deeper understanding of the widest array of technologies that exist nowadays, with the additional benefit of experiencing higher exposure time to the software included in the different courses.

While these specialised programmes are gaining popularity, CAT training is still typically offered as part of the general translator training curriculum, both at an undergraduate level and a postgraduate level. Although our aim in this chapter is not to examine in detail the current academic offer in this regard, we have observed that the common trend is for CAT courses to adopt an introductory format at undergraduate level to then add more advanced content at postgraduate level. The format at undergraduate level includes an overview of existing technologies, their main functionalities, advantages and disadvantages (see example of syllabus in Rodríguez Castro 2018). The format at postgraduate level includes the examination of technical and professional issues linked to CAT and the assessment of tools according to different contexts of use (see example of syllabus in Doherty and Kenny 2014). However, the degree of specialisation of CAT courses may be simply determined by the number of hours allocated to this subject in the programme's curriculum. Thus, some undergraduate programmes may cover more advanced aspects of CAT than postgraduate ones, if they offer more than one CAT course. The type of technologies included may vary as well, with recent studies demonstrating a stronger prevalence of machine translation-related contents in the syllabus (Depraetere 2010; Flanagan and Christensen 2014; Kenny and Doherty 2014).

In terms of objectives and learning outcomes, there seems to be general consensus among CAT trainers. Student translators should not only test the tools' functionalities (*what*), but also understand their relevance for the translator's work (*why*) and the situations in which their use could prove more beneficial (*when*), with the ultimate goal being to stimulate critical thinking and life-long learning (Bowker and Marshman 2010; Killman 2018; Rodríguez Castro 2018). Within such a pedagogical context, the emphasis is less on *which* tools are taught, but rather on *how* they are presented to the student. This change of focus has fostered the introduction in the classroom of alternative tools to the popular commercial translation

software, which are seen to be more expensive and complex, and for which hundreds of hours of practising could be required by both trainers and trainees to reach a proficient level of use (Aiping and Deliang 2017). These alternate options include, among others, Free and Open Source Software (FOSS) translation technologies (Flórez and Alcina 2011), such as Apertium, OmegaT or Pootle to name just a few. They may also include technology developed in research projects that are then used for teaching and learning (e.g. the ACCEPT Academic Portal described in Bouillon et al. 2018), which generally offer a higher level of adaptability, and contribute to lower license costs, as well as lower maintenance and technical support costs (Veiga Díaz and García González 2015).

The content and learning outcomes briefly outlined above inevitably call for a practice-based approach to translation technology pedagogy. As noted by different scholars in the field, the popular constructivist perspective is often preferred over transmissionism in CAT training (Pym 2011; Rico Pérez 2017b). While the latter places the student in a passive learner position with respect to the teacher, who is the main reference point and source of knowledge, the former promotes the construction of knowledge in an interactive and collaborative manner, between and with students. In particular, situated learning has been subject to considerable attention in the literature as a socio-constructivist pedagogical approach (Kiraly 2000, 2005; González Davies and Enríquez Raído 2016) that is chosen by many CAT trainers, although their interpretation of the concept takes different forms. When the classical task-based or project-based situated learning is adopted in the CAT classroom, students develop both instrumental and critical-thinking techniques through role adoption and the recreation of quasi-real translation activities or scenarios, previously designed by the teacher. While this is the most common form of situated learning, it is often argued that the simulation of a computer-assisted translation task or project should not take place in isolation but rather be embedded in practical translation courses (Pym 2013; Mellinger 2017).

A one-fits-all solution does not exist regarding which teaching techniques to follow, whose choice may, in turn, be directly influenced by the type of learning environment (face-to-face, online, blended). As described in Rico Pérez (2017b), teaching techniques in learner-centred settings can be categorised in four main groups: (i) one-to-many, (ii) many-to-many, (iii) one-to-one, and (iv) one-alone. Task-based instruction models typically combine the first two, with short lectures followed by practical hands-on sessions where students work individually or in groups, normally with the teacher's support. Exercises conducted during labs may vary from the classical inspection of the functionalities of a given tool to more advanced evaluation activities, such as the assessment of the utility of CAT tools in a specific context of use (Starlander and Morado Vázquez 2013) or the comparison of different MT systems in terms of post-editing effort, adequacy and error typology (Moorkens 2018). These in-class activities can be also accompanied by reflective exercises which invite students to think about different aspects related to the use of the tools they have just tested and prevent them from blindly following instructions. Reflective learning journals in general and e-portfolios in particular have been recently put forward as a novel technique for CAT learning. Although its efficacy as a method has not been empirically tested yet, e-portfolios offer, in Rico Pérez's view (2017b) a more empowering academic experience, through which students gain authority and confidence, as they show they are individual learners and they are meeting high standards of achievement. While often seen as complementary exercises, forum, online quizzes (Varela Salinas 2007) and peer feedback (Flanagan and Heine 2015) are examples of many-to-many teaching and learning techniques whose full potential has not yet been completely unlocked in CAT training. Similarly, it would be interesting to test the efficacy of more one-alone analytical techniques, such as Pym's learning proposal of self-analysis of the translation process, where students could record their on-screen computer-assisted translation processes and see how that affects performance (Pym 2013).

All in all, regardless of the variety of pedagogical approaches and methods identified, we have observed that many challenges still remain with regard to the teaching of translation technology and that, in fact, these are often overlapping and influence each other. For ease of discussion we divide them into three broad categories here.

Teaching and learning

An important consideration in teaching translation technology is how to establish an acceptable balance between teaching formats. A typical approach is to mix a lecture and lab format, where lectures introduce concepts and tools in general and labs provide structured opportunities for students to learn and apply knowledge using the tools. There is a tension here, we believe, between teacher and student preferences. Students are understandably focused on gaining practical skills deemed to be beneficial for the workplace. Teachers, while also seeing this as an essential learning outcome, also prioritise opportunities to teach about concepts, benefits and disadvantages in general, which can be applied to any tool, not only specific ones. The features in particular tools can change relatively rapidly. Market leaders can be toppled from year to year, hence the need for students to learn to learn (Kiraly 2013; Pym 2013). Thus, it would seem sensible not to focus only on specific tools and to attempt to establish a good balance between the 'what' and 'why' (lectures) and the 'how' (labs).

It is impossible to say what this balance might look like as many factors will play a role (e.g. the duration of the course, whether it is undergraduate or postgraduate level, number of credits, etc.). Combining the two formats in one teaching session is an option too; in this case, some lecture content would first be presented, followed immediately by a lab session, and this could continue in a cycle for specific teaching and learning points. However, it should be borne in mind that lab set-ups are not always the best environments for the delivery of typical lecture or seminar content – students are obviously focused on the screen in a lab. Recurring

course evaluation could help inform what the best balance might be for each particular teaching and learning context.

The raison d'être of translation technology is to aid the translation process, broadly speaking. Why then, is translation technology not more embedded in translation practice classes, in keeping with the view of translation as a situated practice (Kiraly 2005; Risku 2005)? The teaching of translation per se tends to be separated from the teaching of technological skills. There are both pedagogical and practical reasons that serve to explain this. Pedagogically, a strong belief seems to exist that students should gain skills in the fundamental human process of translation before becoming reliant on tools. Yet, this belief is open to criticism as very few (if any?) translators work without some form of human-computer interaction these days (O'Brien 2012). Alongside the pedagogical argument, there are some practical explanations: it would be logistically challenging to schedule every translation class, for every language pair, in a lab. Furthermore, even if this were possible, it would require every teacher of specialised translation to be relatively comfortable with a broad toolset, something that is currently unrealistic. A proposal for overcoming these challenges is to have an additional course that combines authentic project- and situated approaches to translation that includes team work across multiple roles, for example, project manager, terminologist, translator, reviser (Kiraly 2005), as well as all required tools to replicate a real translation project (Austermühl 2013).

Human Resources

A significant challenge in teaching translation-related technology is the continuous demand on teaching staff to stay abreast of technology innovation, whether in the basic form of new features or significant advances in technologies. This effectively requires Continuous Professional Development (CPD) on the part of teaching staff. Even so, it is impossible to know each tool and type of technology in considerable depth. Teachers will therefore have to focus on a sub-set of tools.

As versions of software are released frequently nowadays, lab instructions, including screen shots, can become redundant from one year to the next, necessitating a continuous update. This places considerable demands on the time of those who teach such modules, especially in comparison with courses where knowledge evolves at a slower pace. To keep this challenge under control, it is perhaps wise not to upgrade every time a new version is released, especially since upgrades often involve only minor changes in features.

Anyone who has tried to teach a lab on his or her own with large numbers of students will be aware of how mentally and physically demanding this can be. As is the wont of technology, things will go wrong for some people and troubleshooting can take time away from running the lab. Keeping numbers relatively small can help, but this inevitably leads to a greater number of groups and contact hours. Having more than one instructor in a lab can also ease this problem.

Regardless of the course in which the CAT-oriented situated learning takes place, it will always demand a well-informed instructor, always up to date with recent industry trends and new technologies. Aiping and Deliang (2017 pp. 410–417) consider that this is the main reason why this pedagogical approach is not sustainable, arguing that realistic simulation is complex, if not impossible: the more authentic an environment is, the more input from the industry it requires: real translation tasks, translation briefs, proofreading, customer feedback, technical support, etc. (*ibid*.). They contribute to the literature with a different vision of situated learning, where students acquire CAT-related skills within the framework of authentic translation assignments, leaving behind in-class simulated projects. They illustrate their position with the case of some universities in China, where there is a Translation Centre that accepts external translation contracts or where students accept real translation jobs requested by the School itself. The advantages of such an approach are clear, as students understand the usefulness of translation aids through first-hand experience. However, this

third form of situated learning comes with associated challenges, including ethical concerns (e.g. should students by paid for what they do?) and time issues, as the quality control and coordination efforts required on the instructor's side may result in a similar time investment when compared to the adaptation of quasi-real scenarios for the classroom.

Technical and economic

It goes without saying that technical issues can arise when teaching technology. In relation to translation tools in particular, there may be occasions where one tool requires a certain computer specification and/or operating system that may clash with the requirements of other tools. If labs are shared across a broad university community, the problem may be worsened. Having a strong technical support team in place is a pre-requisite. Nevertheless, broad-spectrum technical support teams are rarely trained in the vagaries of translation technology. These days, there is a trend in favour of cloud-based tools, which rely only on having a browser and access to the Internet. We expect that in the future we will deploy such solutions to a greater extent as they remove some of the challenges that come with having to locally install and support software.

Some of the challenges listed here have been addressed in the CERTT project (Bowker and Marshman 2010) through the creation of a centralised repository of CAT-related materials (tutorials with questions for reflection, exercises, sample texts, slides, glossaries, FAQ, bug reports and solutions) supporting independent and in-class learning. This resource, designed both for educators and learners, was implemented in Canada for both CAT-dedicated and specialised translation courses. According to Marshman and Bowker (2012), the platform was well received by both instructors and students, who particularly welcomed the introduction of translation technology in the technical translation course and preferred this modality over a stand-alone CAT course.

Some software used for teaching translation-related technology is free of charge, some comes with a discounted academic licence. How much, or even whether, an academic department has a budget for this, will determine which tools can be deployed in teaching. The students and universities clearly benefit from having access to this technology. However, the software companies and, ultimately, the market are significant beneficiaries too. In the case of translation technology, a symbiosis exists, which ought to be taken into consideration when costs are being negotiated.

CONCLUSIONS AND FUTURE DIRECTIONS

CAT is a broad concept, comprising many tools and functionalities. The ability to critically use and evaluate such tools is firmly embedded in translator competence models. Given the broad array of tools available and the rapid pace of development, its teaching poses numerous challenges for the present and for the future, which in turn has led to embryonic research on the topic, as discussed in this chapter.

There is no clear answer to the question of how best to teach translation technology, not least because the technology continues to evolve, at times at a faster pace than academia can keep abreast of. Nonetheless, there appears to be a consensus that it is imperative to teach students not just *how* to use technology, but also *when* to use specific technologies, *why* they are used and *what* the implications of an increasingly technologised profession might be. Understanding this final point in a world where technology development is incredibly rapid is crucial for students. Furthermore, equipping students with skills to adapt to rapid technological change is perhaps of equal importance to teaching them about state-of-the-art technologies. In translation teaching in general, and in the teaching of CAT, there is an increased focus on social-constructivist approaches and collaborative learning experiences, which we expect will be embraced further over the coming years.

FURTHER READING

Bowker, L. (2015) Computer-aided translation: Translator training in Sin-wai, C. *Routledge Encyclopedia of Translation Technology*. Oxon, New York: Routledge. pp. 88-104.

Bowker's contribution and the present chapter address the same topic, but from different angles, so they complement each other. In her chapter, Bowker provides insightful arguments related to the need for translators to learn about CAT and the different challenges associated to this new reality.

Doherty, S. and Kenny, D. (2014) The design and evaluation of a Statistical Machine Translation syllabus for translation students. *The Interpreter and Translator Trainer*. 8(2), pp. 295-315.

Kenny, D. and Doherty, S. (2014) Statistical machine translation in the translation curriculum: Overcoming obstacles and empowering translators. *The Interpreter and Translator Trainer*. 8(2), pp.276-294.

These two articles go hand in hand. They address the topic of teaching (Statistical) Machine Translation. The first discusses potential barriers to the use of SMT by translators generally and in translator training in particular while the second article uses a mixed-methods approach that aims to capture students' view of an SMT syllabus and their self-assessment of their own learning.

O'Hagan, M. (2013) The impact of new technologies on translation studies. A technological turn? in Millán, C. and Bartrina, F. *The Routledge Handbook of Translation Studies*. New York: Routledge. pp. 503-518.

This chapter places emphasis on the implications of the emergence of translation technology for Translation Studies as a field of research, with a special focus on social aspects.

Roturier, J. (2015) *Localizing Apps*. New York: Routledge.

Although the book revolves around the topic of localisation, 'Chapter 5. Translation technology' offers a comprehensive overview of the most popular types of translation aids used nowadays. It not only describes their main characteristics with illustrative examples, but it also puts forward four sample tasks that could be used for CAT training purposes.

RELATED TOPICS

computer-assisted language learning, translation teacher training

REFERENCES

Aiping, M. and Deliang, M. (2017) The ecosystem of translator workstation. Learning electronic tools in a training program for professional translators in China. *Babel*. 63 (3), pp. 401–422.

Alcina, A. and Granell, J. (2007) Translation technology skills acquisition. *Perspectives: Studies in Translatology*. 15(4), pp. 230-244.

Austermühl, F. (2013) Future (and not-so-future) trends in the teaching of translation technology. *Revista Tradumàtica*. (11), pp. 326-337.

Bouillon, P., Gerlach, J., Gulati, A., Porro Rodriguez, V. and Seretan, V. (2018) The ACCEPT academic portal: A pre-editing and post-editing teaching platform in Corpas Pastor, G. and Durán-Muñoz, I. *Trends in E-tools and Resources for Translators and Interpreters*. Leiden: Brill. pp. 175-202.

Bowker, L. (2002) *Computer-Aided Translation Technology: A Practical Introduction*. Ottawa: University of Ottawa Press.

Bowker, L. and Marshman, E. (2010) Toward a model of active and situated learning in the teaching of computer-aided translation: Introducing the CERTT project. *Journal of Translation Studies*. 13 (1-2), pp.199-226.

Depraetere, I. (2010) What counts as useful advice in a university post-editing training context? Report on a case study in Yvon, F. and Hansen, V. *Proceedings of the 14th annual conference of the European Association for Machine Translation*. Saint-Raphaël, France, 27-28 May 2010 [online]. Available from: http://www.mt-archive.info/EAMT-2010-Depraetere-2.pdf [Accessed 17 December 2018].

Doherty, S., Kenny, D. and Way, A. (2012) Taking statistical machine translation to the student translator in *Proceedings of the 10th Biennial Conference of the Association for Machine Translation in the Americas*. San Diego, USA, 28 October - 1 November 2012 [online]. Available from: https://doi.org/10.13140/2.1.2883.0727 [Accessed 17 December 2018].

Doherty, S. and Moorkens, J. (2013) Investigating the experience of translation technology labs: Pedagogical implications. *JoSTrans. The Journal of Specialised Translation*. (19), pp. 122-136.

Dragsted, B. (2005) Segmentation in translation: Differences across levels of expertise and difficulty. *Target*. 17(1), pp. 49-70.

EMT Network (2017) *European Master's in Translation Competence Framework*. European Commission. [online]. Available from: https://ec.europa.eu/info/sites/info/files/emt_competence_fwk_2017_en_web.pdf [Accessed 17 December 2018].

Esselink, B. (2000) *A Practical Guide to Localization*. Amsterdam: John Benjamins.

Flanagan, M. and Christensen, T.P. (2014) Testing post-editing guidelines: How translation trainees interpret them and how to tailor them for translator training purposes. *The Interpreter and Translator Trainer*. 8(2), pp. 257-275.

Flanagan, M. and Heine, C. (2015) Peer-feedback as a translation training tool in web-based communication. *Hermes - Journal of Language and Communication in Business*. (54), pp. 115-136.

Flórez, S. and Alcina, A. (2011) Free/open-source software for the translation classroom. *The Interpreter and Translator Trainer*. 5(2), pp. 325-357.

Gaspari, F. (2001) Teaching machine translation to trainee translators: A survey of their knowledge and opinions in Forcada, M. L., Pérez Ortiz, D. R. and Lewis, D. *Proceedings of the Workshop 'Teaching Machine Translation'*. Santiago de Compostela, Spain, pp. 35-44 [online]. Available from: http://mt-archive.info/MTS-2001-Gaspari.pdf [Accessed 17 December 2018].

Gaspari, F., Almaghout, H., and Doherty, S. (2015) A survey of machine translation competences: Insights for translation technology educators and practitioners. *The Interpreter and Translator Trainer*. 23(3), pp. 333-358.

González Davies, M. and Enríquez Raído, V. (2016) Situated learning in translator and interpreter training: Bridging research and good practice. *The Interpreter and Translator Trainer*. 10(1), pp.1-11.

Göpferich, S. (2009) Towards a model of translation competence and its acquisition: The longitudinal study 'TransComp' in Göpferich, S., Jakobsen, A.L. and Mees I. *Behind the Mind: Methods, Models and Results in Translation Process Research*. Copenhagen: Samsfundslitteratur. pp. 11-37.

Göpferich, S., Jakobsen, A.L., and Mees, I. (eds) (2008) *Looking at Eyes: Eye-tracking Studies of Reading and Translation Processing*. Rosenoerns: Samsfundslitteratur.

Jiménez Crespo, M.A. (2009) The effect of translation memory tools in translated web texts: Evidence from a comparative product-based study. *Linguistica Antverpiensia*. (8), pp. 213-232.

Kenny, D. (1999) CAT Tools in an academic environment: What are they good for? *Target*. 11(1), pp .65-82.

Kenny, D. and Doherty, S. (2014) Statistical machine translation in the translation curriculum: Overcoming obstacles and empowering translators. *The Interpreter and Translator Trainer*. 8(2), pp. 276-294.

Killman, J. (2018) A context-based approach to introducing translation memory in translator training in Godev, C.B. *Translation, Globalization and Translocation. The classroom and Beyond*. Cham: Palgrave Macmillan. pp. 137-159.

Kiraly, D.C. (2000) *A social Constructivist Approach to Translator Education. Empowerment from Theory to Practice*. Manchester: St. Jerome.

Kiraly, D.C. (2005) Project-based learning: A case for situated translation. *Meta: Journal des traducteurs*. 50(4), pp.1098-1111.

Kiraly, D.C. (2013) Towards a view of translator competence as an emergent phenomenon: Thinking outside the box(es) in translator education in Kiraly, D. C., Hansen-Schirra, S. and Maksymski, K. *New Prospects and Perspectives for Educating Language Mediators*. Tübingen: Narr Verlag. pp. 197-224.

Mahfouz, I. (2018) Attitudes to CAT tools: Application on Egyptian translation students and professionals. *Arab World English Journal (AWEJ)*. (4), pp. 69-83.

Marshman, E. and Bowker, L. (2012) Translation technologies as seen through the eyes of educators and students: Harmonizing views with the help of a centralized teaching and learning resource in Hubscher-Davison, S. and Borodo, M. *Global Trends in Translator and Interpreting Training*. London: Continuum. pp. 69-95.

Massardo, I. and van der Meer, J. (2017) *The translation industry in 2022. A report from the TAUS industry summit.* TAUS. [online]. Available from: https://www.taus.net/think-

tank/reports/event-reports/the-translation-industry-in-2022 [Accessed 17 December 2018].

Mellinger, C.D. (2017) Translators and machine translation: Knowledge and skills gaps in translator pedagogy. *The Interpreter and Translator Trainer*. 11(4), pp. 280-293.

Moorkens, J. (2018) What to expect from neural machine translation: A practical in-class translation evaluation exercise. *The Interpreter and Translator Trainer*. 12(4), pp.375-387.

O'Brien, S. (2002) Teaching post-editing: A proposal for course content in Proceedings of the 6th EAMT Workshop 'Teaching Machine Translation'. Manchester, UK. pp. 99-106 [online]. Available from: http://www.mt-archive.info/00/EAMT-2002-OBrien.pdf [Accessed 17 December 2018].

O'Brien, S. (2010) Eye tracking in translation process research: Methodological challenges and solutions in Mees, I., Alves, F. and Göpferich, S. *Methodology, Technology and Innovation in Translation Process Research*. Rosenoerns: Samsfundslitteratur. pp. 251-266.

O'Brien, S. (2012) Translation as human–computer interaction. *Translation Spaces*. 1(1), pp.101-122.

Olalla-Soler, C. and Vert Bolaños, O. (2013) Traducción y tecnología: uso y percepción de las tecnologías de la traducción. El punto de vista de los estudiantes. *Revista Tradumàtica*. (11), pp.338-356.

PACTE, 2003. Building a translation competence model in Alves, F. *Triangulating Translation: Perspectives in Process Oriented Research*. Amsterdam: John Benjamins. pp. 43-66.

PACTE, (2005) Investigating translation competence: Conceptual and methodological issues. *Meta*. 50 (2), pp. 609-619.

Pym, A. (2011) Training translators in Malmkjær, K. and Windle, K. *The Oxford Handbook of Translation Studies*. Oxford, England: Oxford University Press. pp. 475-489.

Pym, A. (2013) Translation skill-sets in a machine-translation age. *Meta*. 58 (3), pp. 487-503.

Pym, A. and Torres-Simón, E. (2016) Designing a course in translation studies to respond to students' questions. *The Interpreter and Translator Trainer*. 10(2), pp.183-203.

Rico Pérez, C. (2017a) La formación de traductores en traducción automática. *Tradumàtica*. (15), 75-96.

Rico Pérez, C. (2017b) The ePortfolio: Constructing learning in translation technology. *The Interpreter and Translator Trainer*. 11(1), pp.79-95.

Rico Pérez, C., Sánchez-Gijón, P., and Torres-Hostench, O. (2018) The challenge of machine translation post-editing: An academic perspective in Corpas Pastor, G. and Durán-Muñoz, I. *Trends in E-Tools and Resources for Translators and Interpreters*. Leiden: Brill. pp. 203-218.

Risku, H. (2005) Situatedness in translation studies. *Cognitive Systems Research*. 3(3), pp. 523-533.

Rodríguez Castro, M. (2018) An integrated curricular design for computer-assisted translation tools: Developing technical expertise. *The Interpreter and Translator Trainer*. 12(4), pp.355-374.

Rodríguez Vázquez, S. and Mileto, F. (201) On the lookout for accessible translation aids: Current scenario and new horizons for blind translation students and professionals. *Journal of Translator Education and Translation Studies*. 1(2), pp.115-135.

Starlander, M. and Morado Vázquez, L. (2013) Training translation students to evaluate CAT tools using Eagles: A case study in *Proceedings of the Translating and the Computer Conference (TC35)*. London, UK, 28-29 November 2013 [online]. Available from: https://archive-ouverte.unige.ch/unige:35622 [Accessed 17 December 2018].

Varela Salinas, M.J. (2007) How new technologies improve translation pedagogy. *Translation Journal*. 11 (4) [online]. Available from: http://translationjournal.net/journal/42technology.htm [Accessed 17 December 2018].

Veiga Díaz, M.T. and García González, M. (2015) Usability of free and open-source tools for translator training: Omegat and bitext2tmx in Sandrini, P. and García González, M. *Translation and Openness*. Innsbruck: Innsbruck University Press. pp. 115-130.