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Teaching information and communication technologies

A proposal for the interpreting classroom

Abstract

The impact of information and communication technology on interpreting has grown over the last few years. The technical solutions that have recently entered the market have partially changed the way interpreters work and could have a disruptive influence on the profession in the years to come. In light of these developments, interpreter training programs – especially but not limited to simultaneous interpretation – need to address this 'technological turn' and adapt their curricula accordingly.

In this paper we discuss the emerging technological trends in the field of interpreting and propose a general framework for organizing a teaching module dedicated to this subject as well as teaching activities designed to develop the skills needed in the modern interpreting world, focusing on computer-assisted preparation, remote interpreting and computer-assisted simultaneous interpreting.

1 Introduction

In recent years, the impact of information and communication technology (ICT) on interpreting has considerably grown. The technical solutions that have recently entered the market, for example in the areas of remote interpreting (RI) or computer-assisted interpreting (CAI), are slowly changing the way interpreters work and could have a disruptive effect on the profession in the years to come. There are several reasons for the growing interest in technology-based interpreting. In the case of RI, for example, technology can potentially change the delivery of interpreting services, offering an effective solution to some of the current problems surrounding their provision (Olsen 2017: 14ff). As far as CAI tools are concerned, they can contribute to improving interpreters' performance in highly specialized settings, ultimately improving quality and professionalism (Fantinuoli 2017a: 29). However, the small body of research on technology-supported interpreting makes it clear that the presence of technology is a challenging factor for interpreters. For this reason, in order to successfully integrate technology in interpreted-mediated communication, interpreters need to undergo a process of knowledge and expertise acquisition, understanding the chances and limitations of technology use and integrating

them, whenever reasonable, in their daily practice. The design of training modules on ICT seems to be an integral part of such process.

Higher education institutions and Continuing Professional Development (CPD) providers have recently begun to offer training on technology at an undergraduate or postgraduate level and workshops for professional interpreters. However, there is currently very little information on the way technology can be addressed in the context of interpreter training. In order to deal with this "technological turn" and base the introduction of ICT in training programs on a solid foundation, institutions and instructors need to be provided with extensive information on the major technological trends in interpreting as well as practical suggestions on how they can address them in a classroom. For these reasons, in this chapter, we briefly discuss the emerging technologies in the field of interpreting and propose a training program to cover such trends. In particular, we propose a general framework for planning a module dedicated to this subject as well as teaching activities designed to develop the skills needed in the modern interpreting world. To the best of our knowledge, this is the first paper that focuses on the teaching of technology in interpreting.

Our training module covers three topics that we consider crucial in this area: remote interpreting (RI), computer-assisted interpreting (CAI) and automatic speech translation (AST). They are very different technologies with completely different goals (influencing the delivery of the interpreting service, improving an interpreter's performance, and replacing human interpreters). However, it is our belief that all three will play an important role in the professional life of interpreters in the years to come.

The module is designed to be adapted to local contexts and requirements, allowing institutions and trainers to select or expand the ideas that most suit their needs. The delivery of the module is flexible, as it can be offered during one term and become part of a broader teaching unit or course on conference interpreting, but it could also be condensed in one day, for example, to suit the needs of professional associations or in-service training. It is assumed that those taking part in the training will have at least initial interpreting experience, to ensure that they will be able to understand the challenges of the use of technology and its implications.

It is against this background that we have developed our pedagogical approach, our recommendations and the practical exercises we propose in this chapter and, more extensively, in the webpage associated with this paper (Prandi/Fantinuoli 2018). The concepts presented in this chapter are derived from the authors' experience as researchers in the area of technology and interpreting and have been piloted with several groups in the past few years. In particular, these concepts have been used in different combinations at a university level with interpreting students enrolled in the master's degrees in conference interpreting at the University of Mainz and at the University of Innsbruck who attended a one-term long class on interpreting technologies. They have also been applied in the context of short workshops with Bachelor and Master students enrolled in the International Summer School Germersheim as well as in workshops organized for several professional associations (in particular for *Associazione Italiana*

Traduttori e Interpreti [*AITI*], *Verband der Konferenzdolmetscher* [*VKD*], and *Schweizerischer Übersetzer-, Terminologen- und Dolmetscher-Verband* [*ASTTI*]).

The rest of this chapter is organized as follows: Section 2 offers a brief overview of the main technological advancements in the area of interpreting, in particular, remote interpreting (2.1), computer-assisted interpreting (2.2), and automatic speech translation (2.3). Section 3 introduces the training activities proposed for these areas. Section 4 summarises the topics introduced in this paper and presents some future perspectives.

2 Technological advancements in interpreting

The use of information and communication technology is not new in the language industry. Although ICT did not have the same impact on interpreting as it had on translation (suffice it to think about the success of computer-assisted translation tools and, more recently, of machine translation in the professional translation workflow), during the last decade advances in ICT have consistently influenced the way interpreters work. The World Wide Web with its abundance of data, for example, has changed the way interpreters access and elaborate knowledge (cf. Kalina 2009: 394; Fantinuoli 2017a: 25, 2018b: 2); laptops and tablets allow interpreters to look up event-related terminology directly in the booth (cf. Tripepi Winteringham 2010: 90; Fantinuoli 2016: 42ff), even without any manual input by the interpreter (Fantinuoli 2017b: 25ff), or are starting to replace pen and notepad (Goldsmith 2017: 40ff); the advancement of remote interpreting is making interpreting available where it was not possible in the past (Olsen 2017: 16). If we consider that these developments are happening in the broader context of the radical technological change that is affecting society as a whole, it is reasonable to believe that such profession-related innovations may have a disruptive impact on interpreting in the years to come. They will pose both opportunities and challenges for current and future stakeholders. No matter how controversially these innovations are perceived and debated in the interpreters' community, there is no reason to believe that the way interpreters work will remain the same and will not be influenced by these developments.

2.1 Remote interpreting

Remote interpreting (RI) is a broad term that commonly defines a form of interpreter-mediated communication delivered by means of information and communication technology (ICT). Among the different technologies available, RI is considered a setting-oriented technology because it primarily influences the way interpreting is delivered (Fantinuoli 2018c: 155). It is not a monolithic concept, but can occur in different forms and flavors: in simultaneous interpretation (SI), for example, all event participants typically meet at one place while the interpreters are located at a different venue, be it another room, building or location (Mouzourakis 2006: 46; ISO 20108 2016; Ziegler/ Gigliobianco 2018: 119). In other modes of interpreting, in some cases, the interpreter is in the presence of one of the interlocutors, for example during hearings (Braun/Taylor 2011: 27ff), while in other cases neither the participants nor the interpreters are located

in the same venue. This is the case, for example, in new forms of communication, such as videoconferences, webinars, or virtual press conferences (Olsen 2017: 15). The reasons behind the increasing interest in RI are manifold and can generally be classified into budgetary issues (e. g. reducing travel costs for interpreters), availability aspects (e. g. interpreters are not available at the event venue for a specific language combination), or organizational matters (e. g. gaining timely access to qualified interpreters or the lack of interpreting booths in the room).

In the past RI has been used by institutions and public service providers mainly to provide remote consecutive interpreting services, for example in the area of healthcare and in the judicial sector (Braun/Taylor 2011), while for other modalities, such as conference interpreting, RI has been scarcely deployed. The scarce diffusion of RI has to do both with some limitations of the technology itself and with the complexity of interpreting. Tests conducted in the area of remote simultaneous interpreting, for example, have stressed, among others, issues in the quality of the audio/video signals, the partial loss of contextual information due to the remoteness, and psychological factors, such as fatigue, higher levels of stress and loss of motivation and concentration (United Nations 2001; Moser-Mercer 2003). In the area of consecutive interpreting, issues like turn-taking, alienation and stress have been pointed out (Braun/Taylor 2011: 35ff).

Technological progress is, however, removing technical barriers to remote interpretation and is making RI interesting for many stakeholders. The increasing demand of consecutive interpreting services (for example in a refugees context) has led to the adoption of this technology by many public institutions.[1] In the context of conference interpreting, tests conducted by the EU have shown that it is possible to successfully perform remote simultaneous interpretation (RSI) without breaching the codes for the use of new technologies in interpretation, ISO standards or other related norms applicable to interpretation (Causo 2011: 202). Even if RSI practice is still not widespread and professional interpreters are generally against its use, RSI could become standard practice in future, provided minimum audio-video quality standards are satisfied. In fact, different to the more interactive face-to-face interpreting, such as court and healthcare interpretation, SI is already performed in the "isolation" of the booth with none or very little interaction between the interpreters and the other event participants, i. e. in a setting where the "rapport" between interpreter and the other interlocutors appears less crucial. It is almost a logical consequence that, for example, central interpreting hubs, i. e. dedicated sites where interpreters will find a professional environment (booths, professional consoles, technicians, etc.) and colleagues to work remotely with, may become the common workplace for many interpreters.

No matter how good the technical solutions may become, the loss of "presence" due to RI will not be canceled by technology. In some respects, RI will always remain "different" to interpreting in presence. For this reason, in order to perform well in a RI setting and to deliver a high-quality service, interpreters need to adapt to this new reality,

[1] See the paper's webpage for a series of examples (Prandi/Fantinuoli 2018).

for example by developing different strategies to approach and solve the potential interpreting-related difficulties of this technology.

2.2 Computer-assisted interpreting tools

Computer-assisted interpreting (CAI) tools fall into the category of process-oriented technologies, as they influence the cognitive processes involved in interpreting, with the ultimate goal of improving the quality of interpretation and the productivity of interpreters, while keeping the additional cognitive load as low as possible (Fantinuoli 2018c: 155).

Especially at international specialized conferences, interpreters are called upon to convey their clients' message, often rich in technical jargon, even though they do not share the same level of knowledge. In order to support interpreters in acquiring specialized knowledge and organizing semantic information, CAI tools have been developed on the basis of professional interpreters' experience as well as on the first few studies carried out on the topic. For example, drawing on Will's (2000: 125ff, 2007, 2009) DOT model of terminology work conducted by interpreters, Rütten (2004: 167ff, 2007) discussed the features and the structure of an ideal CAI tool, thus laying the theoretical foundation for the development of software programmes for interpreters. According to Rütten, CAI tools should provide the user with modules to carry out online and offline research, to manage documents for conference preparation, to extract terminology and to analyse it, to organize and manage terminology, and to memorize it. Given the "time pressure under which interpreters work" (Rütten 2004: 172), a system for quick and precise queries in the terminological database should also be available.

In addition to these initial publications, the use of CAI tools for terminology management and in the interpretation booth has been addressed in a few Master's and Ph.D. thesis and exploratory studies. While some of these studies have a more descriptive approach (cf. De Merulis 2013), a recent development in CAI research is the adoption of empirical methods to investigate how the use of CAI tools, both during conference preparation (cf. Xu 2018: 29ff) and simultaneous interpreting (cf. Biagini 2015; Gacek 2015; Prandi 2015a, 2015b: 48ff), influences the quality of interpreting. First results suggest that using CAI tools does improve the quality of SI, but further research is still needed to collect a larger amount of data on the cognitive processes involved in interpreting (Prandi 2017: 76ff, 2018: 29ff).

Similar to CAT tools, CAI tools have experienced an evolution in their rather short history. Based on their "architecture and functionality spectrum" (Fantinuoli 2016: 44), two generations of CAI tools can be identified (Fantinuoli 2016: 44ff, 2018c: 164ff). The first generation comprises tools which cannot be considered a complete interpreter's workstation, as they mainly provide a way to organize terminological entries in multilingual glossaries. They are: Terminus (2008), Glossarmanager (n.d.), Glossary Assistant (n.d.), Interplex (n.d.), Flashterm (n.d.) and Interpreter's Help (n.d.).

The second generation of CAI tools aims more at conference-preparation rather than simple terminology management, with the goal of supporting interpreters along all the

stages of their workflow. This involves terminology and knowledge retrieval and organization, terminology memorization, and, in some cases, looking up terminology through search algorithms designed to take into account the time constraints inherent to the interpreting process. Finally, these tools provide the infrastructure for follow-up work after the assignment has been completed. This category comprises the tools Intragloss (n.d.) and InterpretBank (Fantinuoli 2012). Intragloss focuses on the preparation stage, by facilitating manual terminology extraction from preparation documents and linking them to the terminology database. It also offers a progressive look-up function to query the active glossary or the whole database. InterpretBank is made up of three interconnected modules, "designed to cope with a particular task of the interpreting workflow" (Fantinuoli 2016: 45): the Edit Modality, for the creation and the management of multilingual glossaries, the Memory Modality, for the memorization of terminology, and the Conference Modality, for terminology look-up during interpretation. The lookup function offered by InterpretBank is the most advanced to date and integrates state of the art natural language processing tools. It implements progressive search, fuzzy search, stopwords exclusion and accent-insensitive search; it allows for the integration of automatic speech recognition in order to reduce the cognitive load experienced by interpreters while looking up terminology during interpretation; it includes a document management function with automatic terminology extraction and summarization.

In order to gain a better picture of whether and how CAI tools have been integrated into the training of future interpreters, a survey was conducted from October to December 2017. 85 universities from the CIUTI members list (Conférence Internationale Permanente d'Instituts Universitaires de Traducteurs et Interprètes n.d.) were contacted via e-mail. 24 questionnaires from 15 countries were returned. The most represented countries are Belgium, Germany, Italy, Austria and Spain.

The questionnaire is based on a survey conducted by Berber-Irabien (2010) on the subject of ICT in interpreting. While her survey had a much broader scope, ours focuses on CAI as a subtopic of technology in interpreting. The questions aimed at finding out the degree to which training institutions have included CAI tools in their curriculum. No definition of CAI was provided in the questionnaire, so as to also verify whether trainers were familiar with the topic. All responding universities include technologies in the interpreting curriculum. More than half of the sample (15 out of 24) has a specific class dedicated to technologies. The rest of the sample includes technologies in the curriculum by introducing trainees to video conferencing and remote interpreting, through a general overview and practical exercises.

In half of the sample, CAI tools are covered in the curriculum, and teaching units usually include both an introduction in the form of a presentation, and practice. The focus seems to be on gaining experience in the use of such tools. The tool presented more often to trainee interpreters is InterpretBank, followed by Interplex, Interpreter's Help, Terminus, Flashterm.eu, Glossary Assistant, Intragloss, and Glossarmanager. To our surprise, other programs were mentioned as CAI, even though they don't belong to this category, such as SDL MultiTerm, CrossTerm, online databases, corpora, and corpora

creation and analysis tools, as well as video conferencing software (Zoom, Polycom, Adobe Connect). This already shows a certain lack of information among trainers, or at least a certain degree of confusion.

When asked whether their institution planned on expanding or changing the way CAI tools are integrated into the curriculum, 15 out of 24 respondents answered maybe, 4 no and 5 yes. Those who answered positively stated that the university planned on introducing a dedicated course on CAI, increasing booth practice and "implementing high-performance strategies", as well as "validating empirical findings" on the topic. In one case, remote interpreting was mentioned. The main reason why training institutions haven't included CAI tools in interpreter training or don't plan on expanding the subject is a lack of resources, both technical and financial. Computer-assisted interpreting is not seen as a priority and there is a lack of expertise among trainers that makes it difficult to properly introduce trainees to the topic.

In our sample, 3 institutions stood out for the way and the degree to which they have integrated CAI tools in interpreter training. The table below sums up the number of hours dedicated to CAI, the tools used in the course and basic information about how lectures are structured.

Institution	**Università di Bologna/Forlì**	**Universität Heidelberg**	**Universität Innsbruck**
Total training hours on ICT	40	10	22
Training hours on CAI	25	8	6
CAI tools	InterpretBank Interplex Interpreter's Help	InterpretBank Interplex Intraglos LookUp Interpreter's Help flashterm.eu	InterpretBank Interplex Interpreter's Help
Structure of lectures	Theory + practice (during course) InterpretBank also tested during events (conferences, seminars)	Workshops, workflow of technical conferences	Theory (goals of CAI, interpreting setting during specialized events, etc.)

Table 1: Examples of CAI teaching in three institutions

What emerged from the survey is that CAI tools are not as rare in interpreter training as they were some years ago, but also that trainers are in some cases not sufficiently informed on the topic. The number of responses received and the fact that half the sample already included CAI in interpreter training certainly is a sign that training is starting to take account also of this aspect of the profession.

2.3 Automatic speech translation

Automatic speech translation (AST) or automatic interpreting or speech-to-speech translation is the technology that allows the translation of spoken words from one language to another by means of computer programs. AST generally combines at least three technologies to perform the task: automatic speech recognition (ASR), to transcribe the oral speech into written text, machine translation (MT) with possibly some auxiliary technologies, such as segmentation and punctuation prediction, and speech-to-text synthesis, to generate an audible version in the target language. Depending on the technology used, the translation can be performed simultaneously or in a consecutive mode (Paulik/Waibel 2010: 2534ff).

Different from RI and CAI tools, which are supposed to assist human interpreters in their work and may change the interpreter's working environment, AST is a technology rival to human interpreters with the ultimate goal to replace them. Although automatic speech translation is still in its infancy and is far from reaching the quality of human interpreters, considerable improvements have been made over the last few years. This is due to the latest developments in natural language processing brought about by the widespread use of Deep Learning frameworks and algorithms. In particular, the first two components of an ASP system, speech recognition and automatic translation, have considerably profited by these developments. ASR based on neural networks is quicker and more precise than ever, allowing the transcription of spoken words even without training, and machine translation has reached unprecedented quality in terms of precision and fluency of the target language output. First prototypes have been used in specific settings, such as the real-time automatic speech translation system for university lectures implemented at the Karlsruhe Institute of Technology (Müller et al. 2016), or have been put on the market by technology giants, such as Google (Pixel Buds) or Microsoft (Skype Translator).

The success of these systems, especially on unlimited domains, has been quite modest so far as they fail to achieve the goal of quality and usability for the majority of languages and real scenarios. Automatic speech translation is so challenging for several reasons, both of a technical and of a communicative nature. On the technical side, the precision of AT, latency, flexibility in terms of speech recognition, noise tolerance, and speaker independence, to name just a few, exponentially increase the sources of errors and inaccuracies. On the communicative side, AST systems suffer from not being able to anticipate context and to translate, like human interpreters, all the information that is not coded verbally, such as attitude, world references, etc.

Although the limits of current implementations are clear, there is no doubt that the evolution of this technology will have an impact in some areas of the profession and, more importantly, on the public perception of the activity performed by professional interpreters (Fantinuoli 2018b: 7ff). For this reason, it is paramount that future interpreters are informed about the potential and the limits of this technology. Given the current stage of development of AST, which does not yet represent a real "threat" to the

profession, interpreters are generally quick to discard the subject and are rarely well-informed on the subject. This lack of information could, however, become problematic and counterproductive once the technology improves and starts entering certain market segments, which may happen sooner than most practitioners think. Once AST starts looking sufficiently attractive for some potential clients, saying that AST "is not good enough" will not be a strong argument anymore. Since interpreting is a service, knowing what is competing or will compete with human interpreters is essential to be able to present one's own service in the best light. Education can play a key role in this respect.

3 Training proposal

The training activities presented in the following sections target university programs that aim at introducing the topic of technology in their interpreter training curriculum. The theoretical framework and the practical exercises we present are however relevant also for other contexts, such as workshops organized by professional associations or for in-house staff.

Our training approach is based on two cornerstones. The first is the *integration of theory and practice* and the second is *constructivism*. Since it is virtually impossible to offer a first-hand experience for the different modes, settings, and specializations that characterize present-day interpreting, it appears crucial to offer students a theoretical overview of the basic concepts of technology use in interpretation. Not only the technicalities of each solution, but also general considerations about working conditions, influence on quality, etc. should be in focus. This knowledge will put them in the position to infer useful information even for the situations that cannot be contemplated in the classroom, and thus, to anticipate the potential advantages and disadvantages of each technology in a wide variety of settings and situations. This is even more necessary if the proposed activities are targeting novice interpreters, as a good combination of theory and practice will help overcome the lack of practical experience and of in-depth knowledge of real-life interpreting. Finally, a deep knowledge of technology and the implications of its use has the potential to turn interpreters from passive actors to steering forces for the changes that will reshape the future of the profession in the years to come.

The amount of time that a teaching unit on interpreting technology should devote to theory will depend on many factors, among others on the vocation of the training program (practical versus academic), on the target group (novice versus experienced interpreters), etc. However, in actual teaching, theory should be used sparingly and selectively. Its main goal, in fact, should be to help instructors achieve a deeper understanding of the issues and challenges of new technology and make their teaching more effective (see for example Setton/Dawrant 2016).

As stated above, not all aspects of technology use can be extensively simulated in the classroom. There are many reasons for this. On the one hand, the setting and requirements of each interpreting assignment can vary greatly. On the other hand, technologies can differ substantially and have different implementations. This means that the

use of a specific solution may have benefits in a particular form of interpretation or setting, but be completely unsuitable for another one (Olsen 2017: 14ff). For instance, the use of CAI tools as a means to retrieve terminology during simultaneous interpretation may be suited for specialized conferences, where it can positively impact the overall quality of the interpretation (cf. Prandi 2015a, 2015b; Xu 2018: 50), but may be less useful, or even counterproductive, when rhetoric plays a bigger role, for example in diplomatic circles. Furthermore, interpreting is a very personal activity, and interpreters' needs and expectations may vary greatly, making it hard to find a common ground in terms of the trainees' opinion on the tools. Pedagogically, it therefore makes sense to introduce trainees to the use of technology in interpreting by building on theoretical information presented by the teacher and elaborated together in a first stage of the class.

As for *constructivism*, instructors should create realistic and relevant conditions to put technology into practice. In order to help students construct knowledge, it has been suggested that education and training should mirror professional practice (Kiraly 2000). When solutions for computer-assisted preparation are explained, for example, it is necessary to embed them in a real preparation workflow and to give students practical goals for the use of a specific technology – for example, the creation of a glossary for a specific event. In this way, not only will the technicalities of the tool of choice be learned (e. g. how a concordancer works) and the theoretical principles of the underlying approach be understood (e. g. the basics of corpus-based preparation), but the students will also be able to extend their experience and to evaluate whether the proposed solution suits their needs in that particular context or not.

On more general terms, the goals of training in interpreting technology are:

- to raise awareness of the forms of technologies that are emerging in the field of interpreting;
- to provide a detailed introduction to the various technologies;
- to enable students to explore the specific challenges of interpreting with the use of technology in comparison with traditional interpreting (such as the perception of the reduction of visual clues in RI);
- to inspire in students a thorough understanding of the reasons for the emergence of ICT-assisted interpreting;
- to provide opportunities for practicing different forms of computer-assisted interpreting;
- to encourage discussion and reflection upon practical experience;
- to discuss the ability of technology to assist the interpreter versus its role as a rival.

As far as the learning outcomes are concerned, it is expected that at the end of the training students will have a good insight into the different technologies that are emerging in the interpreting profession, into the motivations behind their use and into the specific challenges that these technologies create for the interpreting practice and the future of the profession. Furthermore, students will also have acquired sufficient know-how to be able to evaluate when the support of technology is appropriate and when it is not.

3.1 Remote interpreting

Involving a complex infrastructure and complicated technical norms which are difficult to be simulated in most training programs, the teaching of remote interpreting seems to be quite a hard task to be performed in a typical training context. Nonetheless, it is our suggestion that even simple means of simulating remote interpreting situations, if properly paired with a theory-guided approach, may be of great benefit to students (cf. Braun et al. 2011: 286ff).

The unit on RI can be divided into three sub-components. The goal of the first component is mainly awareness rising. This component should focus on the discussion of some preliminary aspects, such as:

- the settings in which RI can be deployed (court, conference, etc.) as well as the interpreting modalities it can support (dialogue, consecutive, and simultaneous mode). Students should be able to differentiate their opinion depending on these variables;
- the results of the empirical tests conducted to date (both from the interpreter and from the user perspective);
- the analysis of leading RI service providers, their attitude, the proposed technical solution, etc. This should allow students to evaluate the different approaches to RI of the main service providers and the potential consequences on the working conditions and ultimately on the interpreting quality;
- the position papers on RI of several professional associations and, whenever available, of multilingual institutions;
- the often-expressed concern that such technologies may have adverse effects on the interpreters' working conditions and the quality of interpreting.

Once those participating in the training have acquired an overview of the topic, the second phase can be devoted to simulating RI with exercises covering the interpreting modes that most suit the training program. At its best, a training module should cover several modes of interpreting and different settings (conference, court hearings, etc.) so that students can develop a realistic impression of the specifics of each mode and are enabled to assess the suitability of RI for different modes and settings.

The simulation of simultaneous RI is quite easy to organize. Provided the booths are equipped with a monitor (or the training room has at least a big projector), simultaneous RI may be trained using a video recorded speech. Although this is quite often done during normal training to provide real material for practice, the focus of this exercise should be on the peculiarities of interpretation outside of the conference venue. In order to increase the ecological validity of the simulation, the video should contain typical elements of decontextualization, such as participants introduced by the speaker, reference to the

specifics of the remote location, etc. For advanced students, videos of different length and complexity could be used to test their reactions in terms of stress and fatigue.[2]

A video-mediated interpreting of a dialogic situation can be simulated by means of simple audio/video communication software such as Skype, provided students have been informed that such technology has not been designed for this task and that quality standards for audio and video transmission are crucial to allow video-mediated interpreting. It is advisable to train several potential settings, for example when the parties are located at two video-linked locations with the interpreter being situated at either end of the link (a quite typical situation in legal proceedings, e. g. courtroom and prison), or when the event takes place at a single location, with the interpreter working at a remote location (this situation is typical, for example, in healthcare).[3]

After the simulations, the third phase of this unit should focus on the discussion of the potential issues brought about by RI. At this stage, the ad-hoc and local problem-solving strategies used by the students should be discussed. The development of compensating techniques to overcome the difficulties that may arise, using global avoidance and preventive strategies to avert problems, such as communication management to avoid overlapping speech and turn-taking in a dialogic interpreting mode, should complete this phase.

In general terms, practicing remote interpreting in simulations of real-life situations should help to familiarize with the peculiarities of this form of interpreting. It should also broaden the knowledge of the implications and risks that may arise in video-mediated interpreting, such as the way technological mediation affects the quality of interpreting, the importance of the videoconference setting and the distribution and number of participants involved in the communication, the difficulties in the management and coordination of communication, the issues posed by a suboptimal view of the speaker and of the other participants, the interpreter's working environment, both in the sense of the actual physical environment and in the sense of the atmosphere or ergonomics, and, ultimately, whether RI is sufficiently reliable for achieving the specific goals of interpreter-mediated communication.

3.2 Computer-assisted interpreting

3.2.1 Corpus-based preparation

As introduced in section 2.2, terminology research and domain knowledge acquisition represent a substantial part of the preparation activity performed by trainee and professional interpreters. Tools for corpus creation and analysis have the potential to enhance the quality of preparation. In particular, monolingual corpora can assist

2 See our webpage for a collection of examples suitable for this purpose.

3 For a detailed explanation of the distinction between video conference interpreting and remote interpreting, see Braun and Taylor (2011).

interpreters in investigating subject-related terminology as well as phraseology, and in acquiring subject-specific knowledge (Xu 2018; Fantinuoli 2017a, 2018a).

From a practical point of view, corpus-based preparation can be divided into two parts: corpus construction and corpus analysis. Even if general corpora are available,[4] the great variance in topics and languages typical of the interpreting profession requires users to build their own ad-hoc corpora any time they deal with a new subject. Corpora creation can be performed manually simply by searching the web for suitable texts and downloading them (i. e. replicating the way an interpreter searches for reference documents) or automatically, using tools that automatize the process of searching, downloading and preparing the texts for analysis. Among others, two free tools can be used for this purpose: BootCat (2018; Baroni/Bernardini 2004) and CorpusMode.[5]

Given a specific topic for a forthcoming interpreting simulation, such as “solar energy” or “pulmonary fibrosis”, and a language pair, students should create two monolingual corpora, one for each language. Although a direct comparison between the manually and the automatically constructed corpora is of course not possible, first of all because they are constructed to be analysed in two different ways, i. e. through traditional reading and through computer-assisted analysis respectively, the students should reflect at first on the difference in terms of the amount of time needed to collect the documents and of the quality of results (relevance, usefulness, etc.).

By means of a concordancer, the typical analysis tool for corpus analysis, the automatically built corpora should then be analysed in parallel in order to identify linguistic units that may be useful for preparation and, possibly, to store them in a topic-related glossary. For this purpose, many free tools are available, among others AntConc (Anthony 2018), WordSmith (n.d.) or the computer-assisted interpreting tool InterpretBank (n.d.). Such tools allow users to discover useful information starting from a list of statistically significant terms that are automatically extracted from the corpus. If the extraction procedure is performed for both languages, the user can try to establish terminology connections between the languages. Furthermore, the analysis of the concordances may shed light on both meaning and usage. Seeing the term in context helps understand its meaning and create a conceptual map of the subject, but also learn the way a term is used by a particular group of people (the experts on that subject).

This analysis method should ultimately be applied to create a bilingual glossary on the subject. Students should not be prevented to also use the other tools they normally adopt for glossary creation, such as online terminology databases, but at the same time, they should be encouraged to confirm or reject the solutions they found in other resources through corpus analysis, as this represents an authoritative instance of specialized knowledge for the subject under analysis (Fantinuoli 2018b).

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4 A collection of free speech corpora can be downloaded at Speech Corpora (2018).
5 Translator Bank/Corpus Mode (2018).

3.2.2 Live interpreting

The main point of criticism on CAI tools is that their use during interpreting generates additional cognitive load and that they "may be time-consuming and distracting in an activity that requires concentration and fast-paced decoding and delivery" (Tripepi-Winteringham 2010: 90). If this is true for professionals, then using a CAI tool should be nearly impossible for students. While not enough data has been collected to underpin this assumption, initial investigations in this subject suggest that an integration of CAI tools in the interpreting curriculum is indeed possible (cf. Prandi 2015a, 2015b; Biagini 2015). The introduction of CAI tools in interpreting courses should serve the purpose of exposing students to these solutions, and of providing them with the means to make an informed use of such tools. Thus, an introduction to CAI tools can be beneficial, even if trainees will not reach complete mastery of the tools.

In order for an introduction to CAI tools to be efficient, some key points should be taken into consideration:

- since using CAI tools during simultaneous interpreting requires additional cognitive resources and the ability to efficiently allocate attention, CAI tools should be presented to advanced students, ideally at the end of their training, when they have a better grasping of the main interpreting techniques;
- a gradual approach should be followed, both in the complexity of the exercises and in the material used, in order to gradually increase the awareness and the trainees' proficiency in the use of the tools;
- the role of CAI tools should be stressed throughout the course: as tools, they are meant to provide support to interpreters, not to replace them. For an effective use of CAI tools, one cannot do away with proper preparation;
- ad-hoc speeches, prepared by the instructor, should be used during training so that features such as speed, accent, and terminological density can be controlled;
- several practice sessions are needed for students to start developing a method for the use of CAI tools. It is important to understand how to make these tools work for oneself, and whether they actually suit one's needs;
- different CAI tools should be compared so that students can get a broad picture of the options available on the market and experiment with their functions.

A teaching module on computer-assisted interpreting should include a preliminary theoretical unit, aimed at drawing attention to the reasons behind the use of CAI tools and at fostering a critical approach to the use of this technology. An overview of the tools available on the market should follow, with a focus on their structure and the functions they offer. The tools which will be actively used during training can be described in more detail, ideally with practical demonstrations by the instructor.

Then, practical exercises should follow. In our suggestions, we focus on the use in the booth, which is the most controversial aspect of the introduction of CAI in interpreter training, but the fundamental features of glossary creation and management should also

be addressed in the curriculum, as they are closely related with the functions to be used in the booth (see 3.2.1).

Since using the conference modality of CAI tools is a complex activity, also from a cognitive point of view, the practical exercises should aim at addressing the sub-skills required to effectively use CAI tools while interpreting and at promoting awareness among trainees, especially about efficient attention allocation and when and how to use the tools. The activities described hereafter should not be considered as a complete list of exercises, but rather as examples and recommendations for an effective integration of CAI tools in the curriculum.

Listening to the speech while looking up technical terms, without interpreting at first, can be a useful exercise to draw awareness to attention allocation. First, students can be invited to look up all technical terms they hear without interpreting. Later on, they can be asked to interpret while looking up the same amount of terms. This exercise is designed to show students that, unless the speech is extremely slow, being able to look up all specialized terms is unrealistic. A selection of the terms to look up is usually necessary in order to preserve a certain level of overall quality and avoid cognitive overload.

If available, checking the LOG file produced by some tools and finding alternative solutions for the terms searched can be useful to encourage the use of alternative strategies when looking up terms is not feasible, and to identify the terms that strictly require a glossary query. The students can then interpret again and only look up the terms that require a query. Transcribing the trainees' deliveries under the two conditions and comparing them can be useful to make students reflect on how precision, cohesion, coherence, and fluency of the rendition are affected. Two different speeches with the same terms can be used, or if this is not possible, comparable speeches can be prepared.

An effective way of raising awareness of the role of CAI tools can be comparing interpreting with and without CAI tools. By analysing the renditions, attention can be drawn to the differences between the two conditions.

Another interesting variation is practicing simultaneous interpreting with CAI tools alone and with a booth partner. By comparing the two situations, students can verify which one is more comfortable and effective for them. This can also be a useful activity to practice teamwork in the booth, a skill necessary for simultaneous interpreting in general.

Analysing the sound wave of the students' renditions, for example by recording them with Audacity (2018), can be useful to check whether pauses are motivated or whether they occur in relation to a query in the database, and to raise awareness on how this affects the fluency and the prosody of the rendition, with the ultimate goal of evaluating whether the students' strategy in the use of the tool is effective or not. Even though these activities can be very revealing, they do require quite a lot of time. It is up to the trainer to establish which exercises can be most beneficial for trainees and are easier to integrate in the curriculum, and to adapt them to the individual training environment.

At a more advanced stage, students can practice interpreting speeches for which an additional visual input is present, such as a presentation, and reflect on whether this makes it easier to look up terms. In order to stress the importance of preparation for an effective use of CAI tools in the booth, trainees can be asked to interpret with a glossary prepared by them and then with a glossary prepared and provided by the trainer.

Finally, several factors affecting the level of complexity of the speech can be varied, so that students can be exposed to a variety of conditions. At a basic level, trainers can use speeches with average speed and easy syntax, so that terminology is the only element of difficulty. Later on, aspects like speed, accent, terminological density, level of redundancy and overall degree of complexity can be tweaked. The goal is to help students develop awareness of the conditions under which using a CAI tool is possible and effective, and of those under which other strategies should be preferred.

3.3 Automatic speech translation

Automatic speech translation is the only component of our pedagogical concept that does not imply the acquisition of skills and competencies to be practically used in the profession. As introduced in Section 2.3, the goal of this component is to allow interpreters to identify the potential and the limitations of this emerging area of intersection between technology and interpretation.

Considering the fact that AST technology is still in its infancy and that our training program is aimed at professional interpreters performing at high levels, practical activities should not focus on the evaluation of the AST quality, possibly comparing it to human performances, as it goes without saying that at the moment no system is good enough to compete with human interpreters in any mode and setting. First-hand experience of the improvements achieved in the past few years as well as the shortcomings of this technology should improve the general knowledge about the topic (which is generally quite scarce and often based only on stereotypes or wrong assumptions) and prepare interpreters to argument with those that, in the future, may start to doubt about the need to resort to a human interpreter or to admit the cases where AST may be successfully employed.

AST can be brought to the classroom in the form of several tools such as Skype Translator or Google Pixel Buds, to name just a few. Important is that experimenting with such tools should not be done with casual texts and situations, but as in the case of human interpreting trainees, much attention should be devoted to choosing the right texts and adapt the way the speech or dialogic situation is performed to the “rules” imposed by the specific tool in terms of speed, pronunciation, pauses between sentences, etc. For example, the instructor or the trainees should choose several texts or text excerpts varying in terms of complexity, genre and level of specialisation. At best, for the test each text should contain only one parameter of potential difficulty, with all others set at “easy”. Among the variables that could be tested are formal or idiomatic language, figurative expressions, use of specialized terminology, use of polysemantic words, etc. Both one and bidirectional interpretation can be simulated. Students should be able to evaluate

if communication is happening correctly, what are the problems and their potential causes, etc.

4 Conclusions

This paper represents a first attempt to develop a didactical program for the introduction of technologies into the curriculum of trainee interpreters. We addressed three main types of technologies: remote interpreting, computer-assisted interpreting and automatic speech translation. A fundamental aspect of our approach lies in the combination of theory and practical experience, which we believe are key elements both to develop awareness of how to best integrate technology in one's workflow and to promote a deep understanding of the potential and the shortcomings of these technologies. Even though the inclusion of the topic of technology in interpreter training comes with a series of issues and limitations, recent advancements have made this a topic which cannot be ignored, not only to improve professionalization, but also to prepare future interpreters for the challenges that lie ahead.

The didactical proposal described here and the practical exercises presented in the related website should be intended as suggestions and guidelines to be followed during training, which trainers can expand upon and further develop in accordance with the individual training framework. Our proposal should not be intended as an extensive coverage of the topic of technology in interpreting, but rather as a first step towards a broader discussion of this subject matter. A deeper understanding of technologies applied to interpreting is essential to safeguard the profession and to improve training.

With this paper, we hope to help assuage the fear and overcome a certain reluctance towards the use of technologies in interpreting and in interpreter training. We wish to encourage an open and critical approach to technologies and interpreting, and we believe education can be a fertile ground to spread more knowledge on this subject and to promote those changes in attitude that will make today's interpreter trainees the true drivers of any future advancement in technology applied to interpreting.

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