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Decoding technical codes in professional translation

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Abstract. In translator training courses, students are often found incompetent when handling technical translation, especially those with little knowledge in science and technology. So are novice translators in the translation industry. This invites scholars to investigate the phenomenon and find feasible explanations, and better still, propose some practical suggestions for translator training and ESP teaching programmes. In this paper, I suggest that each message in the source text consists of at least three basic codes, which are related to language, culture and knowledge separately. The decoding process of knowledge codes in technical translation, in particular, often involves skills related to proficiency in reading comprehension of ESP texts. I will demonstrate how experienced professional translators are able to tackle various problems in technical texts to solve the terminology problem in the target language. Furthermore, a good knowledge in specialized subject domains contributes significantly to the success of a technical translation. So do inspirations from linguistic and nonverbal considerations. To support my argument, I will use two case studies concerning terminology problems observed in my past technical translation job and current translation class and show how the problems can be solved with decision-making strategies specific to processing technical texts.

Keywords. Decoding process, ESP, linguistic knowledge, nonverbal clues, technical translation, terminology.

1. Introduction

In our daily life, communication between speakers of different language and cultural communities can be found happening more and more frequently around us with the rapid development of globalization (Ho 2008). When a person with certain knowledge of a foreign language is available, the communication with foreigners becomes easier. However, for sophisticated communication between different language users, translators and interpreters are needed for the success of cross-linguistic/cultural communication. When foreign language communication involves specialized knowledge in a specific subject domain, such as business, technology, law and so on, professional interpreters and translators are in demand to ensure the quality of communication for professionals to exchange information. In a word, foreign language communication takes place around us so frequently today that it demands further investigations into its nature and establish theories to explain its mechanism (cf. Byrne 2006: 22). The following hypothesis is my tentative attempt.

2. A hypothesis of composition of codes in foreign language communication

In the situation where language contact happens, any communication between speakers of different language and cultural communities can be understood as a process of codes switching, during which codes contained in the message in the source language (SL) are decoded, analysed and undergo a recoding process in the target language (TL) before the message is received and perceived by the TL listener(s) or reader(s).

Of the codes that are decoded in the SL and recoded in the TL, three main components can be found that play crucial roles in foreign language communication: linguistic, cultural and knowledge codes, illustrated as below:

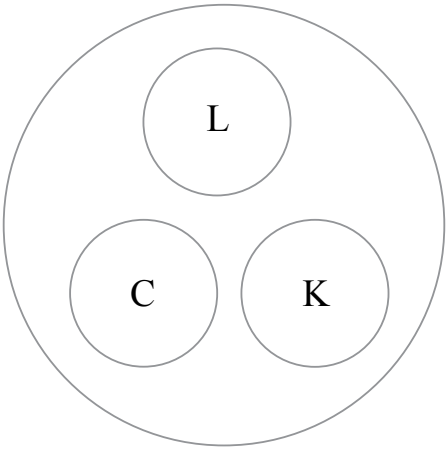

Figure 1: The composition of codes in foreign language communication

Here "L" stands for Language, "C" for Culture, and "K" for Knowledge.

A source message normally contains at least three types of codes related to information about language, culture and knowledge individually. Only through correct interpretation of these codes, namely through decoding the message appropriately in the target language, will the message in the SL be comprehended adequately. During the code-switching process from the SL to the TL, the translator or interpreter need to command good verbalizing skills to process them in a dynamic way to ensure the success of communication between the SL and TL (cf. Nida 1964: 159; Nida and Taber 1982: 12, 22, 24). Otherwise, barriers to the communication will be built up and lead to the failure or problems of foreign language communication.

Of these three types of codes, the linguistic one is essential, because it is the carrier of our thought. Without it, ideas will fail to be expressed and perceived. The cultural code plays a crucial role in understanding the disparity between different cultures in the way of thinking, life style, conventions, and customs and traditions. The knowledge code helps the communication run smoothly on the common ground of various aspects of our understanding of the world.

During the process of decoding a message in the SL (English in our discussion), a translator needs to understand the source text (ST) fully. As the basic meanings of the message are interpreted through syntactic, semantic, cognitive and pragmatic analyses, as well as analyses in some other related fields (e.g., sociology, psychology, and semiotics), the translator's excellent command of the SL is a prerequisite for the job. When the source message contains culture-specific information, the translator is to go through the process of cultural interpretation so that the cultural implications in the source message will not get lost during the decoding process and are able to be switched to its equivalent codes, fully or partially, in the TL. As thought is construed in the framework of knowledge and interfaces with experience, the message expressed in the SL is always associated with various topics based on knowledge and experience (see Gommlich 1993: 175, 177; Shreve 1993: 185). If the message consists of information that can be understood by the general public, such as love, birth, natural phenomena, social life, and so on, the knowledge codes embedded in the message will be relatively simple. However, when the topic concerns something specific to a certain subject domain, such as business, technology, medicine, law, and architecture, etc., comprehending the message will become a big challenge even for laymen of the native speech community, let alone non-native language readers/listeners. When translation of the ST into the target text (TT) is required, the translator must be equipped with certain specific knowledge related to the subject domain, including jargon, terminology, abbreviations, acronyms and concepts popularly understood in that specific profession (cf. Byrne 2006: 85-86; Finlay 1971:7-8, 14, 89-92; Wilss 1996: 58, 60-62; cf. also Danks and Griffin 1997: 168; Goldman and Rakestraw 2000: 311; Teague 1993: 162; Risku, Dickinson and Pircher 2010: 89, 93). Without such knowledge, the message exchange will be doomed to fail.

As the importance of linguistic and cultural communication has been discussed extensively in the literature already, the role of knowledge codes in foreign language communication will be examined in this paper. Attention will also be given to the decoding process of technical codes. While the process of foreign language communication in general involves three major stages, i.e., decoding, code-switching and recoding, the decoding process, especially that of technical codes, in professional translation will be scrutinized in the discussion to follow. It is hoped that a study concentrated on this topic will provide some insight into professional translator training, as well as ESP teaching and learning, particularly that related to the aspect of reading comprehension of texts in English for Science and Technology (EST).

3. Reading competence in ESP and decoding process in translation

ESP proficiency, especially in reading comprehension, plays a very important role in translation from English into other languages (Byrne 2006: 107). Without a good reading competence, a translator will misunderstand and consequently misinterpret the message in the SL. As a result, the output of the recoding processes in the TL will pass a wrong message on to the reader. In general translation, the consequence of mistranslating a text may merely cause distortion of the original message; in translation of texts for specific purposes, such as commerce, technology, law and medicine, the translator's negligence or mistake will lead to a terrible disaster in business expansion, technical applications, legal trials or medical treatments (cf. ibid: 19-20). In this sense, then, accurate interpretation of the original message is decided by the translator's reading competence in ESP.

To fully understand the meaning of the original message, the translator should be aware of some typical linguistic devices employed in ESP writing.

In comparison with writing materials for general purposes, such as news reports, feature stories, literature, classics, and so on, authors tend to use passives and complex nominal structures in ESP texts more frequently, especially those related to a subject domain of EST (Kennedy and Bolitho 1984: 6, 19; Byrne 2006: 91). The vocabulary also consists of words based on Greek and Latin roots with "scientific" prefixes or suffixes (Kennedy and Bolitho 1984: 19, 58). More often than not, a word in EST often changes its normal meaning (ibid: 19). In addition, abbreviations and acronyms can be found extensively in technical texts, plus a large number of symbols and formulae, as well as illustrations and charts (ibid: 56-58). The greatest challenge for a technical translator, however, is how to deal with neologisms and coinages (ibid: 58), because the term is so new that no one in the target speech community has yet encountered it before, let alone translate it into the TL (cf. Finlay 1971: 56).

It is obvious that the above-mentioned linguistic and semiotic devices typically used in EST demands special skills and strategies to help solve decoding problems when translators are translating highly technical texts into the TL. In the following discussion, I will propose a few tentative solutions to deal with the decoding problems that professional translators often encounter. Hopefully, these skills and strategies may also apply to the learning process in ESP, especially that in EST.

4. Skills and strategies for decoding technical codes in professional translation

In practising technical translation, translators tend to deploy some specific skills and strategies for decoding technical codes (cf. Shreve 1993: 186). These skills and strategies have largely derived from the translator's previous learning experience from his/her education at school, especially during the learning process in reading comprehension. However, they may also be generated from the translator's autonomous learning process trigged by his or her personal interests and judgement of importance (Alexander and Jetton 2000: 291, 295).

Generally speaking, translators will not find it too difficult to deal with general grammatical structures when analysing EST texts, such as the passive voice and complex nominal structures, as long as they had robust training in English grammar at school.

In the real world of technical translation, however, there are far more complicated and challenging situations where translators have to deal with problems caused by a large number of technical terms. Worse still, the size of technical vocabulary simply keeps snowballing with the rapid development of modern science and technology. As a result, technical terms, neologism, coinages, acronyms and abbreviations become greater and greater challenges for technical translators. At first sight, these problems might be successfully solved as long as the translator has a good knowledge of semantics, because they are largely about the meaning of words. In reality, however, they are far beyond the linguistic knowledge that is taught at school, because many technical texts are written by professionals for a specific reader group, e.g., technicians, engineers, or other professionals. Such "authentic" texts are used specifically for professional communication of subject content rather than communication between laymen for verbal exchange of general ideas (cf. Hutchinson and Waters 1987: 48). When these texts need to be translated into a foreign language, more challenging situation will emerge. There will be not only problems caused by new terms but difficulties introduced by new concepts in the subject domain (Finlay 1971: 56; Kennedy and Bolitho 1984: 48). In other words, if these technical terms and concepts were old, there would hardly be any need to translate them into those in another language. In this sense, then, technical translators have to confront a situation of self-learning during the process of translation. That is to say, the translator has to learn something well beyond language itself. S/he has to understand the basic workings of the subject domain concerned before starting the translation process (Finlay 1971: 89), because technical translation involves a process of verbal communication between professionals of different languages and cultures.

The success of verbal communication between people from different language and cultural backgrounds depends totally on the translator's intelligence and knowledge of both general and professional communication. In other words, linguistic and cultural knowledge is essential, yet inadequate when dealing with technical communication between two different languages. Furthermore, when decoding technical codes during translation, a translator often relies on a variety of skills and strategies to comprehend these highly technical texts. The skills and strategies that the translator often deploys include those for information-retrieving, and problem-solving and decision-making.

4.1. Information-retrieving

We are now living in an era characteristic of knowledge explosion and information expansion, which has become outrageous and out of control (Alexander and Jetton 2000: 286). This is particularly so in science and technology, especially in information technology (IT) and biochemistry. To transfer advanced knowledge in science and technology to other countries that desperately need it, the most effective channel is through technical translation. Although in many Western countries, professionals with high proficiency in other languages may have no problem to read technical texts in a foreign language; for many professionals in a country that use a totally different language and has a highly heterogeneous culture, such as China, Japan, Egypt, Brazil and Russia, technical translation is a must for communication between professionals across language and cultural barriers. In the vast ocean of new information and knowledge, translators need to use specific skills and strategies to search and retrieve information and knowledge specialized in the subject domain that the EST texts are involved in (cf. Finlay 1971: 56; Park 1993: 103).

The traditional and fundamental ones are library or reference skills (Finlay 1971: 136-146; Kennedy and Bolitho 1984: 71; Hann 1992: 7). An experienced translator always has a clear idea where to find the most needed information and the most useful dictionaries and encyclopaedias and other reference books in a library. They can immediately pick up the best possible dictionaries within minutes and find the right technical terms very quickly. In comparison, trainee translation students or EST students tend to rely on online search engines and dictionaries, and machine translation (MT) software to deal with new terms. They do not understand that the translated

terms may be provided by amateur translators or MT software, which may contain unreliable lexical meanings of the term. In a society filled with modern technology, paper dictionaries, especially those ones specialized in science and technology with many volumes, have their unique role for professional translators, as well as for EST or translation students. In other words, paper dictionaries are still our indispensable tools and trustworthy friends.

However, in comparison with many online dictionaries and information where a translation can be found within seconds, paper dictionaries are often quickly out-of-dated and new words or definitions will not be so easily found (cf. Park 1993: 101, 106). Therefore, a good command of skills for online searching for useful information is a prerequisite for any technical translators and students (cf. Byrne 2006: 6). In this respect, young students often outsmart their teachers. They may take full advantage of online searching skills to find information they want within seconds. The only advice that a teacher needs to provide them with is: "Watch out for *faux amis*" (cf. Hann 1992: 21; see also Finlay 1971: 112-113).

4.2. Problem-solving and decision-making

The process of technical translation often involves a translator's problem-solving and decision-making skills, which decide its quality. In many cases, such a process is not a smooth one, especially in technical translation, where codes to be interpreted pose daunting challenges to the translator's proficiency in languages, knowledge in both cultures, comprehension of the technical terms involved, ability to conceptualize the mechanism of the technical project and competence in decoding and encoding the texts in a professional way.

The most common problems a technical translator will encounter include: 1.) a word with a reference specific to that text of EST (cf. Hann 1992: 21, 223-224); 2.) acronyms and abbreviations (cf. Finlay 1971: 122-123; Kennedy and Bolitho 1984: 56, 58) and 3.) newly-minted technical terms (cf. Byrne 2006: 86). Some examples will be given later in this paper. At this moment, I would like to briefly introduce some strategies commonly used in technical translation.

During the process of technical translation, trainee and novice translators tend to pick up any definition of a word (normally the one with general reference) from a bilingual dictionary and use it as the translation for a technical term used in EST. They often find it difficult to identify a specific definition in EST, owing to their lack of background knowledge about the subject domain concerned. For example, if the translator has never been interested in computer technology, it will become a great hassle for him or her to translate a text involving terminology for computer hardware or software. Terms such as "chip", "display", "motherboard", "interface", "modem", "bit", byte", "terminal", "server", "compilation", "configuration", "restore", "script", and "Java", as well as acronyms such as "RAM", "ROM", "CPU", "GB", "bps", "HTML", "ADSL", "Wi-Fi", and "ISDN", probably mean nothing when s/he is reading them (see also Finlay 1971: 122).

To solve the problem, a trainee or novice translator is advised to read extensively to accumulate a variety of background knowledge at spare time (cf. also Niedzielski and Chernovaty 1993: 125; Risku, Dickinson and Pircher 2010: 90). Such a process must be autonomous. In other words, the knowledge expansion process cannot be carried out totally through school education system. Moreover, a translator specialized in technical translation needs to learn not only individual terms alone; rather, the translator must read articles and books dedicated to the subject domain concerned so that s/he is able to conceptualize the fundamental ideas and principles behind the mechanism upon which the technology is established (cf. Byrne 2006: 5). Only in this way, can the translator be confident when decoding technical codes in EST texts, because the "reciprocal connections come about as a result of increasingly complex experiences with objects and events and the language associated with them" and are thus able to "evoke other language in ways similar to the spreading activation theorized in semantic-network models" (Sadoski and Paivio 1994: 586).

Very often novice translators tend to feel panic if they fail to determine the definition of a term

in an EST text, although they know its meaning in general English perfectly. However, they will become more confident next time if they know the way how to solve such a problem. The commonly employed devices in technical translation include 1.) globally searching the occurrences of the term in the whole text so that comprehension of the term can be achieved by inferring its meaning form the context (cf. Byrne 2006: 139-140) and 2.) taking advantage of some nonverbal facilities available in the EST text, such as illustrations, charts and some other graphics that help the reader (*viz*., "the translator" in our discussion) conceive the concepts related to the term (cf. Byrne 2006: 76, 131).

Some ESP scholars suggest that words should not be comprehended in isolation; rather, they must be understood in a global environment, such as the context, their relationship with other words, and the collocation they are frequently associated with (cf. Kennedy and Bolitho 1984: 62-66). Moreover, as "many word meanings are learned through implicit or contextual reference (inferring the meaning from cues in the verbal contexts in which the word is encountered)" (Daneman 1996: 525; cf. also Spiro and Myers 2002: 488; Byrne 2006: 139-140), it is important for technical translators to infer implicit meanings of unknown technical terms from the context they occur to solve the terminology problem (cf. Byrne 2006: 139-140; cf. also Risku, Dickinson and Pircher 2010: 85, 87, 90). Such strategies also apply to the reading comprehension process of EST texts.

Apart from the verbal problem-solving strategies, experienced translators also resort to nonverbal measures to solve the terminology problem when decoding technical codes that they have little or no knowledge about (cf. Byrne 2006: 5).

In their joint study on reading comprehension, Sadoski and Paivio propose a dual coding theory for reading comprehension. According to this theory, human experiences can be represented by verbal and nonverbal systems (Sadoski and Paivio 1994: 584-586). When verbal and nonverbal stimuli are detected in the environment by our senses, their corresponding mental representations will be activated in the verbal and nonverbal systems in our brain, during which, referential connections will take place between the verbal and nonverbal systems in addition to the associative reactions inside each system, followed by verbal and nonverbal responses (ibid). The nonverbal system can also be called the imagery system, which processes visual and auditory and some other information (ibid).

The significance of this theory lies in its revelation of the contribution of nonverbal, especially graphic, mental representations, known as "imagens" (ibid: 584), to our reading comprehension of highly abstract texts, especially EST texts. In other words, reading comprehension of highly technical texts will become easier when illustrations, charts, and other graphics are available (Kennedy and Bolitho 1984: 73; cf. also Hegarty, Carpenter and Just 1996; Byrne 2006: 76). This is how experienced translators solve the reading comprehension problems from time to time with the help of nonverbal interpretations from the accompanying graphics available in the EST texts. A case study later will provide its empirical evidence.

In decoding technical acronyms and abbreviations, translators often have to halt the translation process to identify the complete words of the acronyms or abbreviations so as to ensure a full understanding of the term in the EST text. Such problems often occur when the EST text is written by a technical writer who takes it for granted the comprehension of professional jargon, including technical acronyms and abbreviations, when rendering a text for professionals in EST without realizing that translators need the complete set of words of these acronyms and abbreviations before starting translation (cf. Finlay 1971: 88-90; Bryne 2006: 11-12). The solutions for the problem include:

1. find the acronyms and abbreviations in a dictionary, especially in a dictionary dedicated to abbreviations and acronyms, such as *A New English-Chinese Abbreviations Dictionary* (Shi 1995);

2. search them from various online dictionaries of acronyms and abbreviations, for example, http://acronyms.thefreedictionary.com/ and http://www.acronymfinder.com/;
3. ask for help from other professional translators or technical writers through dedicated newsgroups or other online resources (cf. Finlay 1971: 60-65, 146-149; Risku, Dickinson and Pircher 2010: 89-90);
4. contact the translation agent for clarifications; or,
5. if possible, contact the technical writer directly for the complete words of the acronyms or abbreviations. If all the above measures fail, the translator may employ the strategy of guessing to figure out their possible component words (see Byrne 2006: 5; cf. also Kennedy and Bolitho 1984: 58, 65).

In dealing with newly-minted technical terms, some knowledge about lexicology, especially about word-formation, often plays a crucial role (cf. Kennedy and Bolitho 1984: 58-59; cf. also Adams 1973). If the translator knows how a large number of words, particularly those in chemistry, medicine and biochemistry, are formed, they can solve a lot of terminology problems by segmenting the term into the root, prefix and suffix derived from Latin and Greek to identify the basic meaning of each segment and figure out an integral meaning of the term and generate a newly-minted equivalent in the TL for the neologisms and coinages in the EST text (cf. also Fischbach 1993:94).

Should the problem still exist, leave the acronyms or abbreviations in a pair of brackets and put a tentative translation before them. That is what professional translators do as a last attempt to solve the terminology problem in technical translation.

4.3. Case studies

The following two case studies illustrate how linguistic knowledge and nonverbal clues help translators solve terminology problems in professional translation.

4.3.1. Case One: Word-formation knowledge for decoding a technical term

In the late 1990s, I received an assignment for translating a brochure for safety directions for the use of powder coatings. In the original text, there was a chemical called "triglycidylisocyanurate", which is an ingredient in powder coatings used in the metal finishing industry. As the chemical was newly invented at that time, there was no Chinese translation available. So I had to solve the terminology problem by deploying my word-formation knowledge. I segmented the long word into the root, prefixes and suffix and interpreted each with its possible Latin or Greek lexical meaning:

Root – *isocyanur(e)*: isocyanuric acid

Prefixes –

- *tri*: three
- *glycidyl*: *epoxy*

Suffix –

- *ate*: salt or ester of an acid

Finally I provided a tentative translation based on the interpretations above for the user of the brochure to have a basic idea what this new chemical is roughly about.

4.3.2. Case Two: Inference from nonverbal information for decoding a technical term

In the following technical text of a brochure about a baggage handling system used for airports, the term "cam bladed device" is rather implicit:

> *This cam bladed device transfers baggage from one line to another, or to a sorting destination, at a rate of 60 bags per minute, whilst maintaining the gentlest treatment of baggage through the unique constant velocity curved shape.*

When one of my students were asked to translate the paragraph, she interpreted "bladed" as "a blade used in a razor" even though she had realized it did not make sense in the context. Male students were not sure, either. When I showed the following scanned picture, they had a much better understanding of the term "cam bladed device".

Figure 2: Illustration of a part of a baggage handling system used for airports

It is clear that the skill to take advantage of the nonverbal (in this case, the imagery) information and associate it with the verbal term does help EST readers and technical translators solve reading comprehension problems.

Due to space limitations, I am unable to provide more examples that show how technical translators often manage to solve problems with the strategy of contextual inference to decode a technical term or the guessing technique to decode an acronym.

5. Teaching technical translation with ESP reading skills as a backbone

With the rapid development of globalization, professional translators are in high demand; yet the outcome of training programmes for professional translation is far from being desirable (Ho 2008). At present, few universities in the world are able to offer a technical translation programme based on the real environment of technical translation (cf. Finlay 1971: 169-174). A similar situation also happens in EST teaching. As Hutchinson and Waters point out, the trouble that most teachers have encountered is the difficulty to cope with "subject matter beyond the bounds of their previous experience. Teachers who have been trained for General English teaching or for the teaching of Literature may suddenly find themselves having to teach with texts whose content they know little or nothing about" (Hutchinson and Waters 1987: 160-161). Such a bottleneck is mainly caused by teacher's unfamiliarity with "specialist knowledge and language" (ibid). There are several reasons behind this: 1.) English teachers "often receive little or no education in the Sciences" (ibid: 162); 2.) they are reluctant to be involved in teaching English language used in the highly technical or professional fields; and 3.) it is unreasonable to expect ESP teachers to know as much as possible in a wide range of subject domains, which are well beyond their knowledge realm (Kennedy and Bolitho 1984: 6, 51, 121; Hutchinson and Waters 1987: 162-163; cf. also Niedzielski and Chernovaty 1993: 125; Alexander and Jetton 2000: 293; but see Finlay 1971: 29, 37).

It is therefore urgent and compulsory to find some solutions to solve the bottleneck problem of demand and supply in the job market for competent language experts specialized in technical communication across language barriers. In other words, the old paradigm for English Language Teaching (ELT) must be shifted to a new one that promotes researches and develops new programmes to accommodate the new environment changes in the global age (cf. Hutchinson and Waters 1987). But how?

Of course it is impossible for ELT teachers or general translation teachers to cross the boundary between the Humanities and the Sciences overnight. However, improvements can be achieved if language and translation teachers are willing to be adapted to the changing environment. The initial step is the change of attitudes (Hutchinson and Waters 1987: 163). This means teachers may try to be friendly with knowledge related to business, law, medicine, science and technology. They may also start reading certain popular science magazines rather than picking up books only related to romantic stories, poetry, arts and so on. In this way their knowledge domains can be expanded and their interests increased. Based on the new development in the background knowledge, they can be more confident when teaching ESP courses or technical translation texts.

As Hutchinson and Waters suggest "ESP must be seen as an *approach* not as a *product*" and "it is an approach to language learning, which is based on learner need" (1987: 19, italics in original; see also ibid: 2, 16). This means the design and application of a proper ESP programme should be learner-centred rather than contents-focused. The same applies to professional translator training programmes, in which the students play the key role in the classroom while teachers only provide advice to help them exert their own initiatives to solve the problems related to the technical texts (cf. Kiraly 1995, 2003; Johnson 2003).

Another problem is that the texts selected for ESP learning are often limited to those found in popular science books or introductory textbooks. More often than not, the reading materials are out-of-dated and contain merely general contents. Even these simplified and adapted texts may have challenged ESP students, as well as ESP teachers a great deal (cf. Hutchinson and Waters 1987: 160-162). In technical translation classes, such a challenge can become more severe, because the texts used in technical translation teaching and learning must be similar to those that technical translators may encounter in the real world of the profession and industry of translation. Those adapted and simplified from popular science books and introductory textbooks in EST simply do no good to trainee translators, because they will not facilitate their problem solving and decision-making skills and strategies (cf. Robinson 1991: 20, 56; cf. also Kennedy and Bolitho 1984: 48). In a learner-centred translator training environment, all that counts is how to help translation students to accumulate the procedural knowledge under the supervision of the teacher and experts from the translation industry (cf. Kiraly 1995, 2003; Johnson 2003; Alexander and Jetton 2000: 295; Kennedy and Bolitho 1984: 51). The same is also true for EST teaching and learning.

6. Conclusion

Translation, by nature, is a process of conveying a message written by a source language writer to its target languages reader(s). Its ultimate goal is to facilitate the communication task between the sender and the receiver of the message cross-linguistically and cross-culturally in various subject domains. Thus, the process of translation goes well beyond text transfer and cultural adaptation (cf. also Byrne 2006: 19). It should be extended to include a process of knowledge transfer in various subject domains. Accordingly, the goal of translation services is to establish a communicative channel between the sender and the receiver of the message who need translators' help to communicate with each other effectively.

When the subject matter in the message to be translated or interpreted concerns professional knowledge, such as business, technology, science, medicine, law, etc., which is exclusive to a small number of professionals, a good understanding of technical jargon, abbreviations and

acronyms, as well as of the basic theory and principles of the profession or discipline concerned, is a prerequisite for any successful professional translation or interpreting services, as well as for those dealing with foreign language communications. In other words, the translator or interpreter's knowledge of the specialized topic in a certain profession or discipline decides the success or failure of the communication between the message sender and receiver across language and cultural barriers. For this reason, translation studies must take into serious consideration the study of the impact of specialized knowledge in professional domains on the quality of translation, particularly on that of professional translation. So should ESP research and teaching.

7. References

Adams, Valerie (1973). *An introduction to modern English word-formation*. London and New York: Longman.

Alexander, Patricia A., & Jetton, Tamara L. (2000). Learning from text: A multidimensional and developmental perspective. In Michael L. Kamil, Peter B. Mosenthal, P. David Pearson & Rebecca Barr (eds.), *Handbook of reading research*, Volume III. N.J.: Lawrence Erlbaum Associates, Inc., 285-310.

Byrne, Jody (2006). *Technical translation: usability strategies for translating technical documentation*. Dordrecht: Springer.

Daneman, Meredyth (1996). Individual differences in reading skills. In Rebecca Barr, Michael L. Kamil, Peter B. Mosenthal & P. David Pearson (eds.) *Handbook of reading research*, Volume II. N.J.: Lawrence Erlbaum Associates, Inc., 512-538.

Danks, Joseph H., & Griffin, Jennifer (1997). Reading and translation: A psycholinguistic perspective. In Joseph Danks *et al* (eds.), *Cognitive processes in translation and interpreting.* Thousand Oaks, Calif.: Sage Publications, pp. 161-175.

Finlay, Ian F. (1971). *Translating*. London: The English University Press Limited.

Fischbach, Henry (1993). Translation, the great pollinator of science: A brief flashback on medical translation. In Sue Ellen Wright & Leland D. Wright, Jr. (eds.), *Scientific and Technical Translation*. American Translators Association scholarly monograph series, VI. Amsterdam and Philadelphia: John Benjamins, 89-100.

Goldman, Susan R., & Rakestraw, Jr., John A. (2000). Structural aspects of constructing meaning from text. In Michael L. Kamil, Peter B. Mosenthal, P. David Pearson & Rebecca Barr (eds.), *Handbook of reading research*, Volume III. N.J.: Lawrence Erlbaum Associates, Inc., 311-335.

Gommlich, Klaus (1993). Text typology and translation-oriented text analysis. In Sue Ellen Wright & Leland D. Wright, Jr. (eds.), *Scientific and Technical Translation*. American Translators Association scholarly monograph series, VI. Amsterdam and Philadelphia: John Benjamins, 176-184.

Hann, Michael (1992). *The key to technical translation*, Volume 1: Concept Specification. Amsterdam and Philadelphia: John Benjamins.

Hegarty, Mary, Carpenter, Patricia A., & Just, Marcel Adam (1996). Diagrams in the comprehension of scientific texts. In Rebecca Barr, Michael L. Kamil, Peter B. Mosenthal & P. David Pearson (eds.) *Handbook of reading research*, Volume II. N.J.: Lawrence Erlbaum Associates, Inc., pp. 641-668.

Ho, George (2008). *Globalization and translation: towards a paradigm shift in translation studies*. Saarbruecken, Germany: VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG.

Hutchinson, Tom, & Waters, Alan (1987). *English for specific purposes: a learning-centred approach*. Cambridge, UK: Cambridge University Press.

Johnson, Julie E. (2003). Learning through portfolios in the translation classroom. In Brian James Baer & Geoffrey S. Koby (eds.), *Beyond the ivory tower: Rethinking translation pedagogy*. American Translators Association scholarly monograph series, XII. Amsterdam and Philadelphia: John Benjamins, 97-116.

Kennedy, Chris, & Bolitho, Rod (1984). *English for specific purposes*. London and Basingstoke: Macmillan.

Kiraly, Donald C. (1995). *Pathways to translation: pedagogy and process*. Kent, Ohio and London: Kent State University Press.

Kiraly, Donald C. (2003). From instruction to collaborative construction: A passing fad or the promise of a paradigm shift in translator education? In Brian James Baer & Geoffrey S. Koby (eds.), *Beyond the ivory tower: Rethinking translation pedagogy*. American Translators Association scholarly monograph series, XII. Amsterdam and Philadelphia: John Benjamins, 3-27.

Nida, Eugene (1964). *Toward a science of translating: with special reference to principles and procedures involved*

in Bible translation. Leiden: E. J. Brill.

Nida, Eugene, & Taber, Charles R. (1982). *The theory and practice of translation*. Leiden: E. J. Brill.

Niedzielski, Henry, & Leonid Chernovaty (1993). Linguistic and technical preparation in the training of technical translators and interpreters. In Sue Ellen Wright & Leland D. Wright, Jr. (eds.), *Scientific and Technical Translation*. American Translators Association scholarly monograph series, VI. Amsterdam and Philadelphia: John Benjamins, 123-149.

Park, William M. (1993). Translating for the small world. In Sue Ellen Wright & Leland D. Wright, Jr. (eds.), *Scientific and Technical Translation*. American Translators Association scholarly monograph series, VI. Amsterdam and Philadelphia: John Benjamins, 101-107.

Risku, Hanna, Dickinson, Angela & Pircher, Richard (2010). Knowledge in translation studies and translation practice: Intellectual capital in modern society. In Daniel Gile, Gyde Hansen & Nike K. Pokorn (eds.), *Why translation studies matters*. Amsterdam and Philadelphia: John Benjamins, 83-94.

Robinson, Pauline C. (1991). *ESP today: a practitioner's guide*. New York and London: Prentice Hall.

Sadoski, Mark, & Paivio, Allan (1994). A dual coding view of imagery and verbal processes in reading comprehension. In Robert B. Ruddell, Martha Rapp Ruddell & Harry Singer (eds.), *Theoretical models and processes of reading*, (8th ed.). Newark, De: International Reading Association, 582-601.

Shi, Qun (1995). *A new English-Chinese abbreviations dictionary*. Beijing: Shangwu Yinshuguan.

Shreve, Gregory M. (1993). 'The standard generalized markup language (SGML) and heuristic textual resources in translation-oriented databases. In Sue Ellen Wright & Leland D. Wright, Jr. (eds.), *Scientific and Technical Translation*. American Translators Association scholarly monograph series, VI. Amsterdam and Philadelphia: John Benjamins, 185-205.

Spiro, Rand J., & Myers, Ann (2002). Individual differences and underlying cognitive process in reading. In Rebecca Barr, Michael L. Kamil & Peter B. Mosenthal (eds.), *Handbook of reading research*, (2nd ed.). N.J.: Lawrence Erlbaum Associates, Inc., 471-501.

Teague, Ben (1993). "Retooling" as an adaptive skill for translators. In Sue Ellen Wright & Leland D. Wright, Jr. (eds.), *Scientific and Technical Translation*. American Translators Association scholarly monograph series, VI. Amsterdam and Philadelphia: John Benjamins, 161-172.

Wilss, Wolfram (1996). *Knowledge and skills in translator behavior*. Amsterdam and Philadelphia: John Benjamins.