

# Teaching Machine Translation to Trainee Translators: a Survey of Their Knowledge and Opinions

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## Abstract

This paper reports upon a survey carried out among thirty-eight trainee translators who took courses on machine translation. The survey was conducted asking the sample of students to fill out a questionnaire both at the beginning and at the end of the MT course. The questions aimed at assessing the degree of knowledge about MT of the respondents and the opinions and impressions that they accordingly had on it.

The results of the questionnaire were elaborated so as to investigate the relationship between the increase in the knowledge about MT after the conclusion of the course, and the corresponding change in the students' attitude towards the discipline, which became much less biased and in general fairly positive, thanks to a very successful and rewarding learning process. The paper suggests that the more the trainee translators became familiar with MT, realising its reasonable potential and current limitations, the less afraid they were of it.

These findings encourage the increasing integration and introduction of technology into translation curricula, since the impact of computer technology on language translation directly affects professional human translators. As a result, exposing trainee translators to machine translation seems to raise the profile of their training.

**Keywords:** Teaching, Machine Translation, Trainee Translators, Survey, Technology

## Background and Synopsis

Technology has been playing an increasingly important role within language translation over the past five decades or so, and at present its impact is undisputedly extensive and has reached an unprecedented climax that deserves careful consideration as a crucial factor which affects human translators in the first place.

Regrettably, the translation profession in general, and particularly so in some countries like Italy where the following survey was conducted, does not seem to be taking this situation adequately into account, so as to lag behind the ever-accelerating pace of technological development in the present-day multilingual information society. The reasons for this might partly lie in a long-standing dismissive attitude towards the intervention of technology in the translation process; since its nascent years the ideal of fully automatic machine translation was regarded with healthy scepticism by many, whilst some radical translators and theorists even rejected it out of hand, branding it as unacceptable.

Pursuing the goal of fully automatic machine translation (MT) is of course bound to clash against resistance and opposition on the part of translators in general due to different reasons, ranging from psychological rejection to actual fear of losing job opportunities, if translators tend to think that MT systems can replace human beings. On top of that, the prospect of post-editing raw MT output for a living is a nightmare to most professional human translators.

At present a similar biased and sceptical stance dies hard even as far as computerised translation aids are concerned, although in the 1990s the so-called computer-

assisted translation (CAT) tools, commonly referred to as the translator's workstation environment, appeared on the market as valuable means to enhance and increase the productivity of human translators, by supporting their work.

In general terms, there has always been some tension or even friction between the traditional approach of translators to their own job on the one hand, and the possible alternatives brought about by varying degrees of technological intervention on the other. In the 1950s and early 1960s the announced breakthrough of fully automatic high-quality machine translation caused an upsurge of theoretical interest in this field, and this troublesome and delicate human-machine relationship in the translation activity has been depicted several times from different perspectives up to the present: see the works cited in the references section below marked with (\*).

In the face of this situation, today increasing importance is addressed to the introduction or integration of translation technology into the education and training of prospective professional translators, especially those who take courses and programmes in Universities and academic institutions. Alongside receiving a theoretical background in applied and computational linguistics, an introduction to language engineering, natural language processing and terminology basics and some computing skills, trainee translators are frequently taught to familiarise with state-of-the-art specific technology, software, working methodologies and techniques that directly affect the profession.

The ongoing need and the corresponding effort to constantly keep translation curricula up-to-date according to the demands of the professional market and the

business world as far as technological expertise is concerned are mirrored by the activities of some specialised forums. Several papers discuss the issue of integrating technology into translation curricula: the reader is referred to those marked with (°) in the references below.

An interesting experience was that of an on-line symposium significantly called “Innovation in Translator and Interpreter Training”, held in January 2000 and organised by the Intercultural Studies Group at the Universitat Rovira i Virgili in Terragona (Spain), aiming at achieving new standards in translation training programmes world-wide. A part of the discussions of this symposium specifically revolved around the role and importance of technology in translation curricula<sup>1</sup>.

A recent project was LETRAC<sup>2</sup> (Language Engineering for Translators Curricula) funded by the European Commission, DG XIII, whose consortium also included CIUTI (the International Permanent Conference of University Institutes of Translators and Interpreters). Another major initiative launched in this field with a specific focus on localisation was LEIT<sup>3</sup> (LISA Education Initiative Taskforce), set up under the aegis of the Localisation Industry and Standards Association and chaired by Prof. Alan K. Melby of Brigham Young University (USA).

The impact of technology on translation is also one of the hot topics of meetings and courses organised by (national or regional) professional associations of translators for their members or professionals in general (e.g. the author is familiar with those devoted to CAT tools, terminology and localisation sponsored and promoted on a fairly regular basis in Italy by AITT<sup>4</sup>, the Italian Association of Translators and Interpreters).

## The Survey

### Introduction and Aims

Against this exciting background, this paper presents a survey which might contribute to shed some light on the relationship between trainee translators and fully automatic machine translation. This report describes the main stages and the development of the survey, which was carried out as part of three MT courses, devoting particular attention to the format of the questionnaire that provided the information for the experiment and the rationale behind it. At the end of the paper some very general conclusions and indications are drawn from the findings of the investigation.

The main aim of the survey was to investigate (and to the extent that this was possible also to measure and assess) the interdependence of knowledge and opinions about MT among the sample of students. In other words,

the primary intention of the present research was to ascertain if the general idea of the interviewed trainee translators about MT might be affected by their actual cognition and culture on the subject, after taking a course on MT. Since the data that was collected suggested that a shift or change in the respondents’ perception of MT did take place due to what they had learnt during the course, the secondary purpose of this research was to observe its orientation and degree of intensity.

The survey was structured since the very beginning as an empirical study, providing quantitative information on different aspects and factors that make up the learning process that trainee translators are exposed to when they are taught about machine translation. Based on this objective starting point, the work reported here tries to investigate the link between the factual knowledge that the students possessed on MT and their corresponding impressions and opinions on fully automatic machine translation.

### Selected Sample and Environment of the Survey

The survey was carried out among thirty-eight students who took three different courses on MT taught by the same instructor (i.e. the author of this report) through a questionnaire. These three courses were held with a similar structure and covering approximately the same contents between October 2000 and March 2001 in three Italian institutions, namely the four-year Degree Course in Translation Studies at the Advanced School of Modern Languages for Interpreters and Translators in Forlì (University of Bologna)<sup>5</sup>, the three-year Diploma Course for Translators and Interpreters in Acqui Terme (Faculty of Modern Languages and Literatures, University of Genova)<sup>6</sup> and the Entrepreneurship Training Course held in Faenza and organised by the Consorzio Provinciale per la Formazione Professionale<sup>7</sup>.

The thirty-eight students who were included in the sample were a sub-set of the total number of students in these three courses (there were seventy of them altogether). However, due to the structure and methodology of the survey, which will be clarified below, only the students who attended at least 50% of the lessons of each course could be included, and among these only those who had attended both the very first meeting and the last lesson at the end of the course were selected. As a result, just approximately half of the whole group in the three classes could eventually be included in this research project.

From a practical point of view, limiting the number of respondents proved useful and desirable, since all the data was collected, registered and processed by the instructor with little external professional help to elaborate the statistics: these operations turned out to be a very demanding and time-consuming task for one person even with a limited sample of thirty-eight respondents.

<sup>1</sup> A summary of the discussion on “Translation and Technology” by Prof. Yves Gambier (Centre for translation and interpreting, Turku, Finland) is available in English at the URL: <http://www.fut.es/~apym/symp/s-technology.html>

<sup>2</sup> Home page of the project: <http://www.iai.uni-sb.de/letrac/>

<sup>3</sup> LEIT’s home page: <http://www.ttt.org/leit/leithome.html>

<sup>4</sup> Home page of AITT’s web site: <http://www.aitt.org>

<sup>5</sup> Home page of the School: <http://www.sslmit.unibo.it>

<sup>6</sup> Home page of the Diploma Course: <http://www.lingue.unige.it/dip/index.htm>

<sup>7</sup> Web site of the Consortium: <http://www.racine.ra.it/cpfp>

Courses in Forlì and Acqui Terme were official University courses for students in the last year of their academic education. The case was slightly different in Faenza, since the training course there was available to a limited number of students or graduates with the intention to create a new enterprise in the language business, and covered a combination of subjects, including marketing (how to develop and present a business plan to start up a new business), law (legal aspects of setting up a new company) and advanced translation techniques (computerised terminology, highly specialised translation, use of CAT tools, introduction to localisation, rudiments of machine translation).

Entry requirements and prerequisites to attend these courses were slightly different from one another, but all the students had very advanced knowledge of English and at least another foreign language (German, French, Spanish or Russian). Word-processing skills and experience with PC use for ordinary operations were not a must, but were strongly recommended: all trainee translators were very familiar with word-processing environment, use of e-mail, net-surfing, access to on-line resources through the Internet (e.g. on-line term-banks, search engines), etc.

At the beginning of the lessons none of the students in the three courses had already received a systematic teaching about machine translation, so it is fair to claim that they were unacquainted with the subject, and that they only had some vague and naive ideas about it. However, six people (i.e. approximately 6% of the total sample) said that they had already used at least once some sort of MT systems.

The average age of the interviewees was approximately twenty-four, and the overwhelming majority (92%) of the sample was made up of female trainee translators (i.e. thirty-five out of thirty-eight in total). In particular, the Acqui Terme students included in the survey were all female, the Forlì sub-group had one male interviewee, and the Faenza sub-sample contained two male respondents.

Out of the twenty-nine students who took the MT course at the University in Forlì and Acqui Terme, only one was already a graduate (in foreign languages and literatures), and was further specialising as an interpreter in Forlì. The presence of graduates was higher in the Entrepreneurship Training Course held in Faenza: out of the nine people who made up this sub-sample, four (corresponding to approximately 44%) already had a University degree - three of them in translation studies and one in foreign languages and literatures - and all the others were in their final year at the University.

The global sample of thirty-eight trainee translators who were considered for the present research attended a course on machine translation which they always took in combination with other series of lessons specifically devoted to terminology and computer-assisted translation (e.g. use of translation memories, terminology management software, translator's workstation suites available on the market), applied linguistics (e.g. corpus and computational linguistics) and also a basic introduction to localisation.

This survey, however, only takes into account and is focused on the machine translation course, and does not consider the other components that went with it in any way. The MT course (whose lessons had a total duration ranging from twenty to thirty hours and were taught over four to eight weeks, depending on the cases) gave to the trainee translators a general overview of the discipline and a wide introduction to it, by covering its historical development, theoretical background (methods and basic design information), linguistic and computational issues in MT systems, practical use of MT, a case study on the Canadian Météo system and the sublanguage approach, etc.

For each lesson, according to the topic of the day, the students were given a handout with suggested readings which were not compulsory but strongly recommended, being in some cases the basis for the interview with the instructor in the final oral exam. Some of them are included in the works cited in the references section below marked with (\*) and (°), but also chapters and sections from manuals and textbooks were used, which are also mentioned in the bibliography of this paper and marked with (TB).

The course always included a practical hands-on lab session of use of MT systems, which lasted two to four hours (in the latter case it was split into two slots). Due to financial reasons in no case was it possible to purchase and install on the lab's PCs commercial systems, and research systems did not appear suitable for a convincing demonstration. As a result, the instructor decided to use on-line free MT systems to conduct the hands-on session, getting the students to machine-translate sample texts or URLs, if this feature was available.

The lab session was guided and supervised by the instructor, and all the interviewed students attended. Using free on-line MT systems through the Internet during the classes turned out to be a very successful choice. Students in fact realised how easily available these systems are to the general public of net-surfers, and showed interest in discovering that some MT engines are accessible through popular portals and search engines (which the vast majority of them ignored before). Experiencing the wide and massive presence of MT systems on the world wide web boosted the students' curiosity and willingness to put them to the test, so as to check the raw translations.

During the hands-on session in the lab the students were given a list of useful URLs with recommended MT systems, or indexes of MT resources<sup>8</sup>, and they were basically free to experiment the systems as they preferred. However, they were encouraged by the instructor to translate automatically from their strongest foreign language (English most of the times) into Italian (their mother-tongue or first language), and to test samples taken from a variety of real texts found on the Internet.

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<sup>8</sup> A comprehensive list of links is maintained by Federico Zanettin on the web site of the Advanced School of Modern Languages for Interpreters and Translators in Forlì (University of Bologna) at the URL:

<http://www.sslmit.unibo.it/zanettin/cattools.htm>

The evaluation and comparison of the on-line MT systems that they tested could follow two major paths. The instructor expected the students to conduct the experimental session according to one of these two options:

a) choosing three textual samples in English of homogeneous length belonging to very different text types or genres (e.g. a few questions from an IQ test, an excerpt from a call for tenders and a passage or paragraph from a novel). The students were then asked to feed them into the on-line MT system (e.g. BabelFish), and compare the output for each text (by examining the printout of the target texts). Which one was the best? What were the main differences between the machine-translated texts? Could they observe and confirm that one of the three text types (testing other similar samples, if necessary) was more suitable for MT than the others? What were the lexical completeness and terminological accuracy shown by the samples?

b) choosing one textual sample from the web and two on-line MT systems to translate between the same language pair and in the same direction (e.g. BabelFish and FreeTranslation from English into Italian). In this case, the task consisted in feeding the same sample to both systems and assess their performance by comparing the quality of the output. Which target text seemed to be more correct, or more easily readable? Which one provided the most useful basis for rapid post-editing purposes? Which system seemed to have the best grammar and syntax generation rules? What problems or mistakes could be spotted in the output (lexical ambiguities, anaphora resolution, homographs, ambiguous sentence structure, unrecognised idioms, untranslated terms, etc.)?

This hands-on lab session proved very popular and successful with all the trainee translators in the classes, not only those who were considered to carry out this survey. The procedures to be followed to test the systems were not difficult or boring (all the students were very familiar with web-based on-line interaction through the computer in all sorts of operations), and the course participants were eager to see how MT really worked after taking the lessons and learning the theory behind it. The lab session was in fact always scheduled at the end of the course, so as to provide the conclusion of the learning activities.

The students particularly enjoyed being able to use their bilingual competence and their expertise in translation to spot the mistakes and find the difficult stumbling blocks for the systems. They were invited to share with the rest of the class and the instructor interesting points or observations about the use and performance of the MT systems that they came across (they were especially welcome to tell the others when they discovered MT howlers, which they were very impatient to do). Being free to express their findings and impressions, some of the students came up with very insightful and revealing remarks.

On the whole, all of them were amazed by how quickly the MT systems provided the output on the PC screen. Another unexpected feature that impressed them was the possibility with some on-line MT systems to translate complete URLs, rather than samples or passages

of plain text, so as to obtain a completely new version of a web page without significant alterations to layout and design in a matter of seconds.

Exams for final marking and assessment of the students in the courses took a variety of forms and were based on different assignments, since examinations could be oral, written or mixed (the choice being partly up to the students). One of the three courses, namely the one in Acqui Terme, did not request a formal standard assessment. However, these differences seem to be largely irrelevant to the results and the core of the present survey.

## Phases and Methodology of the Survey

Since the results of this work are based on the measurement of the differences in the knowledge-opinions relationship concerning MT of the trainee translators, each interviewee was asked to fill out a questionnaire containing the same questions twice, namely at the very beginning of the course on MT, i.e. immediately after the instructor had briefly presented himself to the class (phase 1), and then at the conclusion of the last lesson, i.e. the hands-on experimental lab session (phase 2). Questions that were logically irrelevant were obviously omitted from the questionnaire, e.g. "Have you ever heard of MT?" simply did not make sense at the end of the course, and was changed into the question which is explained in the following paragraph.

Students were not forewarned or told in any way that they would answer the queries again at the end of the course, so that their response in phase 2 might be as spontaneous and objective as possible. The final questionnaire included an ad hoc question about whether they had expected to be asked to fill out the questionnaire again, and only seven people (approximately 18%) answered positively out of the thirty-eight students who were included in the research sample.

The observations that derive from this survey are based on the realistic assumption that the students gave a reliable and objective picture of their knowledge and an objective self-evaluation of their own opinions, by responding spontaneously and sincerely to the questions. However, not all the queries of the questionnaire filled out by the students were considered and included in the following description of the results.

The limited length and general approach of the present report do not allow the in-depth discussion of all the results, but this paper deliberately adopts a partial approach focusing on a limited set of significant answers, and is also centred on the description of the rationale behind this experimental research.

## Design and Contents of the Questionnaire

Students of the three courses were given exactly the same questionnaire to fill out. When answering the questions, the respondents were also asked to provide some basic personal information (such as name, age, sex, foreign languages studied at the University), which might help to describe their personal profiles as individuals and as a whole group, as briefly summarised above.

The fifty questions in the questionnaire were written in Italian, i.e. the mother-tongue or first language of all the students, and belonged to two different categories: one set of queries (which made up section A of the questionnaire) aimed at evaluating the knowledge of the students concerning MT as a subject, referring to the theory and topics covered during the lessons of the course. The other questions in the list (section B) were included to measure and represent the opinions of the students about MT (its role, potential for future development, how interesting they found it, whether they were afraid of it, etc.).

From the point of view of the instructor, the final questionnaire (phase 2) revealed whether the teaching had actually been effective in conveying to the students some information on the topics covered during the course. This feedback to the instructor is an indirect benefit of the survey that does not have immediate relevance to the present research, but can be mentioned as an interesting and useful by-product: taken in isolation from the rest, the answers of section A of the phase 2 of the questionnaire (i.e. concerning the contents of the lessons) can be evaluated as a test to assess the progress made by every student in terms of individual learning, and can provide a basis (maybe along with an oral interview and the evaluation of another assignment such as a project or paper at the end of the course) to give a mark.

All the questions in the questionnaire were matched with a range of possible answers, with the well-known multiple-choice format (except those referring to personal data and information, of course). Students were simply asked to tick the response of their choice, which they found to be most suitable in each case. A “don’t know” option was always available, since in the context of this survey it was a meaningful variable: for the purpose of this research it was significant to consider that a student had some opinions as a consequence of ignorance or unawareness of the subject, or did not feel to have a clear idea on some points concerning MT.

The “don’t know” option was actually very often chosen by the students during phase 1 (i.e. filling out the questionnaire at the beginning of the course), both in section A (knowledge about the subject) and section B (opinions and impressions about MT). One clear difference with the answers given by the interviewees during phase 2 (i.e. at the end of the lessons of the course on MT) was that the number of times in which the “don’t know” response was ticked was substantially reduced in both section A and section B.

This was expected since the beginning of the experiment, and seems to account for the reliability of the procedure adopted to carry out the questionnaire and the survey: after the course the students (at least those who attended the lessons on a fairly regular basis, who made up the statistical sample) were bound to have a higher degree of confidence with the subject. This of course allowed them to know (most of) the correct answers for section A, and they could accordingly have some clearer ideas and opinions to express in section B.

The twofold and different nature of the questions (referring to knowledge in section A vs. those about the students’ opinions in section B) was carefully taken into

account in the design of the questionnaire, and did not hinder the processing of the data. As a matter of fact, however, unlike knowledge about a subject, opinions are very difficult to assess and measure impartially, being a matter of personal interpretation very much entangled in feelings and individual attitude. In spite of that, every effort was made to consider them as objectively as possible.

All the thirty questions of section A gave the respondents the possibility to choose among three possible alternatives (Yes/No/Don’t know). This made it fairly easy for the instructor to check the correctness of each answer, and see whether the knowledge of the students had improved and increased between phase 1 and phase 2 of the questionnaire (and how much, considering the variation in the correct/wrong answers ratio).

Questions in section A were of varying difficulty and complexity. Five randomly chosen questions from section A with the corresponding multiple-choice answers (in italics) were the following (the original version of the questionnaire was in Italian - the questions and multiple-choice answers are translated into English here for the benefit of the reader of the present report):

18. Machine translation is a synonym for computer-assisted translation: *O true O false O don’t know*

20. On the Internet there are on-line MT systems available for free to translate samples of texts or web pages among various language pairs (including Italian both as source and target language): *O true O false O don’t know*

22. Machine-translated texts can be unnatural from the point of view of register and style, but they are always correct as far as grammar and syntax are concerned:

*O true O false O don’t know*

26. An MT system that translates from language X into language Y can always translate the other way around, from Y into X: *O true O false O don’t know*

29. The European Commission uses an MT system to translate part of its own internal documentation among the working languages of its officials, and has set up a rapid post-editing service to guarantee the readability of MT output: *O true O false O don’t know*

In section B (which contained twenty questions) the students were asked to select one answer with the same format used in section A when their opinions could be logically expressed in terms of Yes/No/Don’t know, to show whether they agreed or not with the judgement or statement expressed in the question. In other cases they were asked to use multiple-choice rating scales between two opposite values or poles of meaning, (e.g. negative - positive; useless - important).

This gave the instructor the possibility to measure and describe with a certain degree of accuracy and objectivity the real opinions of each respondent, since there were eleven empty boxes to tick between the two opposite poles, which allowed to find immediately the corresponding value expressed in percentage: for instance, in the case of the useless/important dichotomy, the answers could range from 0% important to 100% important, with nine discrete intermediate intervals of

10% in between (as shown in questions 44, 47 and 48 in the examples below).

As a result, the difference between the opinions expressed for the same question by the students between phase 1 and phase 2 could be exactly weighed in case of minor or major changes in the same way. The following sample shows five questions (and the corresponding multiple-choice responses in italics) referring to the students' opinions about MT, and extracted at random from section B. They were translated into English from the original Italian version of the questionnaire:

34. Machine translation is a threat to human translators:

*O true O false O don't know*

36. Machine-translated texts can be of some help in the work of people who do not know foreign languages:

*O true O false O don't know*

44. My idea of machine translation is:

*negative O O O O O O O O O O positive O don't know*

47. Having an idea of the impact of MT systems on translation and of their actual possibilities and potential is a component of the professional background of present-day professional translators that I rate as:

*useless O O O O O O O O O O important O don't know*

48. Considering my global training as a translator, I rate what I've learnt in this course devoted to MT as:

*useless O O O O O O O O O O important O don't know*

Notice that this was question 48 at the end of the course, i.e. in phase 2. The same question in phase 1 was of course slightly different, and in fact was asked in the following terms:

48. Considering my global training as a translator, I expect that this course devoted to MT is going to be:

*useless O O O O O O O O O O important O don't know*

## Main Results and Findings of the Survey

The method employed to ask questions providing multiple-choice answers proved successful, since all respondents filled out the questionnaires without problems, and the instructor was offered a wide range of interesting data to consider and examine. The questions can be reasonably expected to mirror the real knowledge and opinions of the thirty-eight trainee translators about MT. A detailed analysis of the answers provided by the sample of students who were interviewed is beyond the scope of this paper. However, general trends and considerations that were observed from the survey can be outlined here.

First of all, the difference in the right/wrong questions ratio between phase 1 and 2 for section A of the questionnaire showed that the students at the conclusion of the course had on the whole a high degree of knowledge about MT as a subject, which was very different from the initial situation, when most students answered by choosing the "don't know" option or ticking the wrong option. This result was obviously expected and desired by the instructor, and provides indirect evidence for the fact that at the end of the course the students who were included in the research sample acquired a basic and

general understanding of the main information and points concerning MT that were presented to them.

This element was also confirmed by the self-evaluation that the students gave of their own knowledge of the subject. One question asked the respondents to assess on a rating scale ranging from "very poor" to "excellent" their own degree of knowledge about MT. Here is a translation into English of this question (and the corresponding multiple-choice answer in italics), which was asked both at the beginning and at the end of the course on MT (phase 1 and 2 of the questionnaire, respectively):

7. My knowledge about machine translation at this stage can be rated as:

*very poor O O O O O O O O O O excellent  
O don't know*

The responses to this query for phase 1 showed that the students on average assessed their own knowledge as being "very-fairly poor", or at most "intermediate" in a few cases. Answers given in phase 2 of the questionnaire after the conclusion of the course, on the other hand, prove that there was a substantial increase on average (30-40%) in the degree of knowledge about the subject. As a matter of fact, after the lessons were over the students rated their own knowledge from "advanced" to "fairly high" (and in a few cases even "almost excellent").

Interestingly, nobody ticked the "excellent" option: of course the students did not feel that they had become experts in MT after taking the introductory course; however, they were in general convinced that they had improved their knowledge. This was very valuable feedback for the instructor, since conscious substantial progress in the learning process seems to account for a good motivation factor both for the students and the teaching staff, and enables the creation of a positive environment in the class, as far as interpersonal relationships are concerned.

Other results were emphasised by this survey, and they are also reported upon here: the objective increase in knowledge about MT on the part of the students was accompanied by a significant change in the opinions held on the subject by the respondents. In general the answers given in phase 1 showed a negative attitude towards MT, which seemed to be largely based on lack of knowledge or misinformation. This situation of unfamiliarity with the subject was certainly a cause of misconception and prejudice among trainee translators, and the ultimate aim of this survey is to provide some elucidation on this point.

In this respect it might be interesting to examine in somewhat closer detail the answers given by the thirty-eight trainee translators to a couple of questions contained in section B of the questionnaire, since they were explicit and self-explanatory enough to be included in this general discussion. One question read as follows:

34. Machine translation is a threat to human translators:

*O true O false O don't know*

In phase 1 these were the numbers of respondents who chose each of the available alternative answer: *true*



students in phase 2 proved more balanced and much less biased or apprehensive than those of phase 1.

At the end of the course another interesting piece of information was collected through phase 2 of the questionnaire, which is worth mentioning while discussing the results of the survey. The students were asked if they had autonomously used MT systems of whatever type since the beginning of the MT lessons, without taking into account the hands-on lab session supervised by the instructor, which was part of the official course. Fifteen people of the sample (approximately 40%) answered that they had in fact got hold of working (commercial, experimental or on-line) MT systems, and had used them for experimentation purposes on a voluntary basis for personal interest.

The course they took raised their curiosity about this new subject to such an extent that some of them wanted to see how the systems really worked, and during the period of the lessons some 40% of the interviewees did some personal experiment on their own initiative, which was not prompted or requested by the instructor within the course. This seems to clearly account for the interest of the interviewed trainee translators in the reality of MT, presumably as a consequence of the course that they were taking.

## Conclusion

This survey can give several indications to those who are interested in (teaching) machine translation. Here particular emphasis will be laid on the fact that learners and respondents of the questionnaire were a sample of trainee translators. The answers given by the interviewees show that at the beginning of the course they had a very poor and confused knowledge about MT, and their opinions on the subject were accordingly biased and negative on the whole.

At the end of the course, on the other hand, having received at least an introduction to the most important points of the subject, the students in general showed a more balanced attitude and a shift towards a more positive perception of MT. A decisive role in this respect seemed to be played by the hands-on practical lab session of on-line MT systems, since students could directly appreciate their limitations, while experimenting in practice what they had learnt with a theoretical approach.

One interesting factor to be considered is the extent to which the initial preconceptions hindered or impeded the learning process on the part of trainee translators. In spite of their biased stance towards the discipline, the students on the whole learned new contents and became on the whole familiar with MT, as section 1 of the questionnaire proved. The results given by the considered sample seem to suggest that the trainee translators could eventually complete a successful learning process, even though at the beginning they had taken the course being clearly subject to some prejudice and misconception about the subject.

This survey focused on machine translation shows that introducing and integrating technology into

translation curricula is highly desirable, and proves successful in terms of the intellectual progress of the students. Trainee translators showed that they could in fact positively absorb the exposition to a new subject such as MT, which in the first instance was not likely at all to attract their interest or receive attention on their part.

Present-day global translation business is exposed to highly demanding challenges. As a consequence, the international market is spontaneously and quickly integrating as much as possible machine translation software into the overall multilingual documentation management and workflow (as is today the case in well-known large companies, high-profile supranational institutions, popular web-sites, etc.): human translators of the (near) future can no longer ignore this situation, since whether they like it or not basic awareness and knowledge about MT are becoming significant components of their cultural and professional background. The experience reported upon here seems to indicate that University education and training (both at undergraduate and postgraduate level) can successfully bridge the gap between trainee translators' natural scepticism towards MT and the impending need to equip tomorrow's professionals with necessary knowledge and skills.

The general conclusion that can be derived from this empirical investigation is that Universities and academic institutions offering translation programmes at both undergraduate and postgraduate level would raise the profile of their training by running and introducing into their syllabuses courses with a significant technological component, e.g. devoted to fully automatic machine translation. Information society and MT are in fact here to stay, and they are bound to have an impact on human translators in the first place. It is in the interest of future professionals to be familiar with such computer developments as fully automatic machine translation.

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