РОЛЬ ЭЛЕКТРОННЫХ ОБРАЗОВАТЕЛЬНЫХ РЕСУРСОВ В ФОРМИРОВАНИИ ПРОФЕССИОНАЛЬНОЙ ИНОЯЗЫЧНОЙ КОМПЕТЕНТНОСТИ БУДУЩИХ ИНЖЕНЕРОВ

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SOFTWARE TOOLS FOR CREATING CLASSROOM MATERIAL TO TEACH TECHNICAL ENGLISH

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This article is focused on practical aspects of using natural language processing software in routine teaching practice.

Key words: education in foreign language, language processing software.

Introduction

Professional English language plays a crucial role in the international academic and engineering society as a communication tool. The high proficiency in English is an ultimate requirement to postgraduate students in almost all professional areas. It has been pointed out that «integrating English into engineering, science and mathematics courses is an effective way to improve the performance of engineering students in oral and written communication» [1]. This quotation is perfectly fitted to the object of the development programme of Tomsk Polytechnic University (TPU). The actual situation in TPU is that the professional English courses have been moved from the linguistics to the degree-granting or general-courses departments. The inevitable result of this decision is a rising demand for teachers which are highly qualified both in their academic concentration and languages. In

principle, teaching professional subjects in English might improve students' professional skills and language as well, but some issues must be solved in order to provide an appropriate level of education.

The main question is how to find the balance between linguistics and professional parts of the whole course. It has been suggested that 50/50 ratio is preferable to teach engineering and science subjects, but the obvious side effect of that is the time-shortened courses de facto, meaning either the professional or linguistics components, or both. Another issue is far more demanding requirements to the educator's level of language and their ability to teach professional English. The substantial part of engineers and scientists can explain their professional topics to students perfectly, but suffer a lack of understanding how to teach English.

One of the possible solutions to these issues has been adopted by TPU in form of training language courses for staff and postgraduate students. In order to keep up with actual international requirements to the basic teaching skills, a five-stage modular programme was developed and introduced several years ago. The programme seems to be quite successful and can be considered as the simplest way for personnel of TPU to improve our professional English and the teaching skill as well. Although the programme is undoubtedly efficient, there are some practical aspects of teaching in English which remain out of scope.

First of all, a vast majority of engineers and scientists are not completely aware of the specific methods to teach foreign languages because these methods are far beyond their major subject [2]. Secondly, classroom materials should fulfill at least two important conditions:

1) They should contain the substantial information concerning the main subject;

2) They should cover some aspects of English (for example, grammar and vocabulary which are specific for the professional area).

Not only does it almost double the time needed to prepare lectures and lessons, but also poses a challenge where to find good native English texts corresponding to the main topic. Taken into account these obvious obstacles, it becomes clear that the best way for scientists to guarantee a high standard of education in English is to collaborate with professional linguists. In practice, quite a few routine tasks, such as collecting information, rough text analysis, sorting and ordering, can be easily undertaken using text engineering software, for example GATE (General Architecture for Text Engineering) [3] and SPOS (Stanford Parts of Speech tagger) [4].

This article describes how these software packages can be used in routine practice to create classroom materials for teaching professional English.

Material and methods

In general, a quiz creating procedure might be presented as a processing pipeline comprised of four stages:

1) Gathering relevant information and converting it into a structured text;

2) Ordering raw data according to the given criteria;

3) Extraction of the suitable pieces from the original texts;

4) Modifying the selected pieces and formatting them as a typical quiz questions: multiple choice, filling the gap, etc.

MONITORING: electroenceph- alography. In various painful conditions such as labor, dental <u>procedures</u> , myocardial ischemia, and acute trauma metimes the patient seems to approach light levels of anesthesia (1, 3, 4). . it is likely that EEG activity of patients is changed from the awake pattern during nitrous oxide analg in the absence of other drugs or anesthetics. Studies that have been reported (6-10) failed to demo							
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·2, Sapporo,	C	category 👻	NNS	•	X		
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a)							

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<sentence id="10">
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<word wid="25" pos="JJ">dental</word>
<word wid="26" pos="NNS">procedures</word>
<word wid="27" pos=",">,</word>
<word wid="28" pos="JJ">myocardial</word>
<word wid="29" pos="NN">ischemia</word>
<word wid="30" pos=",">,</word>
<word wid="30" pos=",">,</word>
<word wid="31" pos="CC">and</word>
<word wid="32" pos="JJ">acute</word>
<word wid="33" pos="NN">trauma</word>
...
...
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b)

Fig. 1. Parts-of-the-speech tags in the processed text, interactive editor (a) and corresponding XML file (b)

The first stage is the most difficult and time consuming part of the entire pipeline because of an enormous number of scientific and engineering English texts available on a daily basis. Fortunately, GATE software may help to decrease the complexity of the retrieval process significantly by means of «information extraction/semantic annotation» modules. Using GATE as a pre-filter reduces the total amount of information to be analysed by factor of two up to four depending of the applied filtering rules. Roughly, it prevents from wasting one working hour a day without degrading the quality of the routine analyses. Another text processing task, which GATE is the most suitable for, is an automated step of tokenising and structuring. An example of the processed document is given in fig. 1. The SPOS package is slightly preferable to process large and very large text documents. The structured texts are stored in the indexed datastore and categorized according to the cross-reference indexes with tags such as «Title», «Person», «Date», «Keywords», «Tokens», etc.

The third stage cannot be automated, at least not at the present time, and should be accomplished manually with help of high quality general text processing software. Afterwards, the selected pieces of texts along with the corresponding indexes are collected inside the GATE datastore. This datastore is a source of structured information for the last stage.

Results

Creating simple quiz in Moodle environment is straightforward, but involves a lot of routine formatting work. In order to simplify this part of making quiz a set of shell scripts and standalone software were developed. The general idea behind the quiz maker was borrowed from programming language processing software (commonly known as «compilers»). As a result, the developed tool-kit is similar to a compiler with very basic functionality, allow users to substitute one set of the tokens with another. For example, to create a quiz to master proof-reading skill the tokens «DT» (DeTerminers «a», «an», «the», «any», «other», …) can be replaced with spaces (Fill Gap question type) or list of the determiners (Multiple Choice question type). The same procedure might be applied to virtually any sets of the tokens, although reasonable limitations should be taken into account to prevent creation of weird texts [5]. An example of automatically created quiz with gaps and multiple choice answers is shown in fig. 2.

Conclusion

Natural language processing software (e.g. GATE and SPOS) can be effectively used in daily teacher's activity to gather, categorize and process scientific and engineering texts in foreign languages. These nearly new software packages may be very useful for educators with average linguistics skills in order to keep up with modern tendency in technical education at universities. The positive side effect of introducing professional language processing techniques into routine teaching practice is an expandable personal thesaurus based on high quality scientific texts in English, which can also be used in research activity.

Richard Matthew Stallman (RMS) was invited to give TEDx talk FREEDOM (digital							
age) April and took opportunity to explain fundamentals of free							
software movement to general public. In this speech, RMS specifies vissue and							
makes stake the a explains what computer is and who controls it, what							
▼ various implications of free software and of proprietary software are for you, ■ user,							
what you can do to stop being victim, what obstacles to computer-user freedom are,							
and how you can make difference.							

Fig. 2. Automatically generated quiz in Moodle environment

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