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TECHNIQUE FOR AUTONOMOUS LEARNING OF SPECIFIC TERMINOLOGY IN FOREIGN LANGUAGE BY ELECTRICAL ENGINEERING STUDENTS

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Knowledge of languages is at the heart of a successful international cooperation in electrical engineering. By encouraging students to learn other languages teachers are helping students to become more open to other cultures, able to move and work freely across borders and compete effectively in the global economy. Another important skill for the young engineers is the correct use of technical terminology in a foreign language. We developed the technique for autonomous learning of specific terminology by students on electrical engineering. This paper describes the basics of the technique and example of its introduction into electrical engineers training.

Key words: automatic electric drive, electrical engineers training, electrical engineering terminology, foreign language learning, electronic study materials.

ТЕХНОЛОГІЯ САМОСТІЙНОГО ВИВЧЕННЯ ФАХОВОЇ ТЕРМІНОЛОГІЇ ІНОЗЕМНОЮ МОВОЮ СТУДЕНТАМИ З ЕЛЕКТРОМЕХАНІКИ

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Володіння іноземними мовами є основою успішного міжнародного співробітництва в галузі електромеханіки. Заохочуючи студентів вивчати іноземні мови, викладачі допомагають студентам стати відкритішими до інших культур, здатними вільно рухатися і працювати без кордонів, ефективно конкурувати в глобальній економіці. Іншим важливим умінням для молодих інженерів є правильне використання технічної термінології іноземною мовою. Нами була розроблена методика для самостійного вивчення фахової термінології студентами з електромеханіки й електротехніки. Описано основи технології і приклади її впровадження у підготовку інженерів-електромеханіків.

Ключові слова: автоматичний електричний привід, підготовка інженерів-електромеханіків, електротехнічна термінологія, вивчення іноземної мови, електронні навчальні матеріали.

PROBLEM STATEMENT. The international cooperation in science and engineering has already become a demand of time. The decision making in solving the problems facing the world depends on professional communication of engineers from different countries. Besides, the European Research Area is composed of all research and development activities, programmes and policies in Europe which involve an international perspective. Together, they enable researchers, research institutions and businesses to increasingly circulate, compete and cooperate across borders. The aim is to give them access to Europe-wide open space for knowledge and technologies in which international affords and complementarities are fully exploited (European Commission, 4).

The European Union contributes to the development of quality education by promoting citizens' mobility, designing study exchange programmes, establishing networks, exchanging information, and through a commitment to lifelong learning. Languages are a basic building block behind these activities. The Council conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training (ET 2020) emphasizes that education and training have to play a crucial role in meeting the many socio-economic, demographic, environmental and technological challenges facing Europe and its citizens today and in the years ahead; efficient investment in human capital through education and training systems is an essential component of European and Ukrainian strategy to deliver the high levels of sustainable living, knowledge-

based growth and jobs that lie at the heart of the Lisbon strategy, at the same time as promoting personal fulfillment, social cohesion and active citizenship (EU Official Journal, 2009). The language learning objective is framed as a contribution to the aim of opening up education and training to the wider world. The EU's guiding principle is that every person should be able to speak two foreign languages in addition to their native language. Education and Training 2010 set out benchmarks for assessing the progress of Member States and also prioritizes some areas that will benefit from the exchange of experience: approaches and methods of organizing the teaching of languages; early language learning; ways of promoting the learning and practice of foreign languages. They should make mobility of scientists, professionals and students real.

Ukraine is on the way of integration into the European Community, so its education system is reconstructing according to the Bologna Declaration. The problem of foreign languages learning is very important for Ukrainian Universities to take part in the European students exchange and research programmes.

BASIC INFORMATION ON METHODOLOGY. In Ukrainian universities the electrical engineering students learn foreign languages only during the first year. Then they attend foreign language classes when studying for Master Degree. So students have a long-term break in learning foreign languages. This really causes a lack of knowledge in specific terminology, skills of autonomous work with profession-oriented literature and other skills required for successful professional activity.

To organize continuous learning of foreign language for electrical engineering students, we apply the strategy of content and language integrated learning (CLIL). Content and language integrated learning (CLIL) is an approach for learning content through an additional language, thus teaching both the subject and the language (EU Commission, 5).

Content-based instruction (CBI) is a similar approach. The term CLIL is more common in Europe, although the terms are sometimes used interchangeably. CLIL has been identified as a priority by the European Commission (EU Commission, 2004) because: "It can provide effective opportunities for learners to use their new language skills now, rather than learn them now for use later. It opens doors on languages for a broader range of learners, nurturing self-confidence in young learners and those who have not responded well to formal language instruction in general education. It provides exposure to the language without requiring extra time in the curriculum, which can be of particular interest in vocational settings."

The drawback of the CLIL approach: it requires teachers of special disciplines fluent speaking English or other foreign language. Most universities in Ukraine haven't enough fluent-speaking English staff.

So we propose the technique for autonomous learning of specific terminology in foreign language by electrical engineering students, which is based on the code-switching. Code-switching is the concurrent use of more than one language, or language variety. We have taken the text of study materials on electrical engineering in Ukrainian (native) and changed most terminology into foreign language, English particularly. The text looks like this:

"Підвищення power factor в unbalanced circuit, порівняно із симетричним колом, при однаковому а зумовлюється тим, що в unbalanced circuit енергія, що накопичена в throttle L_d , перетворюється в електричну протягом інтервалу а та віддається тільки в load і не витрачається на negative voltage compensation у мережі змінного струму".

The Example contains English terms as obstacles, not the goal of autonomous work with the text. Therefore, those words may be involuntary memorized better than voluntary when the purpose is just memorizing foreign language terms (Zinchenko P., 1979). In a series of studies, the well-known psychologist P. Zinchenko has demonstrated that recall of the material to be remembered strongly depends on the kind of activity directed on the material, the motivation to perform the activity, the level of interest in the material and the degree of involvement in the activity. Thus, he has showed that following the task of sorting material in experimental settings, human subjects demonstrate better involuntary recall rate than in the task of voluntary material memorization.

EXPERIMENTAL PART AND RESULTS OBTAINED. To introduce the technique into electrical engineering students training, we have analyzed the structural and logic scheme of the disciplines interaction and defined "Automated Electric Drive of Typical Industrial Mechanisms" as a candidate for our experiment. This discipline teaches students technological peculiarities of operation of various industrial machines and units, rational designs of their electric drives, principles of their control systems on the basis of automated electric drives and computerized automation equipment. Teachers of this discipline have designed the electronic study complex for autonomous students' work. The word "electronic" in our research refers to electronic books in the sense of the following definition: "An electronic book, or e-book, is a portable hardware and software system that can display large quantities of readable textual information to the user, and that lets the user navigate through this information" (Borchers Jan, 1999).

The complex is designed as completely finished software product that can be burned onto a CD and given to the student for autonomous learning. It contains the curriculum, list of lectures, labs and workshops, instructional materials as html-pages in Ukrainian (native).

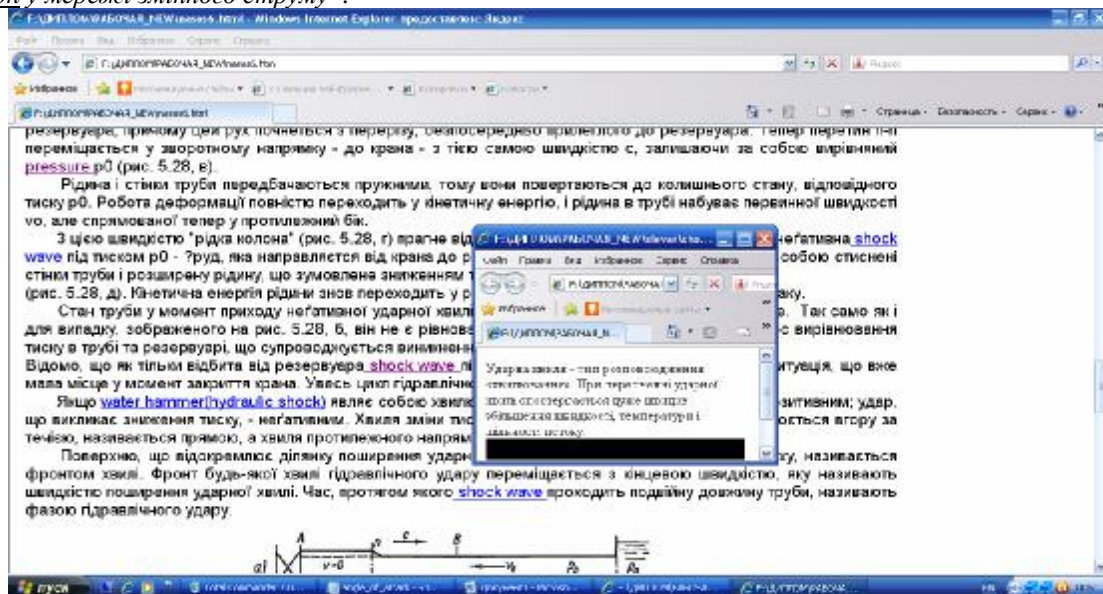


Figure 1 – The window with translation, definition and pronunciation of the term «Shock wave»

At first, we have made a list of specific terminology on the discipline to compile the Ukrainian-English vocabulary. When we were looking for English equivalents, we used the International Electrotechnical Dictionary and New IEEE Standard Dictionary of Electrical and Electronics Terms. But it wasn't enough especially for terms on hydraulic mechanisms. So we searched required terms in English scientific and academic books and Internet-sites of leading manufacturers of the equipment. Then we searched for the definitions in the multilanguage search system Google, dictionaries and specialized glossaries by key words.

After that we have designed the vocabulary as a programmable code to integrate it into the complex. To insert the English terms into the text of the lecture we have used object-oriented scripting language JavaScript. Ukrainian (native) terms from the vocabulary can be replaced automatically with English equivalents.

English words in the text are designed as hyperlinks. Translations and definitions for English terms are designed as HTML-pages. When clicking a hyperlink, the next page with the term definition in Ukrainian opens and sound playbacks (Fig. 1).

Hypertext links are key components making the WEB attractive to users. Adding a hyperlink, the document becomes a holistic and structured allowing the user to obtain necessary information quickly and conveniently.

Students and teachers can use this complex in their own computer, which meets following requirements:

- operating system Windows 98/Windows XP;
- RAM 512 MB;
- CPU with frequency more than 1 GHz;
- hard disk more than 1GB;
- CD ROM.

CONCLUSIONS. Finally we can say that developed technique for autonomous learning specific terminology in foreign language by electrical engineering students makes possible:

- enhancing the quality of electrical engineering students training;

- learning specific terminology in foreign language within any discipline;
- learning specific terminology in foreign language through the whole period of study in university;
- learning specific terminology in foreign language as much as the instructional materials contain;
- learning physical meanings of specific terms;
- training the pronunciation of English terms.

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ТЕХНОЛОГИЯ САМОСТОЯТЕЛЬНОГО ИЗУЧЕНИЯ ПРОФЕССИОНАЛЬНОЙ ТЕРМИНОЛОГИИ НА ИНОСТРАННОМ ЯЗЫКЕ СТУДЕНТАМИ-ЭЛЕКТРОМЕХАНИКАМИ

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Владение иностранными языками является основой успешного международного сотрудничества в области электромеханики. Поощряя студентов изучать иностранные языки, преподаватели помогают студентам стать более открытыми к другим культурам, способными более свободно передвигаться и работать без границ, эффективно конкурировать в глобальной экономике. Еще одним важным умением для молодых инженеров является правильное использование технической терминологии на иностранном языке. Нами была разработана технология для самостоятельного изучения профессиональной терминологии студентами по электромеханике и электротехнике. Описаны основы технологии и примеры ее реализации в подготовке инженеров-электромехаников.

Ключевые слова: автоматический электропривод, подготовка инженеров-электромехаников, электротехническая терминология, изучение иностранного языка, электронные учебные материалы.