

COMPUTER MODELING SYSTEM FOR TEACHING ENGLISH FOR SPECIAL PURPOSES

English for special purposes (ESP) assumes an orientation toward the learner and a profile learning process. Almost every professional activity nowadays involves the use of computer programming tools, mathematical methods, computer simulation and visualization. Computer algebra systems can be applied to implement teaching English for special purposes of developing computer and subject-based competencies. The universality of current symbol modeling in computer algebra systems (Maple, Sage, Maxima, Reduce, etc.) is substantiated in the epistemological NKS-paradigm [1]. Linguistics, that is one of the most promising areas for the successful advancement of symbolic computation, should rely on developments of computational algebra: computer programming tools, such as CAS Mathematica, the Wolfram programming language [2], Wolfram|Alpha [3], CDF (Computable Document Format) [4], and Wolfram Programming Cloud [5]. Files in the CDF format can be inserted into web pages and viewed directly in a browser as full-screen documents, their contents are updated when interacting with the user's graphic elements. Free CDF-Player contains Mathematica runtime library, the contents of the document may be generated in response to a user action by means of any algorithms or visualizing functions [6]. This makes CDF convenient to visualize material operating with volumes of diverse data, including linguistic data. CAS Mathematica is simple to learn and makes it possible to visualize the results of language data processing in the form of a broad set of multimedia models (graphics, sound, animation, interactivity, etc.). Dozens of samples to create interactive models based on symbolic computation of various aspects of linguistic data which cover almost all areas of teaching English for special purposes are presented and available on the Internet [7].

Teaching lexical aspect of speech activity can be effectively implemented through the Word Clouds interactive model. It provides a visible way to systematize lexical material predominantly on its introduction and consolidation phases, which greatly facilitates memorizing new vocabulary. The simplicity of this model makes it easy to integrate into the learning process. The model may serve as a tool for composing exercises focused on the development of receptive and productive lexico-grammatical skills; dialogue composition on the basis of proposed lexemes, as an example.

The Languages in South American Countries multimedia sample model is suited to familiarization of students with regional varieties of the English language. Demonstration of subject-specific vocabulary right on the geographic map, provision of semantic analogies, translation of expressions into the students' first language enables to form cross-cultural knowledge base, as well as providing a way for stepping out of the target language conceptual system. This model can also be realized in the form of a creative research project based on a subject-specific vocabulary topic.

Both the acquisition of topical vocabulary and control of the receptive vocabulary formation level can be accessed through the use of the Wordfinder Puzzle and Play Hangman interactive models. These models operating as a puzzle game may act as a means of stimulating and motivating students to study the foreign language. In the course of task completion, students not only master the required lexical material, but also improve their self-learning skills and attention span. The capability of CDF to be optimized for learners of different skills levels and the multifunctionality of the models themselves extend the range of their use.

The 2008 Convention Speeches sample model provides teachers with an opportunity to organize text analysis interactive activities in text comprehension classes. Having processed the language data, the model represents the list of the words most frequently used in the given work in form of a graph. On the basis of the information received, students can thoroughly explore lexical and grammatical, structural and semantic, stylistic and cultural aspects of a text within a discussion organized by the teacher.

The Word Webs interactive model may be used in order to represent word families. It makes it possible to illustrate the phenomenon of polysemy of English affixes as well as the derivational capacity of the chosen lexical material. Another way to represent affixes in all their diversity is to demonstrate them within a sequence of words containing a common element with the help of the Common Subsequences of Words model. When accomplishing model-based assignments, students not only acquire knowledge of the core principles of affixation in a foreign language, but also expand their active vocabulary.

An illustration of the word wrap rules may be provided with the help of the Un Divisor Silábico (Spanish) demonstration model. Students may also be encouraged to present the chosen words in context or supplement the correct pattern with a wrong one. Besides the obvious educational benefits, the given task simplifies the process of phonetic skills improving by appealing to the principles of syllabification and even contributes to realizing the significance of the article as a part of speech.

The Nonsense Sentence Generator multimedia model may be used as a tool of demonstration of the structural differences of various syntactic units typical of analytic languages. Learners may also be offered to focus on one of the communicative, e.g. interrogative or imperative, or structural, e.g. simple one-membered or compound, types of sentences or to complement their projects with schematic models of the sentences created.

The Animal Sounds interactive model may provide the basis for a wide range of tasks improving hearing and spelling skills, e.g. assignments on homographs differentiation or long/short vowels opposition. It may also be proposed to create a project of a cross-cultural character in form of a test which enables the user to guess the English-speaking country that the speaker lives in from a spoken speech segment. The task fulfillment may not only result in students' acquisition of specific knowledge, but also contribute to the removal of language barriers.

With the example of the Letter Highlighting in Text demonstration model, it is possible to illustrate the connection between orthography and phonetics of the English language: the task may consist in creation of a model in which the phonetic principle of orthography is highlighted along with a less obvious for a non-native speaker type of spelling, explained mostly by historical tradition. In order to facilitate the task students may be offered a text adjusted to the goals of the project by the teacher and given an opportunity to use a speech synthesizer.

Symbol modeling can be successfully used in the context of teaching English for special purposes. Computer algebra systems make it possible to effectively solve the problems of motivation for English learning for specialists of different areas and significantly increase the level of its acquisition.

References

1. Stephen Wolfram A. New Kind of Science / [Electronic resource] – Mode of access: <https://www.wolframscience.com/>
2. Wolfram Language / [Electronic resource] – Mode of access: <http://www.wolfram.com/language/>
3. Wolfram|Alpha / [Electronic resource] – Mode of access: <http://www.wolframalpha.com/>
4. Computable Document Format (CDF) for Interactive Content / [Electronic resource] – Mode of access: <http://www.wolfram.com/cdf/>
5. Wolfram Programming Cloud: Introducing a Programming / [Electronic resource] – Mode of access: <https://www.wolfram.com/wolfram-one/>
6. Wolfram CDF Player for Interactive Computable Document [Electronic resource] – Mode of access: <http://www.wolfram.com/cdf-player>
7. Wolfram Demonstrations Project & Contributors / [Electronic resource] – Mode of access: <http://demonstrations.wolfram.com/>

Анотація. III. Система комп'ютерного моделювання для навчання англійської мови спеціального призначення. У статті описано можливості застосування методів обчислювальної алгебри та комп'ютерного моделювання для вдосконалення методів навчання англійської мови спеціального призначення. У цій статті представлені методи навчального моделювання за допомогою Mathematica.

Ключові слова: Mathematica; обчислювальна алгебра; моделювання; візуалізація;

Abstract: Computer modeling system for teaching English for special purposes. The article describes the possibilities of applying methods of computational algebra and computer modeling to improve methods of teaching English for special purposes. This article introduces instructional modeling techniques using Mathematica.

Key words: Mathematica; computational algebra; modeling; visualization.

Аннотация: Система компьютерного моделирования для обучения английскому языку для специальных целей. В статье описаны возможности применения методов вычислительной алгебры и компьютерного моделирования для совершенствования методики обучения английскому языку для специальных целей. В этой статье представлены обучающие методы моделирования с использованием Mathematica.

Ключевые слова: Mathematica; вычислительная алгебра; моделирование; визуализация.