

THE ORGANIZATION OF TEACHING STUDENTS OF IT SPECIALTIES ESP WRITING

ОРГАНІЗАЦІЯ НАВЧАННЯ СТУДЕНТІВ ІНФОРМАЦІЙНИХ СПЕЦІАЛЬНОСТЕЙ ПИСЬМА

In the paper it was determined that it is necessary for the students of IT to form the skills to write technical documents, in particular, software requirements specification (SRS) for their own software development. We consider the SRS as a technical document (according to the IEEE-830 standard) that defines the requirements and the procedure for creating a software product, according to which it is developed and accepted for the implementation. A subsystem of exercises for teaching students of IT specialties English for specific purposes (ESP) writing is proposed, which consists of three groups of exercises that are performed at the introductory, basic and final stages. The introductory stage is implemented in the self-study work of students, the basic and final stage are implemented both in the classroom work with the teacher and the «SRS Development» course, and in the self-study work of students outside the classroom. The first group of exercises for acquiring knowledge about writing the SRS at the introductory stage contains two subgroups of exercises: 1.1. To get acquainted with examples of specifications, 1.2. To acquire knowledge about the stylistic features of the specification.

The second group of exercises for the gaining of language and speech skills in writing at the basic stage includes four subgroups of exercises: 2.1. for the development of spelling skills, 2.2. for the development of lexical skills, 2.3. for the development of grammar skills in writing, 2.4. for the development of comprehension skills and the use of means of inter-phrase communication. The third group of exercises for the development of writing skills at the final stage involves the performance of three subgroups of exercises: 3.1. to develop the ability compositionally correctly create the SRS in English, 3.2. to develop the skills to write the main part of the SRS, 3.3. to develop skills to edit and evaluate the SRS. On the basis of the developed subsystem of exercises, the teaching course «SRS Development» was created as a means of teaching ESP written communication students of IT specialties using elements of distance learning on the Moodle platform. A model of the organization of teaching writing the SRS was created for the purpose of experimental verification of the developed methodology.

Key words: software requirements specification (SRS), language skills, English for Specific Purposes writing (ESP writing), students in IT, teaching model.

У статті висвітлюється необхідність у студентів спеціальності «ІТ» сформувати навички написання технічної

документації, зокрема специфікації вимог до програмного забезпечення для власної розробки. Специфікацію вимог до програмного забезпечення (ПЗ) ми розглядаємо як технічний документ (відповідно до стандарту IEEE-830), що визначає вимоги та порядок створення програмного продукту, відповідно до якого він розробляється та приймається до впровадження. Запропоновано підсистему вправ для навчання писемного мовлення (ПМ) студентів ІТ-спеціальностей, яка складається з трьох груп вправ, які виконуються на вступному, основному та завершальному етапах.

Вступний етап реалізується в самостійній роботі студентів, основний і завершальний – як в аудиторній роботі з викладачем і курсом «Розробка специфікації вимог до ПЗ», так і в позааудиторній самостійній роботі студентів. Перша група вправ для засвоєння знань про створення специфікації на вступному етапі містить дві підгрупи вправ: 1.1. Ознайомитися з прикладами специфікацій, 1.2. Засвоїти знання про стилістичні особливості специфікації. Друга група вправ для набуття мовленнєвих навичок на базовому етапі включає чотири підгрупи вправ: 2.1. для формування орфографічних навичок, 2.2. для формування лексичних навичок, 2.3. для формування граматичних навичок письма, 2.4. для формування навичок розуміння та використання засобів міжфразового зв'язку. Третя група вправ для формування навичок письма на завершальному етапі передбачає виконання трьох підгруп вправ: 3.1. розвивати вміння композиційно правильно створювати специфікацію вимог до ПЗ англійською мовою, 3.2. розвивати вміння складати основну частину специфікації вимог, 3.3. розвивати вміння редагувати та оцінювати специфікацію.

На основі розробленої підсистеми вправ створено навчальний курс «Розробка SRS» як засіб навчання англійської мови технічного спрямування студентів ІТ-спеціальностей з використанням елементів дистанційного навчання на платформі Moodle. З метою експериментальної перевірки розробленої методики створено модель організації навчання.

Ключові слова: специфікація вимог до програмного забезпечення (ПЗ), мовні навички, англійська мова технічного спрямування, студенти в ІТ, модель навчання.

UDC 378.147:811.111:00
DOI <https://doi.org/10.32782/2663-6085/2024/71.1.9>

Dychka N.I.,
Candidate of Pedagogical Sciences,
Associate Professor at the Department
of English for Engineering № 1
National technical university of Ukraine
“Igor Sikorsky Kyiv Polytechnic Institute”

Lomakina L.V.,
Senior Lecturer at the Department
of English for Engineering № 1
National technical university of Ukraine
“Igor Sikorsky Kyiv Polytechnic Institute”

Hural O.I.,
Lecturer at the Department of English for
Engineering № 1
National technical university of Ukraine
“Igor Sikorsky Kyiv Polytechnic Institute”

As the vast majority of international contacts are made through English written language, and due to the fact that English has acquired the status of an international language, one of the modern requirement for an IT specialist is to master English for Specific Purposes (ESP) writing. Awareness of the

role of ESP writing for future professional activities of future IT professionals necessitates the search for new constructive ideas to solve the problem of effective organization, optimization and intensification of teaching ESP writing students of IT specialties in technical universities.

Analysis of recent research and publications.

Foreigners made a significant contribution to the development of the methodology of teaching ESP writing: D. Slaouti (2000), T. Dudley Evans (2001), I. Badger (2003), J. Morley (2007), Hyland and D. Guillian (2009) and others.

Highlighting previously unresolved parts of the overall problem. Although the problem of teaching ESP writing occupies an important place in scientific research [1, 2, 8, 9], it cannot be considered finally solved. Foreign methods do not take into account the requirements for the organization of the educational process in domestic technical universities. The textbooks contain an insufficient number of exercises aimed at the formation of ESP writing. Therefore, the results of the analysis indicate the need to develop a methodology for teaching ESP writing for students of IT specialties, which requires further theoretical and practical research.

The aim of the study is to introduce the model of the organization of teaching students of IT specialties ESP writing, develop a subsystem of exercises for students in IT specialties for writing the software requirements specification for their own software product.

In the ESP teaching methodology, the concept of «model» refers to an artificially created object in the form of a scheme, drawing or symbolic formulas, which is similar to the object. It represents, reproduces in a simple form the structure, properties, relations between elements of the researched object, the direct study of which is associated with certain difficulties, and thereby facilitates the process of obtaining information about the object of interest. The teaching ESP model we understand as the teacher's individual interpretation of the teaching method of writing the software requirements specification within the framework of specific goals and the conditions for organizing students' educational activities.

The main goal of developing a model for mastering ESP writing is the step-by-step improvement of the skills of future bachelors to create technical documents in English, in particular, the software requirements specification.

We developed a model of the organization of teaching ESP writing for students of IT specialties according to such parameters as function, content, form, systematicity. The function of the model is to explain how the process of teaching ESP writing to students of IT specialties takes place, taking into account their psychological and professional qualities. The content of the model is determined by the types of exercises for ESP writing and their correlation with the stages of teaching. The form of the model of the educational process is the technology of teaching ESP. Under the system parameter we mean bringing all the components of the model to the optimal level. During the development of the model for the implementation

of the methodology of mastering ESP writing on the example of creating a SRS, the specifics of the organization of teaching the discipline «ESP» for bachelor students of the fields such as «Computer Science», «Computer Engineering», «Software engineering», «Applied mathematics», «Informatics» were taken into account [3, 4, 5, 6]. The purpose of study, psychological and professional characteristics of students of IT specialties, stages of the organization of the educational process were also considered.

We offer a model of teaching ESP writing, which is aimed at forming the knowledge, skills and abilities of students in this type of speech activity. According to our methodology, teaching students of IT specialties how to write software requirements specifications has three stages: introductory, basic, and final, during which students have to solve specific tasks.

54 academic hours are allocated for 4th-year students to master Foreign Language at the B2, B2+ level, of which 36 are allocated to practical classes, and 18 hours to self-study work. So, for the implementation of our methodology, the amount of time allocated for learning English per semester was 54 hours: 36 hours of classroom classes and 18 hours of self-study work.

According to the methodical recommendations of the Foreign Language education organization, English classes at a technical university cover listening, speaking, reading and writing [1, 2]. Therefore, 1/4 of the total time of practical classes is planned for teaching writing. Since in the proposed methodology mastering writing does not take place in isolation, but involves all types of speech activity, reading to a greater extent, speaking and listening to a lesser extent, and taking into account the fact that writing the SRS is a long-term intellectual and creative process, we can count on 1/3 of the total time, i.e. 12 classroom hours and 6 hours of independent extracurricular work. The basis of the model is the education of IT-specialty undergraduate students of NTUU «KPI named after I. Sikorsky». The structure of the teaching model is shown in table 1.

The teaching model within which experiment will be conducted is presented in the table 1. The specified data determine the stages and sub-stages of teaching, the number of hours of classroom and self-study work of students in IT specialties.

We will consider in detail each of the model options offered by us.

The introductory stage, during which the student gets acquainted with the peculiarities of writing the SRS, includes 1 hour of classroom classes and 1 hour of self-study work; 7 hours of classroom classes and 1 hour of self-study are intended for the main stage; for the final stage – 4 hours of classroom classes and 4 hours of self-study work. At the same time, the teaching is divided into 18 classes, each 30 minutes are devoted to the teaching ESP writing.

Table 1

Teaching Model

Stages	Subgroup of exercises	Lesson Number	Time	
			Academic hours	Self-study
Introductory stage	to get acquainted with the samples of the SRS	1	1	1
	to gain knowledge about stylistic features of the SRS	2		
Basic stage	to develop spelling skills	3, 4	7	1
	to develop lexical skills	5, 6, 7		
	to develop grammatical skills	8, 9, 10		
	to develop comprehension skills and the use of means of inter-phrase communication	11, 12		
Final stage	to develop skills compositionally correctly create the SRS	13	4	4
	to develop the ability to write the main part of the SRS	14, 15, 16		
	to develop editing and evaluating skills	17, 18		

Let's consider in more detail the assignment of classes and the process of implementing a subsystem of exercises for teaching how to write a SRS. The goal of each stage is the achievement of automated skills, speaking and writing skills and the acquisition of knowledge in ESP.

Introductory stage of teaching.

The first classroom lesson. At the first lesson, the teacher introduces students to the «SRS Development» training course, gives passwords, gives instructions for completing tasks, demonstrates the algorithm for writing the SRS. The main part of the work is self-study work, during which students acquire knowledge: they read a text about the importance of writing a specification of requirements for software development, answer questions, study a multimedia presentation on the topic «How to write a high-quality SRS for their own product. Students independently acquire knowledge about the compositional structure of the SRS according to the standard of the international organization IEEE, their cognitive capabilities, norms and culture of behavior for interaction with customers of software products, differences in behavior in the professional environment of two cultures, language forms for writing specifications, methods of submitting material, tonality of information presentation. The consultations are provided by teachers of professionally oriented disciplines. In the self-study, students read and analyze an authentic sample text of the SRS according to the certain criteria.

The second classroom lesson. Students characterize the style of sentences, distinguish the scientific and technical substyle from other substyles, get acquainted with the syntax of a technical document, a certain structure of sentences when describing the technical requirements for the software. Exercises are performed individually and in groups. There is

also frontal work during the teacher's explanations. The task of self-study work is to describe the technical requirements for own software in accordance with the stylistic characteristics of this writing genre.

The basic stage of teaching.

The third and fourth classroom lessons.

Having worked through the exercises of the 1st stage, students learn the rules of punctuation, citations, references, necessary for writing the specification of requirements. The writing exercises are performed, the purpose of which is the development of punctuation and spelling skills. As a self-study activity, students formulate a topic that corresponds to the topic of the bachelor's project and create the title page of the SRS for their own software development.

The fifth, sixth, and seventh classes are devoted to the study of specific terminology, abbreviations, definitions, acronyms, symbols, directives, and continuances. Students work with educational materials and do the suggested exercises, perform self-monitoring with the help of built-in automated feedback, because this sub-stage mainly contains exercises with minimal guidance from the teacher. A fairly significant part of the exercises has special information, tips in which knowledge is presented. Exercises are done individually and in groups. There is also frontal work during the teacher's explanations. The task of self-study work is to create the crossword with new vocabulary, exchange crosswords and solve them.

In the eighth, ninth, and tenth lessons, the exercises are aimed at developing and improving the grammatical skills of ESP writing and are performed individually. Control of students' learning activities is automated. The teacher's explanations take place in a frontal mode. During extracurricular self-study

work, students continue to do certain exercises and master grammatical material.

In the eleventh and twelfth lessons, students develop the skills of using means of inter-phrase communication in the text of the SRS: conjunctions, pronouns, combining words into sentences. There is individual and frontal work. Studying the rules of using inter-phrase connection is assigned to self-study work.

The final stage of training.

Thirteenth classroom lesson. Students continue to study the field of creating software products, namely, standards for creating technical documentation in English-speaking countries and their compositional structure, differences in behavior in the professional environment of two cultures, semantic features of words and expressions of scientific and technical substyle. Then they create the content of the SRS for their own bachelor's project, form the input data to describe the requirements for their own software

The fourteenth, fifteenth, and sixteenth classes are aimed at students' knowledge gaining about filling out the structural parts of the SRS: Introduction, Overall Description, Specific Requirements. There is also a repetition of the material studied at the previous stages: it includes information about the compositional structure, standards for creating a specification, stylistic, lexical, grammatical features of the SRS, rules for punctuation and spelling of the text. Students gain knowledge about the field of scientific and technical sub-style: use full verb forms instead of short ones, avoid weak phrases and do appropriate exercises.

Each lesson is dedicated to learning how to create a separate part of the software requirements specification. The task of the self-study work after the 14th lesson is to write your own introduction, after the 15th – to write your own general description of the software, after the 16th – to write the last part of your own document. Students describe the «use cases» of the program, add a number index and appendices to their requirements specification. Exercises are performed individually. In classroom classes, students receive teacher's comments on completed tasks with error analysis.

The seventeenth lesson is devoted to teaching text editing. The teacher provides students with knowledge about groups of errors, their marking symbols and how to correct errors in the written text. Students work in pairs. A table for error correction to check the SRS is provided. The ability to edit a technical document is developed. Then the students independently check each other's work, evaluate it, discuss the work, and give advice. Exercises are performed individually and in pairs. Extracurricular self-study work: edit your own text of the software requirements specification and send it to the teacher.

In the eighteenth lesson, the SRSs for own software development within the framework of the bachelor's project, evaluation by the teacher, and error analysis are presented.

So, we have considered in detail the variant model of the organization of teaching undergraduate students writing the SRS in English as a genre of writing. Areas, topics, situations, texts, linguistic, sociocultural material, language material, educational strategies, as well as knowledge, skills and abilities necessary to create a SRS were considered. The educational material was selected according to the following criteria: situations for mastering writing – a criterion of the frequency of their occurrence in the professional life of specialists in computer specialties; sample texts of software requirements specifications – criterion of authenticity, professional orientation, communicativeness, functionality, linguistic and sociocultural value, authority of the Internet source; lexical material – criteria of professional orientation, communicative value, semantic value, frequency, word-forming ability, connectivity, organizational ability; grammatical material – criteria of necessity, frequency, exemplarity; educational strategies – focus on the development of the skills of a productive type of speech activity, namely writing, focus on the development of student autonomy, focus on the optimization of interpersonal professional communication and overcoming socio-cultural difficulties of foreign language communication.

Thus, we have described the implementation of the subsystem of exercises developed by us for writing the SRS, which is correlated with the defined stages of teaching. The created model takes into account the peculiarities of students of IT specialties, curricula and the program of the ESP discipline. Despite the fact that we demonstrated the model on the example of teaching at NTUU «KPI named after I. Sikorsky», it can be adapted for other technical universities. The effectiveness of the developed methodology has been confirmed, which gives grounds for recommending it for the implementation in technical universities of Ukraine.

REFERENCES:

1. Загальноєвропейські рекомендації з мовної освіти: вивчення, викладання, оцінювання. Наук. ред. укр. видання Ніколаєва С.Ю. Київ: Ленвіт, 2003. 273 с.
2. Ніколаєва С.Ю. Зміст навчання іноземних мов і культур у середніх навчальних закладах. Іноземні мови. Київ: Ленвіт, № 3, 2010. С. 3–10.
3. Освітньо-кваліфікаційна характеристика освітньо-кваліфікаційного рівня бакалавр, напрям підготовки 6.050102 «Комп'ютерна інженерія»/О.Д. Азаров, Ф. А. Домнін, В. І. Жабін та ін. Київ: МОНмолодь-спорту України (внесено НТУУ «КПІ»). Галузевий стандарт вищої освіти України, 2018. 17 с.

4. Освітньо-професійна програма освітньо-кваліфікаційного рівня бакалавр, напрям підготовки 6.050102 «Комп'ютерна інженерія» / О. Д. Азаров, Ф. А. Домнін, В. І. Жабін та ін. Київ: МОНмолодьспорту України (внесено НТУУ «КПІ»). Галузевий стандарт вищої освіти України, 2018. 16 с.

5. Програма з англійської мови для професійного навчання / Г.Є. Бакаєва, О. А. Борисенко, І. І. Зуєнок та ін. Київ: Ленвіт, 2005. 119 с.

6. Робоча програма навчальної дисципліни «Іноземна мова для професійного навчання» для бакалаврів усіх спеціальностей/ Нац. техн. ун-т. «Дніпровська політехніка», каф. іноз.мов. Дніпро: НТУ «ДП», 2018. 93 с.

7. Дичка Н. І. Організація експериментального навчання англomовного професійно орієнтованого писемного мовлення майбутніх фахівців з інформаційних технологій. Науковий журнал Вісник Черкаського ун-ту ім. Б. Хмельницького. Серія педагогічні науки. Вип. 6 (339). 2015. С. 66–70.

8. Hyland K., Guillian D. Academic evaluation: review genres in university settings. London: Palgrave-MacMillan, 2009. 203 p.

9. Maamujav U., Olsen C.B., Chung H. Syntactic and lexical features of adolescent students' academic writing. Journal of second language writing, 2021. 225 p.