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## Electronic Dictionary System of Terminology for School Textbooks with Speech Synthesis Function



**Abstract:** - This research, funded under the BR11765535 “Development of Scientific and Linguistic Foundations and IT Resources to Expand the Functions and Improve the Culture of the Kazakh Language” project. The article introduces an electronic dictionary allowing users to look up definitions of terms found in school textbooks. The system accommodates the age characteristics of students, providing a voice-guided interface for primary school students. Users include administrators, specialists with database access, and general users. The article details the algorithm for creating terminology, the user interface, and functionalities for guests, experts, and administrators. The proposed system facilitates equal access to education and aligns with inclusive educational environments.

**Keywords:** Electronic dictionary, textbooks, electronic textbooks.

### I. INTRODUCTION

This work was funded in the framework of the research project BR11765535 “Development of Scientific and Linguistic Foundations and IT Resources to Expand the Functions and Improve the Culture of the Kazakh Language”. The goal of the project is to develop scientific and linguistic foundations and IT resources to expand the functions and improve the culture of the Kazakh language as a language of interethnic communication in a digital format, which is an urgent and important problem in the strategic direction of the development of our state. After independence of the Kazakhstan, national terminology began to develop rapidly. Due to the transmission of the Kazakh language, which has a deep history, the status of the state language and its social significance have increased. New opportunities have been opened to modernize the national specificity of Kazakh terminology. Successful Kazakh alternatives were selected for dozens of former foreign language terms. In the years of independence, the total number of dictionaries published in various fields of science exceeded one hundred.

The organization, systematization and development of national terminology is of particular importance in the development of social and public activities of the state language, in expanding the scope of its use [1].

Compilation and standardization of terms in the Kazakh language is hard work that requires a deeper understanding of the essence of the described phenomena and includes a number of mandatory steps.

Definitions contain the basic characteristics of a concept and provide the student with enough information to define the concept and distinguish it from other similar concepts and to understand the relationship between related concepts. In order to ensure continuity of terms from school subjects, terms and their definitions are collected directly on the basis of existing school textbooks, when collecting terms, whether several textbooks are dedicated to the same subject, whether the authors are different, everything is taken into account.

The proposed approach to the development of terminology for school subjects on the basis of school textbooks

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allows for the systematic development of terminology, providing a complete overview of the use of terms in various dictionaries, textbooks, professional and scientific-technical literature, supplementing traditional terminological dictionaries with examples of use. literature. The proposed terminological system, which includes a relational terminological database on the one hand, and a web application on the other, is a technological solution that allows for data management, constant updating, modernization and expansion of existing data and user interface. levels make content accessible to a wider range of users.

The next innovation proposed in this way of creating a terminological dictionary of school subjects is that the age characteristics of students are taken into account, for example, there is a personal user-friendly interface that guides the terms by voice for primary school students. joined him. Voice guidance, in turn, serves as an auxiliary educational resource for children with total or partial visual impairment in the context of inclusive education.

Today, the creation of a terminological dictionary is one of the most rapidly developing areas, however, with the emergence of inclusive educational environments, a new direction in the creation of terminological dictionaries has appeared. Modern electronic resources should provide equal access to education for students at all levels, taking into account their psychophysiological and personal characteristics. During the compilation of the terminological dictionary, the works done so far in this field are taken into account.

Over the past decade, we can say that the industry words of the Kazakh language have been significantly adapted in the internet space, and some electronic and explanatory online dictionaries are exploding. The acquisition and translation of internet terms and phrases into Kazakh is carried out mainly through English and Russian languages. However, there are also terms that have a national attitude to whitening or cause clothespins in translation. The use of their " own " root names is very meaningless because this leads to the loss of meaning of terms and phrases [2,3]. The modern electronic terminological fund of the Kazakh language, such as <https://sozdikqor.kz/>, <https://termincom.kz/termins>, <https://emle.kz/>, <https://qujat.kz> was analyzed, it allows us to conclude that aspects of term formation are complex and highly contradictory processes, which are difficult to unambiguously interpret or interpret [2].

## II. CREATION OF A DATABASE OF TERMINOLOGY OF SCHOOL TEXTBOOKS

The criteria for determining the inclusion of lexical units in the terminological dictionary were taken as: significance (or semantic value), use (frequency), thematic relationship of the term.

When compiling a terminological dictionary of primary and high school students, one term, two or more different definitions are given, depending on age characteristics and the peculiarities of information perception (table 1, 2).

Table 1. Two-level interpretation

Term	Definition	Class
Figurative words	words formed by imagining the image of various phenomena in nature	4
Figurative words	means the names of the concepts born by seeing the known phenomena in nature	7
Imitative words	words formed by imitation of sound	4
Imitative words	words formed from the perception of sounds produced by various phenomena and objects colliding with each other in nature, as well as various sounds emanating from the vocal organs of animals as well-known concepts through the ability to hear	7

Table 3. Three-level interpretation

Term	Definition	Class
Complex verb	consists of two or three words	2

Complex verb	consists of two or more words and means the same thing	6
Complex verb	verbs consisting of two or more words, expressing only one meaning, answering one question, serving as only one part of a sentence	7
Homonym	words that sound the same but have different meanings	2
Homonym	words that sound the same but have different meanings	4
Homonym	words with the same pronunciation and spelling but different meanings	5

Taking these features into account, the structures of the databases were studied and the structure of the database of terms of school subjects in the Kazakh language was determined. The base structure will contain a term, a definition, and the class in which that term occurs. In addition, a list of the main subjects for creating a set of terms was determined from among secondary school subjects.

### III. DESCRIPTION OF TERMINOLOGY PROGRAM OF THE SCHOOL TEXTBOOKS

#### General information

The electronic dictionary of terms of school textbook allows school students, parents, and other users to look up definitions of terms found in school textbooks. Age characteristics are taken into account in the system, and it is possible to convey the terms and their definitions by voice to students of 1-4th grade.

#### Users of the system

Admin (administrators of program);

Expert (specialists with access to input and correction of vocabulary in the database);

Guest (guests, students, parents).

Algorithm for creating terminology of school textbooks:

Program administrators make necessary settings;

Experts can enter terms into the database, have the opportunity to correct them, download textbooks;

Guests can view terms, have the ability to search by keywords.

To use the system, it is located at <https://kazlangres.enu.kz/> in a computer or phone browser. The intelligent system "Ahmettanu" opens in the main window. On the left side of the window, in the "Dictionary" menu, there are sections "Terminology of school textbooks" and "Terminology of elementary school textbooks" (Figure 1).

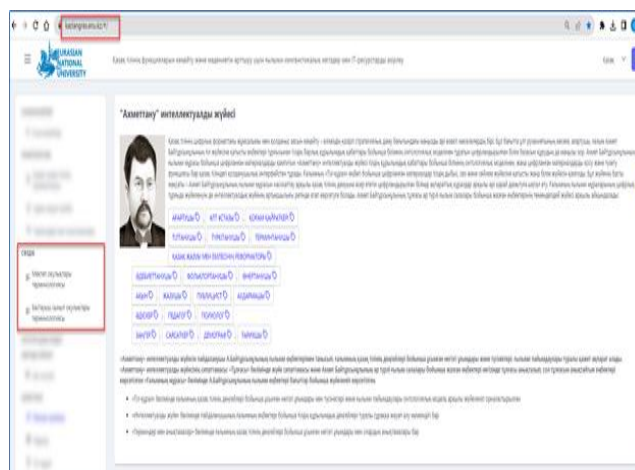


Figure 1 - The main page of the intellectual system "Ahmettanu"

Using the system as a guest

To review terms and definitions, it is necessary to go to the required section for senior grades or elementary grades. If you go to the section "terminology of school textbooks", the page "collection of terms of school subjects" will open. Terms are arranged alphabetically from all subjects in the base (Figure 2).

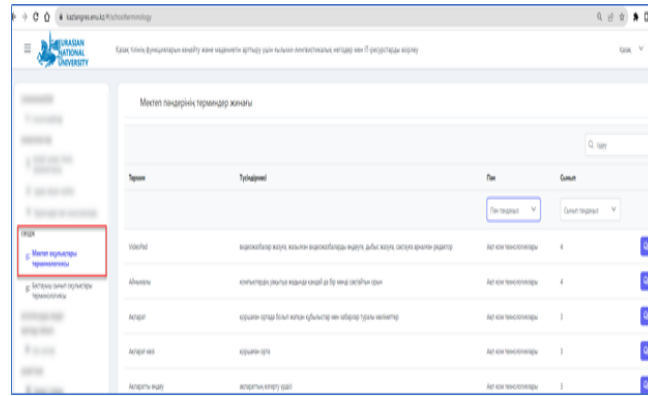


Figure 2 - Page "Collection of terms of school subjects"

Search for a term

To view the definition of any term, type the letters of the term in the "search" field, below will be presented a dynamic floating list (Figure 3).

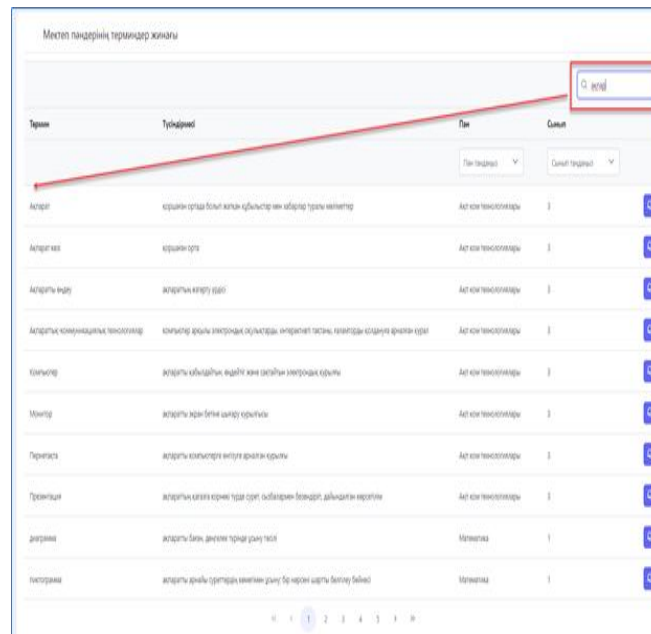


Figure 3 - Search for terms by key word

Filtering by subject, class

Along with the term, the explanation, subject and class are indicated. You can filter terms by subject and class. To do this, you need to select the desired subject in the "subject" and "class" field (Figure 4, Figure 5) (**Error! Reference source not found., Error! Reference source not found.7).**

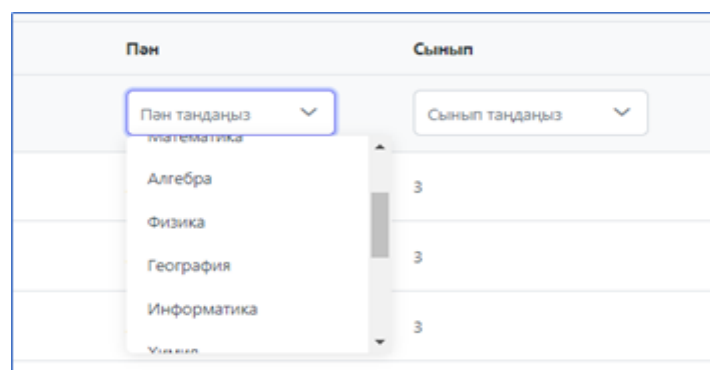


Figure 6 - Search for terms by subject

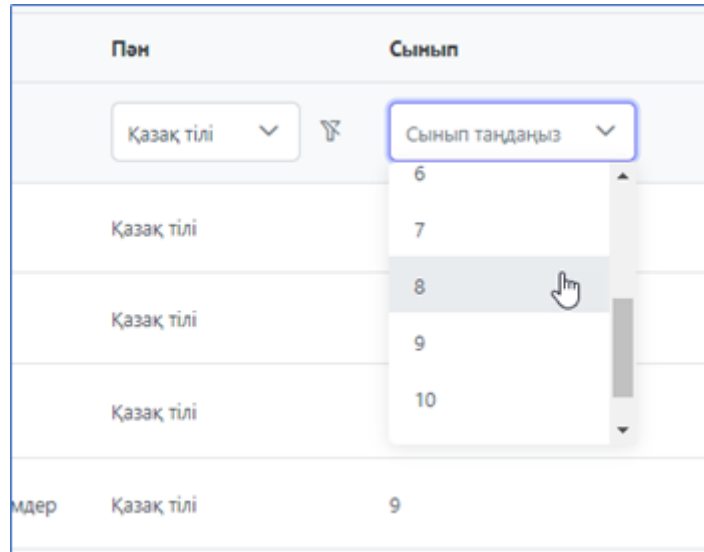


Figure 7 - Search for terms by class

### Leave a comment

In addition, if you need to leave a comment on a specific term, you need to click on the special button indicated next to the term, write your name and comment in the comment input window (Figure 8) and click the "Submit" button. The opinion is sent for consideration to a specialist.

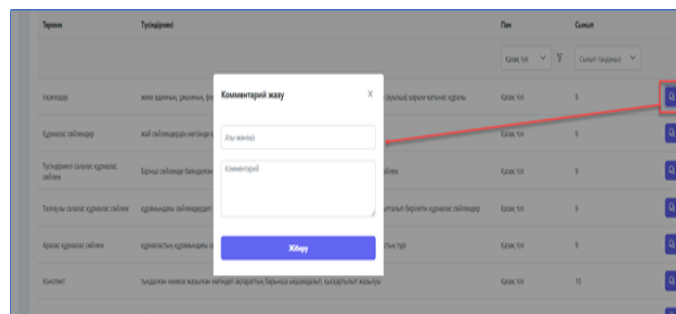


Figure 8 - Leave a comment on the term

### Using the system as an expert

To enter the system, experts need to press the special login button located in the upper right corner, in which case a special window will open allowing to enter the system or register (9).

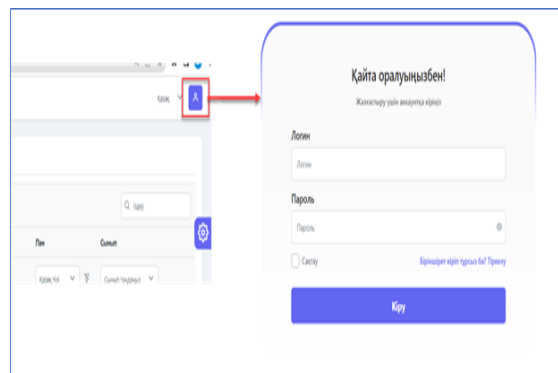


Figure 91 - Login to the system

If the user is logged in for the first time, click on the "Register" link. Further, a special window will open, enter your login and password, name, and click the "Send code" button. The system administrator directs the user to the system as an expert (Figure 10210).

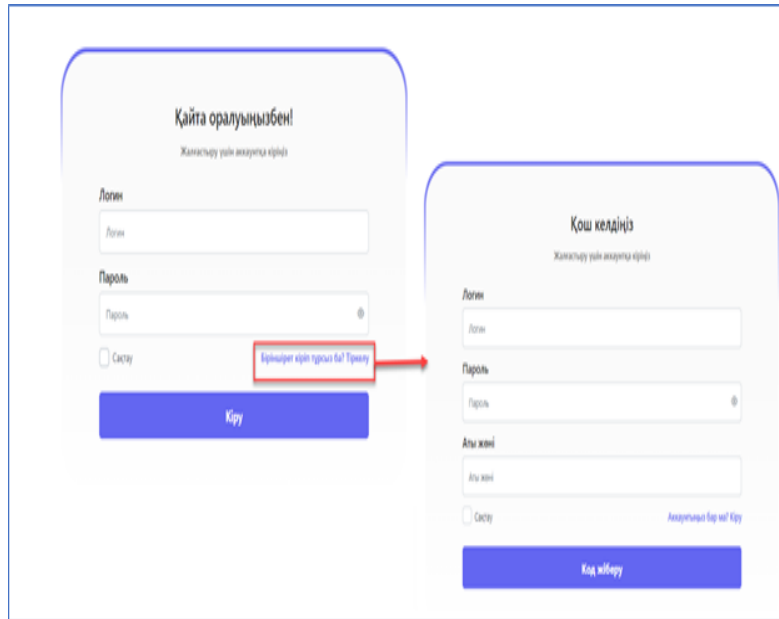


Figure 102 - Register to the system

After registering in the system as an expert, the expert is given the opportunity to enter terms and definitions and download textbooks.

To add a new term

To add a new term, click the "Add a new term" button. In the special window that opens, specify the term, definition, subject and class, and click the "Save" button. If the subject is not in the list, you can add a new subject using the "Add subject" button. (Figure 11311)

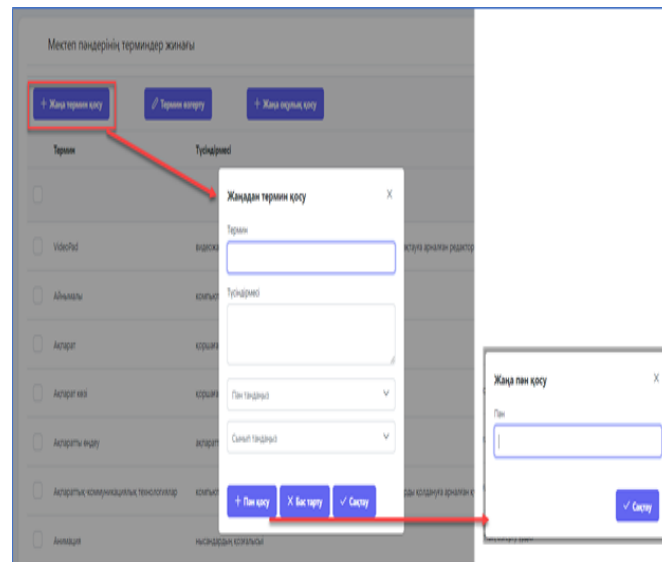


Figure 113 - Adding a new term, subject

Term change

If you need to change a term or interpretation, you need to check the box for the desired term and click the "change term" button (Figure ). In the window that opens, you must make the necessary changes and click the "Change" button. If the change is not required, you need to click the "Cancel" button.

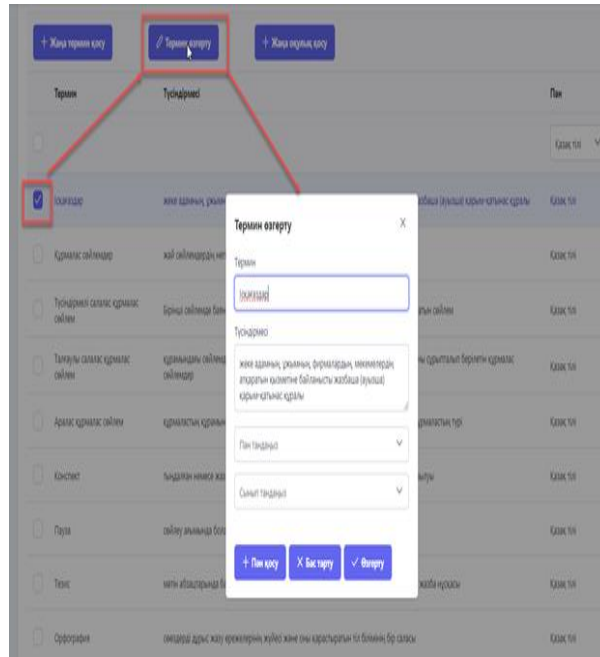


Figure 12 - Changing the term

#### Adding a new tutorial

To add a new tutorial, you need to click the "add a new tutorial" button. In a special window that opens, the necessary tutorial can be downloaded to the system for users.

#### Terminology of textbooks of primary school

Due to the fact that the age of users is especially taken into account when developing the terminological dictionary, an individual interface has been developed for students of grades 1-4, the interface elements are larger, equipped with animated elements for children, students of grades 1-2 are provided with the ability to sound the term due to imperfect reading skills (Figure 13).

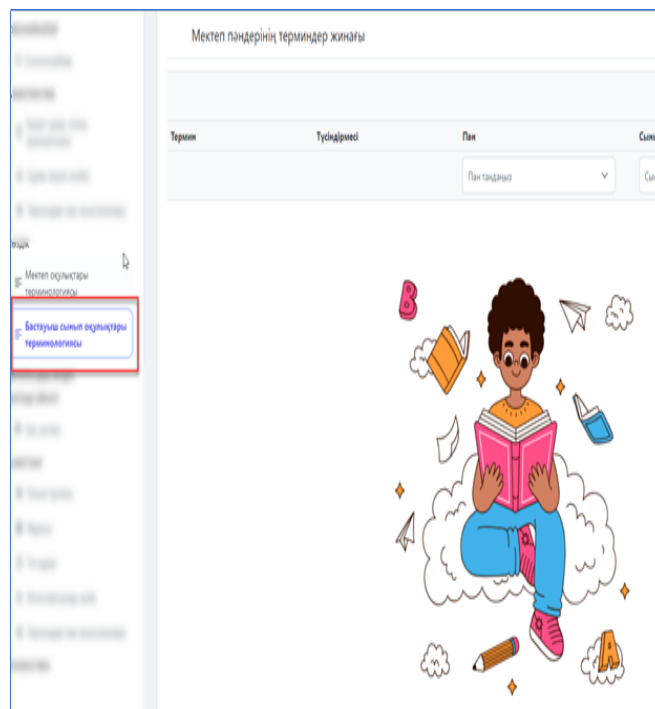


Figure 13 - Terminology of textbooks of primary school

To listen to the explanations of the terms by sound, it is necessary to press the sound button indicated in the term line. The system will read out the explanation for the selected term (14).

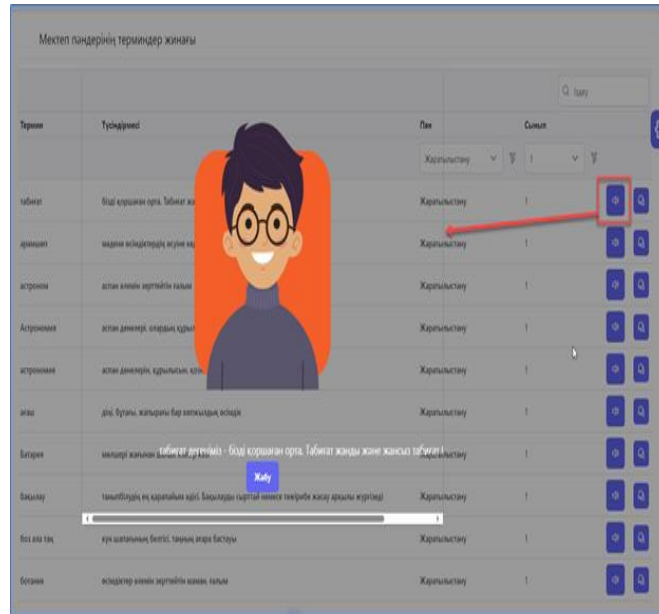


Figure 14 - Pronunciation of terms

## CONCLUSION

In the course of the results obtained at this stage of research, a database of textbooks on school subjects was compiled as the initial information for creating terminological words in the Kazakh language of school subjects, a database of terms was created, and a technical task for a software product of the terminological dictionary was developed, namely:

Collected a database of terms from textbooks taught within the walls of the school on the Kazakh language, the Kazakh literature (literary reading), Mathematics, Natural Science, Self - knowledge, World Studies, Physical Culture, Music, History of Kazakhstan, Computer Science, World History, Local History, Information and communication technologies, Algebra, Geometry, Geography, Biology, Physics, Chemistry, Art work, Fundamentals of law, Algebra and analysis initiatives, Initial Military and technological training, Graphics and design, Basics of entrepreneurship and business.

The main tables in the database of school terms were determined, the key fields were fixed, and the connection between those fields was established;

Based on the created database, the program was developed based on the technical task of the terminological dictionary, its functionality was tested and verified, and a user manual was created.

Evaluation of the completeness of solving the obligations:

All planned obligations have been completely solved.

Recommendations and initial data on actual use of SRW results:

The collected school terms database can be freely used by teachers, parents, teachers or other users of the terminological dictionary software product. The user guide has been updated.

The implementation of the terminology dictionary solves the following problems:

Reduces the time and cost of searching for and understanding information: a terminological dictionary helps you access definitions and explanations of terms.

Improved communication and consistency: helps to eliminate misunderstandings and confusion due to the use of different terms.

Reduction of errors and misunderstandings: by looking at the class of different interpretations of the same term, it can be observed that the age exception is taken into account.

Increase productivity and efficiency: allows quick access to term definitions.

Feedback and correction: users can contact experts.

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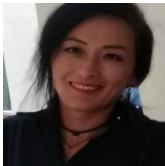
From 1974 to 1975 he was mathematician-programmer with S. M. Kirov Kazakh State University. From 1975 to 1981 he had positions of intern researcher and graduate student of Lomonosov Moscow State University, USSR. From 1981 to 2000 he was Senior Lecturer, Associate Professor, Head of Department with S. M. Kirov Kazakh State University, head of the Laboratory of the Institute of Informatics and Control Problems of the National Academy of Sciences of Kazakhstan, head of the Department at the Kazakh State Academy of Management, director of the Center for Information Technologies. Since 2000 he has been head of the department, professor of the department Technologies of artificial intelligence, L.N. Gumilyov Eurasian National University, Kazakhstan. He is the author of 27 books, more than 400 articles, and more than 30 inventions. His research interests include programming, artificial intelligence, information security and information protection, e-learning.

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She is the author of the following software: technology of automatic create electronic textbooks, system electronic questionnaire of teachers and etc. Also she was involved in projects related to the creation of multimedia learning systems for the Ministry of Education and Science, Ministry of Culture and Information, the Ministry of Finance of Kazakhstan and etc.



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