

# BULGARIAN MULTIMEDIA SIGN LANGUAGE DICTIONARY FOR CHILDREN

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## Abstract

This report describes the problems in the education of deaf children and the role of sign language in communication and forming their own speech. The paper present the role of advanced computer technology and various multimedia tools in the learning process of children with impaired hearing, and the need to integrate these tools and resources in the process of learning. In this connection, the report gives main attention to *Bulgarian Multimedia Sign Language Dictionary for Children*, developed by a team of University of Sofia. This dictionary is designed specifically for children and combines the advantages of modern multimedia technologies and teaching methods to master sign language, which makes it a powerful educational tool.

Multimedia sign dictionary for children contains 2300 vocabulary units of child language. Each unit is represented by an interactive image, sign, one-handed dactyl, written and auditory modality. Special attention is paid to alternative versions of the Bulgarian alphabet – one-handed and two-handed dactyl and alphabet in pictures. Access to its content is provided by alphabetic, character and thematic catalogues and search tool for actual lexical unit.

In alphabetical catalogue for each letter of the alphabet is given a set of lexical units, beginning with this letter. Each lexical unit from the list is illustrated by a picture, video of the gesture, one-handed dactyl displayed the word letter by letter, pronunciation of the word represented by a sound file and games with the word.

In the thematic catalogue lexical items are grouped by themes, each of which is represented by the same attributes as in the alphabetic catalogue.

In character catalogue the letters of the alphabet are represented by a picture of object beginning with this letter, one-handed and two-handed dactyl, and touch gestures of the letter.

The dictionary has very good navigational structure it provides an opportunity to return to the main menu, return step back and exit the program at any time of work. Moreover, at each step in the process of work the user has access to help information.

Multimedia model of sign language dictionary allows creative use and development of new products to support language training and rehabilitation of children with atypical developmental.

## Keywords

Deaf children, children with impaired hearing, sign language, multimedia sign dictionary, special needs education, Imagine.

## Sign language for deaf people

Over the last decade sign language for deaf people has established itself as an alternative linguistic system that is comparable in capacity to meet the communicative, cognitive and personal needs with the auditory-oral language.

The problem with obsessing of language skills is particularly topical in congenital or early acquired deafness. Scientific studies show that deaf children of deaf parents (5-10% of the total population) learn sign language in a comparable mastery of oral language patterns. These children demonstrate significantly higher achievement in the management of oral and written language, higher level of general intellectual development and psycho-social functioning compared with deaf children in hearing families who do not have adequate communication tools. The compensatory potentials of this alternative language are already recognized, and their implementation still in preschool and early rehabilitation, in the communication of parents and children and in the use of general educational content.

Although the sign language of deaf people is recognized as their mother tongue, lack of literacy complicates its assimilation from the hearing people (parents, professionals and peers). Bulgaria is one of the first countries where more than 10 years has created an official (literary) sign language with 5 000 vocabulary units (Union of the Deaf in Bulgaria). In 2006, this dictionary has been expanded and reprinted. Unfortunately, it has not reported the specifics of child language, making it ineffective for purposes of rehabilitation and education.

Group of deaf children is heterogeneous and individual approach to them would indicate the presence of different opportunities to meet their special needs and abilities, especially in terms of integrated training and rehabilitation. The need to integrate alternative linguistic systems in children with various developmental disorders becomes increasingly inescapable fact.

This supposes serious research on both the vocabulary used in language development, language therapy and interpersonal communication and the ability to integrate advanced multimedia and computer technology for video and sound recordings and interactivity in the operation with symbolic characters presented in different language modalities.

## Multimedia sign dictionary for children

### Stages of development

Multimedia sign dictionary for children consists of 2300 vocabulary units of child language based on content analysis of existing image, gestures and language dictionaries for children (paper and software), programs and educational materials approved by the Ministry of education for the comprehensive and special schools.

The process of product development is realized on several major stages:

- Determination of missing in official Bulgarian sign language analogues of verbal units and study of their equivalents in the speech of deaf children with deaf parents and deaf adults;
- Video recording of 2 300 gestures demonstrated by 17 students from special schools in Sofia, Plovdiv and Targovishte, in accordance with the approved principles of Union of the Deaf in Bulgaria in formation of a sign;
- Video recording of hand alphabet – one-handed and two-handed alphabets (dactyl);
- Create a multimedia design of sign dictionary, which combines written, oral, dactyl, image and gestures sign presentation of each lexical unit;
- Program implementation using programming environment *Imagine*.

## Software structure

The Multimedia sign dictionary is stored on DVD. It includes about 2300 lexical units. Access to its content is provided by alphabetic, character and thematic catalogues and search tool for actual lexical unit (Figure 1, Figure 2, Figure 3, Figure 4). Emphasis has placed on the therapeutic possibilities of the dictionary. Each unit is represented by an interactive image, sign, one-handed dactyl, written and auditory modality. Special attention is paid to alternative versions of the Bulgarian alphabet – one-handed and two-handed dactyl and alphabet in pictures.



Figure 1 Initial screen of Multimedia sign dictionary for children



Figure 2 Alphabetic catalogue



Figure 3 Thematic catalogue



Figure 4 Character catalogue

In alphabetical catalogue for each letter of the alphabet is given a set of lexical units, beginning with this letter (Figure 5).



Figure 5 Alphabetic catalogue – letter "A"

Each lexical unit from the list is illustrated by a:

- picture (Figure 6);
- video of the gesture demonstrated by the student comes from a special school (Figure 7);

- one-handed dactyl displayed the word letter by letter (Figure 8);
- pronunciation of the word represented by a sound file;
- games with the word.

Each of these options can be selected via a buttons located on the left side of the screen. The actual presentation of the word in appropriately way is displayed in the main part of the screen. At the bottom of screen has a bar with one-handed dactyl of letters constructing the word, the choice of one of them started in the main part of the screen video with one-handed dactyl of the corresponding letter.



Figure 6 Picture



Figure 7 Video gesture



Figure 8 One-handed dactyl

In the thematic catalogue lexical items are grouped by themes, each of which is represented by the same attributes as in the alphabetic catalogue. There are differentiated seven main topics. They correspond to one of the widely implemented in Bulgaria training programs for preschool age which is developed by a scientific team from the Sofia University (Popzlateva, 1994). The topics are:

- *My World*, which includes words related to the description of body parts, toys, home, food and more (Figure 9);
- *Me and others* – words associated with joint activities in the family, kindergarten, friends and others (Figure 10);
- *Me and Nature* – animals, plants, fruit, vegetables, flowers, seasons, natural phenomena, etc. (Figure 11);
- *I celebrate* - birthdays, Christmas, New Year, Mom's Day, Easter, Holidays and more (Figure 13);
- *The world around me* – a city, village, vehicles, professions and other (Figure 15);

*In the world of fairy tales* - fairy, ethical rules, human qualities and other (Figure 14); *I learn and communicate* – learning activities and materials, tools and standards for communication, greetings and more (Figure 12).



Figure 9 My World



Figure 10 Me and others



Figure 11 Me and Nature



Figure 12 I learn to communicate



Figure 13 I celebrate



Figure 14 In the world of fairy tales



Figure 15 The world around me

Character catalogue of the dictionary is available by clicking the button "alphabet" from the initial screen. There the letters of the alphabet are represented by a picture of object beginning with this letter, one-handed and two-handed dactyl (Figure 16, Figure 17, Figure 18).

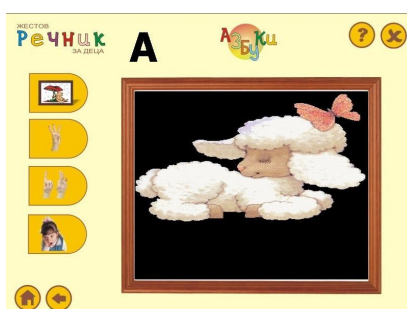


Figure 16 Picture

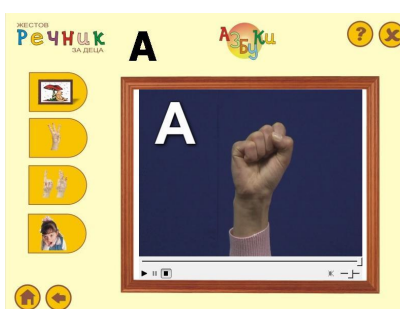


Figure 17 One-handed dactyl



Figure 18 Two-handed dactyl

The dictionary provides an opportunity to find a specific word with a specially designed search tool (Figure 19).

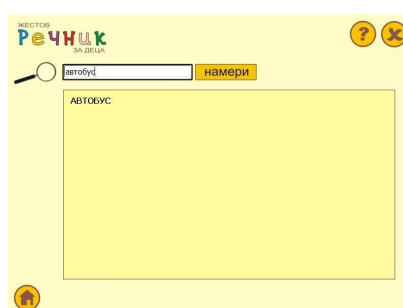


Figure 19 Search tool

In order to master the individual lexical units a separate module with gaming was developed. This module is for developing language skills and basic mental operations through game situations, which are differentiated by several criteria. The games for developing language skills are related between sound, label, sign and its picture. The games for the development of the basic mental operations are meant to identify similarities and differences, setting ratios (at least, most), according to an object or group of objects and environments.

Several types of games that differ in what must be pointed – a gesture or a picture, are developed.



In games to select the correct gesture child may be placed in three different situations - choose one of the displayed gestures corresponding to the showed picture (Figure 20), choose the gesture corresponding to the written word (Figure 21) or select the gesture corresponding to the word shown by one-handed dactyl (Figure 22).

In games to select the right image there are two situations – to choose one of the displayed pictures corresponding to the shown video sign (Figure 23) or selected picture corresponding to the word shown by one-handed dactyl (Figure 24).



Figure 20 Game show the sign – picture

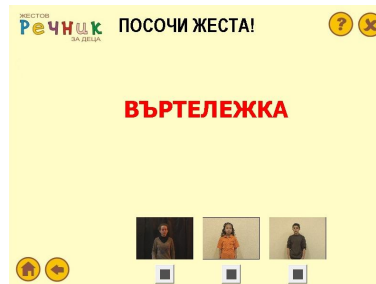


Figure 21 Game show the gesture – word



Figure 22 Game show the gesture – one-handed dactyl



Figure 23 Game show the picture – video gesture



Figure 24 Game show the picture – one-handed dactyl

Games are used to develop teaching module through which to manage their content and degree of difficulty. This allows developing a systematic program for every deaf child, according to his individual special educational needs.

From the methodological point of view, the use of the contents of the dictionary is recommended and should be done through teamwork between the child (children) and teacher (parent). This is of particular importance in the introduction to the letters and words of the thematic catalogs. In it the teacher should draw the attention of the child to the particularities of each gesture and its use. The teacher should ask the child several times repeated gestures shown on screen to assure the proper performance of his child. If this is not done, the student will remain only with the knowledge to understand the language, gestures, but not its use for expression. Two to three new gestures are necessary to make a return to a single gesture, which has already been seen. It requires implementation of the child and then to see the screen video.

When working with the games, the child can be left alone to determine to what extent that he/she understands the gestures. The screen shows only the correct answers and the total number of exercises that are played. At the end of each game, for developing language skills, the teacher can review a list of words that were misspelled by the child. This provides the teacher (parent) feedback on the gaps in language gestures.

The dictionary has very good navigational structure it provides an opportunity to return to the main menu, return step back and exit the program at any time of work. This is done by using the button "Menu", "Back" and "Exit". Moreover, at each step in the process of work the user has access to help information.

Technical characteristics of the captured gestures are based on the HD (High Definition) modern standards. All the requirements of professional cinematography and video editing work - quality lighting, digital media (DV CAM with High Definition recording), suitable optics, wireless microphones of high class, and use of advanced video and audio processing programs are met. The shooting of the individual signs units is made with children of different ages, which further complicates work.

The dictionary is designed to meet the special needs of preschool children with developmental problems and language communication. The modern information technologies, various media types and dedicated rehabilitation provide an effective access for parents and professionals to alternative means of communication and the enrichment of children's linguistic competence in daily life. The dictionary can be used both in special and integrated units of rehabilitation. Multimedia model of sign language dictionary allows creative use and development of new products to support language training and rehabilitation of children with developmental disorders.

### Acknowledgement

The work presented in this paper was supported within the Research Project of Sofia University, Grand agreement №219 - 2009/2010 and №152 – 2010/2011 „Integration of the Sign Language in Psychosocial Rehabilitation of Atypical Children”

The work presented in this paper was partially supported within the project BG 051PO001-3.3.04/13 of the HR Development OP of the European Social Fund 2007-2013.

This paper was partially supported within the SISTER (Strengthening the IST Research Capacity of Sofia University, Grant agreement No 205030) project, funded by European Commission's 7<sup>th</sup> Framework Programme FP7-REGPOT-2007-1.

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