Let's play with keyboard

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Abstract

The paper presents especially developed software applications that aim to teach children with special needs how to perform common keyboard activities. These applications are successfully used in several special schools in Bulgaria. The paper also introduces the results of work with these programs, realised at the Hospital "St. Sofia" (Specialized hospital for residential treatment of prolonged therapy and rehabilitation of children with cerebral palsy, Sofia, Bulgaria).

Keywords

Keyboard, Children with special needs, Computer skills, Comenius Logo, Software applications

6. Introduction

Developing the writing speech is one of the most important skills which define the future personal progress and profesional realisation of man. For most of the children with special needs, especially these with physical disabilities and injuried fine motoric, problems with mastering this skill have been observed. To determine these problems alternative methods of developing writing speech are often used. Computer and its keyboard are main tools for practicing these methods (Ivanov I Zafirova T and Jordanova N, 2005).

During the process of mastering work with keyboard of children with special needs, which is often prolonged for natural reasons, different problems arise. This learning demands not only special methods and well trained teachers, but also special hardware and eligible software (Ivanov I Zafirova T and Jordanova N, 2005), suitable for children's needs.

The presented software package offers one solution for facilitating and mastering the work with symbols and the numeric part of the keyboard. It also allows children to gain some basic preschool knowledge and skills.

The presented software solutions are the result of the common work of the IT team in the Department of Information Technology and the Specialized Hospital for Residential Treatment of Prolonged Therapy and Rehabilitation of Children with Cerebral Palsy. They are developed in a Comenius Logo environment. The open source of the applications allows easy modifications related to the individual needs of users. The software package includes programs for getting control on the mouse (Ivanov I Zafirova T and Jordanova N, 2001a, 2001b) and keyboard. In this paper the programs concerning work with keyboard will be presented in details.

7. What and how we learn from keyboard?

The first step when starting to use keyboard is to familiarize children with the keyboard elements and teach them how to separate in groups the keys and their general functions. Initially children must learn how to use the two main parts of the keyboard – symbolic and numeric pad. Step by step work with other keys and shortcut keys is introduced – quotation marks and symbols, arrow keys, letter + **Shift** for typing capital letter, **Caps Lock** for all capital letters, **Enter** for new paragraph, **Esc** for close program or dialog window.

We offer software solutions developed in Comenius Logo for pre-school teaching of handicapped children,. Training is based on games. Through them children acquire knowledge and skills how to work with the symbolic and the numeric pads.

Besides the physical skills to work with keyboard, these games offer different educational tasks, supporting the intellectual development – counting, calculation, reading, logical arrangement, developing spatial orientation. From learning point of view, using games follows pre-educational preparation aiming sufficient acquisition of educational skills and habits and developing writing skills. A part of them is especially prepared for children with cerebral palsy. The characteristics of the disease are taken into consideration aiming to overcome concrete problems. These games are collected in the software package "Game house" including eleven programs. The other part is meant for children without deficiencies (Ivanov I and Ilieva V, 2001c), but they are successfully used with handicapped children.

8. A software package for computer education of children with special needs

The software package is game-based, and the whole action is inside the "Game House" (Fig. 1).

Figure 1.   Input screen

Games are distributed in several main groups by different areas. Each game has a different educational aim. A different assisting character is responsible for each area. He has its own room and assistants – in charge of separate games. Mr. Mouse (Fig. 2) and his assistants are responsible for mastering skills for work with mouse, Mrs. Book (Fig. 3) and her assistants – for letters, reading and writing, for numbers and counting take care Mr. Abacus (Fig. 4) and his friends and for colors and painting – Mr. Pencil (Fig. 5) and his assistants.
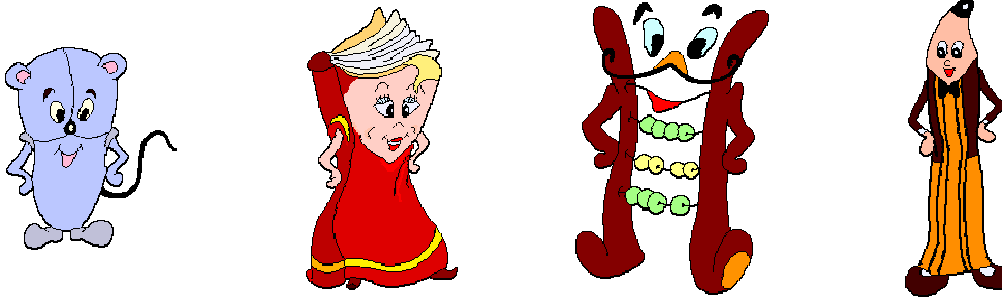
Figure 2. Mr. Mouse   *Figure 3.* Mrs. Book   *Figure 4.* Mr. Abacus   *Figure 5.* Mr. Pencil

The games can be divided in two groups, depending of the role of computer – as a purpose or a means/tool of education (Scheme 1):

- depending on the part of computer system which is master, they can be:

    – programs to get control on the mouse – Silhouettes, Shadows, Sounds, Words (Ivanov I Zafirova T and Jordanova N, 2001b), Colors, Paint
    – programs to get control on the keyboard – Letters, Missing Letters, Sentences, Numbers, Compare

- depending on the subject area, they can be:

    – programs for reading and writing – Words (Ivanov I Zafirova T and Jordanova N, 2001b), Letters, Missing Letters, Sentences
    – programs for numbers (Counting and Compare) – Numbers, Compares
    – programs for developing abstract-logical thinking – Silhouettes, Shadows (Ivanov I Zafirova T and Jordanova N, 2001b)
    – programs for developing hearing and speech – Sounds (Ivanov I Zafirova T and Jordanova N, 2001b)
   – programs for colors and painting – Colors, Paint
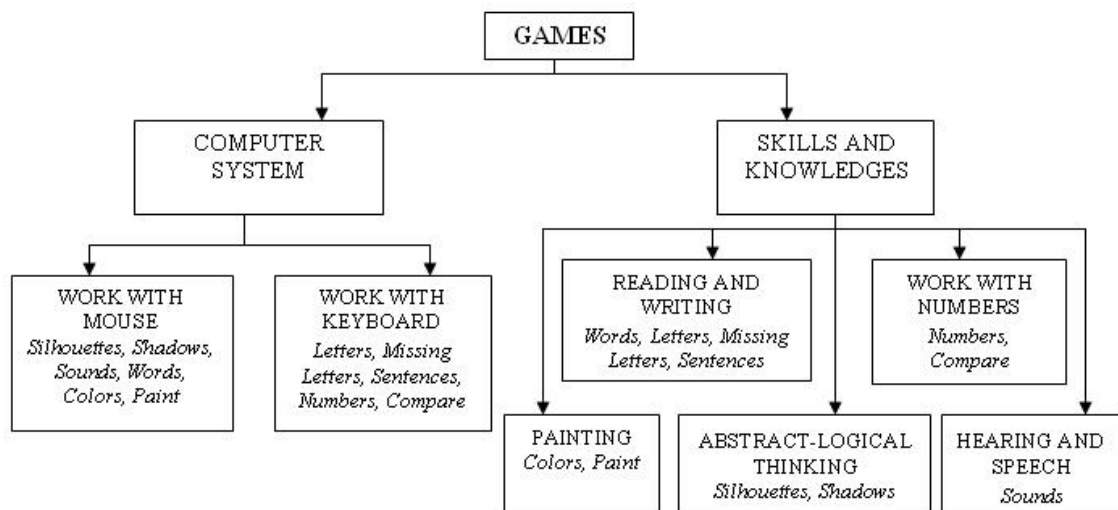
Scheme 1

The presented software has a navigation and help system accessible in each level of package. It is built in a graphical based menu which contains buttons for navigation (for previous level or exit of system) (Fig. 6), settings button (Fig. 7), sound button (Fig. 8) and help button (Fig. 9).

Button for transition to the Main Menu

Buttons for the rooms of the main characters
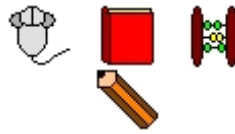
Button for exit from the system

Figure 6.   Navigation buttons

Figure 7.   Setting button   *Figure 8.*   Sound button   *Figure 9.*   Help button

Additional windows with helpful information is opened from the help menu. The information is illustrated by pictures and depends on game or level (Fig. 10, 11, 12).

Figure 10.   Help window – Main menu

Figure 11.   Help window – Mrs. Book's room

Figure 12.   Help window – game "Words" first level

9. The educational games

All games are developed for the sake of mastering the use of the symbolic and numeric part of the keyboard. The educational aim is to find and remember position of each key on the keyboard.

9.1. Letters

The game includes four levels and is designed to get control on the work with the symbolic part of the keyboard, especially to find the position of every letter and remember it. The main task is to enter the initial letter of the name of a randomly chosen object. The information is different at each level.

I level	II level	III level	IV level
A picture appears on the screen and its name stays above. The user ought to enter the first letter of the object's name.	A picture appears on the screen without its name. If the typed letter is correct, it is written above the object.	A shadow of an object appears on the screen. The object's silhouette ought to be recognized and its initial letter typed. If the typed letter is correct, the object's name appears and the shadow becomes a colored picture.	The user hears name of an object which first letter ought to be input. If the typed letter is correct, it is written on the screen and the object appears.

9.2. Missing Letters

The game consists of three levels and is designed to get control over the work with the symbolic part of the keyboard. The main activity is to enter the missing letter of a randomly chosen word. The missing letter may have been placed on different positions. The user has to enter the missing letter. If the typed letter is correct, the user is given opportunity to paint the picture.

I level	II level	III level
A contour of a picture appears on the screen and below it is its name with missing first letter.	A contour of a picture appears on the screen and below it is its name with missing last letter.	A contour of a picture appears on the screen and below it is its name with a missing letter, different from the first and last one.

9.3. Sentences

Game "Sentences" is designed to train working with the symbol keys of the keyboard. It also improves the knowledge and skills for constructing grammatically correct sentences from a given number of words.

In the beginning of the game the user has to enter his/her name and at the end his/her results could be kept – such as time moments of game start and finish, correct and wrong sentences.

The working screen of the game shows a picture and several words (Fig. 13). Some of the words correspond to the picture. The user has to eliminate the unnecessary words, and from the rest to construct a grammatically correct sentence by entering it from the keyboard (the sentence should start with a capital letter and end with a full stop.). The loaded picture and level of difficulty may be changed (Fig. 14) (e.g. to construct simple sentences – consisting of a subject and a verb, or more complex ones – having other parts of the speech).

Figure 13.   Work screen

Figure 14.   Change picture and level of difficulty

9.4. Numbers

The game consists of three levels and is designed to get control on the work with the number part of the keyboard. The main activity is to enter the number of objects on the screen.

| I level	II level	III level
A random number of copies of a picture appear on the screen (between 1 and 9). The user has to enter the correct digit corresponding to the number of the copies.	A random number of different pictures appear on the screen (between 1 and 9). The user has to enter the correct digit according the number of all pictures.	A random number of pictures appear on the screen (between 1 and 9). Some of them could be repeated. The user hears the name of one picture and must enter the correct digit correspponding to the number of the copies of thid picture.
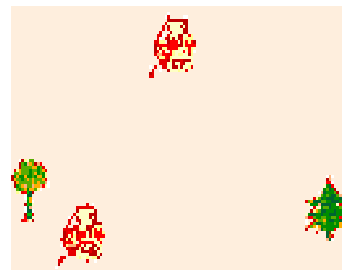
9.5. Compare

Game "Compare" is designed to form quantity concepts and mostly to understand the idea for more and less. It also improves working with the numeric block of the keyboard. The user has to compare two random numbers between 1 and 9. Each number is presented quantitatively by

loading a suitable number of objects vertically (Fig. 15) (one above another). Thus the user can connect the number with the quantity it represents. The names of the digits and the task are heard when objects appear on the screen (e.g. "Which of numbers 5 and 2 is larger?"). The numbers to compare and the question ("more" or "less"). The user has to enter the right digit from the keyboard. When he/she enters any digit, it appears on the screen and its name is heard (Fig. 16). Thus the user could learn the graphical appearance of the digit and the quantity it means at the same time.

The game allows custom setup for the background color, font properties, the color of the appearing digits and the interval in which digits are compared (Fig. 17) (e.g. if the interval is determined from 2 to 5, the tasks of the game would be to compare all the digits between 2 and 5, including 2, 3, 4 and 5).

The game presents the user with the graphical appearance of the digits from 1 to 9 and the names, corresponding to them. It reveals abstract-logical way of thinking, ability to count, and forms quantitatively concepts.

| *Figure 15.* Initial screen | *Figure 16.* Correct answer | *Figure 17.* Custom setting |

10. Influence upon children's development by usage of keyboard

Along with the work with keyboard the following advantages and disadvantages were observed with children having cerebral palsy.

Disadvantages appear when children have high degree of damages on the grobe function and when they have both physical and intellectual deficiencies. In both cases motivation for working with keyboard is low. Children find it impossible to acquire the skills as a result of difficult positioning of the hands on the keyboard and lack of abstract-logical thinking.

In the rest of the cases during the work with keyboard the following advantages are noticed:

Owing to the opportunities offered by Comenius Logo and especially developed training games, improvement on spatial orientation has been observed. This is a very important component in educating children, influencing the skill of a child to work sufficiently with a computer.

This reduces frequency of mistakes such as replacing one letter with another and allows almost appropriate control of the arrow keys and key pads.

Development of writing through alternative methods influences general education and allows handicapped children to communicate, to express thoughts, feelings and wishes.

Usage of mixed keyboards from children with cerebral palsy and high intellect brings at one and the same time acquisition of using symbol keys in Latin and Cyrillic. This gives rise to their further professional orientation.

11. Conclusion

Development of writing through alternative methods with children having cerebral palsy is based on the child's fine motoric. It is connected to ability for acquiring writing techniques and visual memory that affects the memorization of the letters and combinations that form a syllabus and a word.

Working with keyboard gives the opportunity of children to develop their own writing skills, opening ways for new communication. The general skill of using keyboard and a computer offers positive prospects for their future development and professional horizons.

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