

ToolKID – Logo language based software package for children

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Abstract

The proposed paper describes a software package titled ToolKID, based on Comenius Logo language. This package is addressed to children teaching/training. It is used in Bulgarian primary schools for teaching ICT. The programmes included in it provide an environment for carrying out all activities laid-down in the National School Curriculum for working with computers. The software programmes included in the package are classified in 7 main groups: Educational games, Drawing Programmes, Text Programmes, Sound Programmes, Animation and Video, Multimedia Programmes, Algorithms and Programming. In active and easy way children can use the resources created within one programme (like backgrounds, animation, images, sounds, etc.) in the other programmes of the package. This transferability and flexibility supports children creativity when they have to work on different project topics. Some similar software packages for children developed in different countries are also presented.

Keywords

ICT curriculum, primary school, software (SW) package, Comenius Logo language

1. The needs

The National Curriculum for Working with Computers and IT in Primary School was adopted in 1998 (Ilieva V. and Ivanov I., 2001). At that time, training was the first step of the complete process of ICT teaching at school. The main aim of the Curriculum used in this training is to give an initial knowledge on the possibilities offered by the modern computer systems. Children acquire that kind of knowledge and skills by operating with different types of information – graphics, text, sounds, animation and video, and combining them into one know-how. The national curriculum gives the beneficial possibility for implementation of a series of activities. They can be performed only if there is a special software appropriate for this age level. This urges the necessity of providing primary schools with a complete package for ICT learning.

2. Software packages for children

The primary schools of the developed European countries have several similar packages at a disposal. The Russian schools use Robotlandia [2], in the Greek schools - MultiLAND (Kotsanis, Y., Barianis, G., Triantafillou, S., 1995), Great Britain uses Infant Video Toolkit [4], Early Essentials (Casdoso, I., Prof. Dr. Pessoa, T. and Dr. Correia, S 2003), SuperTools. In the USA, Kid Pix Studio Deluxe is the package used for these purposes, however, there is

not an official subject in the primary school Curriculum. Almost all of the mentioned software packages have several specific features:

- single-type toolkit for performing basic tasks in the variable programmes;
- task performing at different levels of difficulty;
- variety of activities that stimulate the creativity;
- task performing connected to the content of different school subjects;
- opportunity for the teacher to adapt the programmes to the individual needs of the student;
- pictured menu for access to the commands, as some of these pictures are duplicated with a text;
- access to different programmes through a common main screen.

The software programmes included in the children packages can be divided into two main groups: *creation tools* (editors) and *educational games*.

The number of those from the first group is considerably greater. Such software programmes are available in all packages. Generally, they are used for teaching Information Technologies, which is aimed at the abilities of the modern computers to process different type of information. They offer toolkits, which allow the children to create products of different sophistication and a variety of themes. From one point of view, this allows their continuous usage in time, and that guarantees acquirement and assimilation of the knowledge and abilities.

Graphics and text, and their combining are the most commonly used features from the group of the creation tools. The next are those for sound and graphical interpretation of data (diagrams, charts). The availability of one or another type of creation software programme is determined by the activities that have to be preformed in the Bulgarian National Curriculum for IT Training in the Primary School.

The second group of software programmes - educational games - offers a game environment for assimilating subject contents. They also develop children's thinking abilities. In addition to the simulation games provided, we also include puzzles for solving. The educational games included in the packages support the development of certain knowledge and abilities, in which children have to find a solution in a definite situation. English packages include programmes for robot navigating. Greek software MultiLAND presents game programmes, for solving mathematical tasks. Russian Robotlandia contains a huge variety of games – from tasks connected with math's knowledge (Automat, Pluscho) to tasks that help (to) develop logical and algorithm thinking (Driver, Horses, Pouring, Letter-Eater).

3. An overview on the use of software packages for children in Bulgaria

The Bulgarian primary school Curriculum "Working with Computers and IT" consists of eleven learning modules. The basic level of knowledge and abilities should be completed in a 4-year educational period. The activities that children perform in class are highly variable. They start from colouring ready images, go through creating such images, inserting text with the keyboard and formatting it, combining graphics and text, recording their own voices, creating animation cards, till they start working with multimedia and programming (V. Ilieva and I. Ivanov, 1999). These activities definitely need to be enhanced with suitable software solutions.

“Programming” is one of the educational modules based on the Logo language. It is popular as a language appropriate for young students. Logo is well known in Bulgaria since the 1980s. It was used experimentally by the Problem Group of Education led by Acad. Blagovest Sendov.

A newer version of Logo language was developed by three university teachers from the Comenius University, Bratislava – Ivan Kalash, Andrej Blaho, and Peter Tomcsanyi. In 1994, this version was adapted by the Department of Information Technologies (DIT) at Sofia University “St. Kliment Ohridski” and named Comenius Logo. It is used in the environment of the Windows operating system. This software contains a variety of possibilities for applications’ development with different levels of sophistication. The work environment and the help documentation are in the Bulgarian language. The software contains an editor for creating animation images. Based on these characteristics, the Bulgarian team chose this software for teaching ICT in the primary school.

Separate software programmes offering different activities in the school curriculum were developed in a 5-year period by DIT. The team was lead by the authors of the national curriculum (V. Ilieva and I. Ivanov, 2001).

In the beginning (1998), ready demonstration programmes (**Cats, Carlson, Paint, Merlin, Frogs, Flake, Symmetry and Tour**) of the Comenius Logo package were adapted. The adaptation included the translation of the programme’s dialogues and adding a new function that allows longer operating with the programmes. Later on, the development of necessary new programmes offering specific activities in the school programme started. Each new SW programme developed was tested by the students of the Private Language School “St. St. Cyril and Methodius” where the authors of the national curriculum teach ICT.

The First National Work Meeting “Information and Communication Technologies in the Primary Stage of the Bulgarian School” [7] was organised in 2001. Nearly 20 programmes for education in ICT from 1st to 4th grade were developed till then. During this meeting, teachers from all over the country expressed their opinions on the software specifications, shared ideas, and formulated special recommendations for its further development. As a result, some of the programmes included in the currently active package were created.

Each programme works in the Comenius Logo environment (Fig. 1). The features of this environment are placed on the work screen together with the applications created in it. Thus, students and teachers are under the impression that the programme software and the programmes used within it are one and the same thing. This provoked us to set the programmes in a separate package, which we named ToolKID. The package contents were presented by the unification of the user’s interface and a common entry screen for all programmes was created. By doing so, the Comenius Logo became a part of the package.

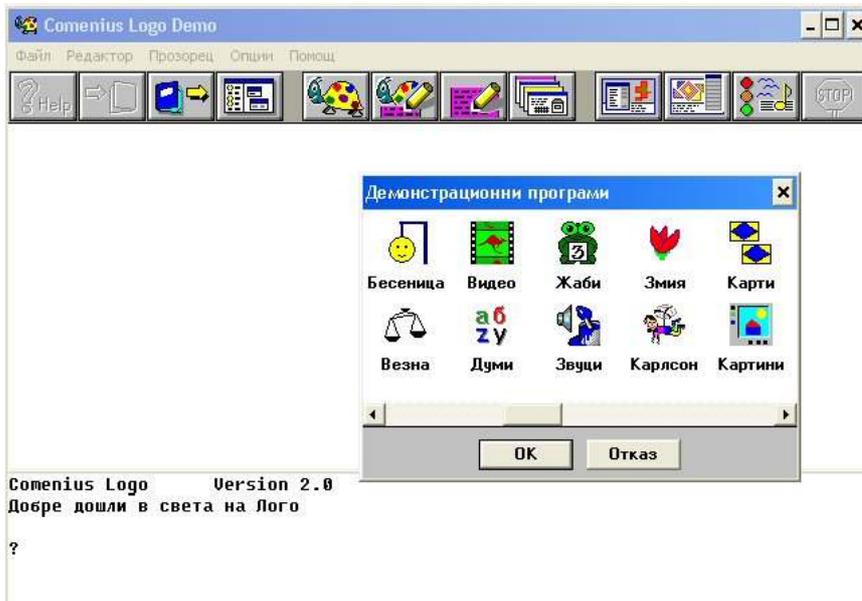


Figure 1 Demo window of Comenius Logo

4. ToolKID – package contents

Today the software package ToolKID contains more than 40 programmes divided in 7 groups: Educational games, Drawing programmes, Text programmes, Sound programmes, Animation and Video, Data Combining, Algorithms and Programming. These groups are presented in the main screen with images giving hints about the type of the programmes included in them (Fig. 2). The programmes of each programme group are presented by image buttons and the name of the programme (Fig. 3).

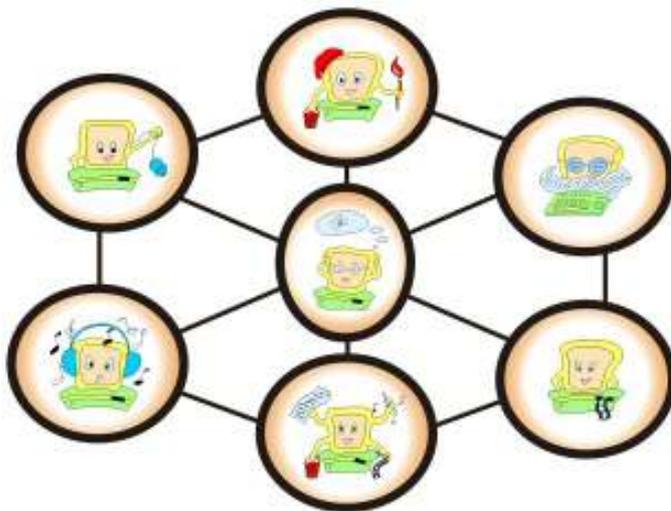


Figure 2 Entry screen ToolKID

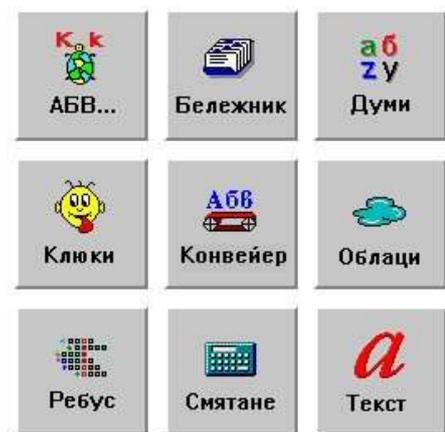


Figure 3 Text programmes

The group of **Educational games** contains programmes, which main purpose is to teach how to use the mouse. Some of the programmes start with free moving of the mouse on the pad (**Silhouettes**, **Cat**), other require a single click with the mouse (**Banica**, **Cards**), until children reach the most complicated performance – dragging with a pressed down button of the mouse (**Spring**, **Christmas**, **Synoptic**). Each programme contains an educational task, the performance of which requires usage of one or another move with the mouse.

The **Drawing** group contains painting programme (**Colour**) (Fig. 5), image constructing by means of given elements (**Merlin**) and a free hand colouring programme (**Faces**) (Fig. 4), (**Pictures, Symmetry, Paintings**).

The **Text** programmes give an environment for different activities to acquire the symbol block on the keyboard and thus to fulfil the main task of the primary education – literacy. It starts with inserting separate letters (**ABC...**, **Clouds**), goes through composing words (**Conveyers, Notebook, Rebus**) and sentences (**Gossip**), and reaches text inserting and formatting (**Text**).

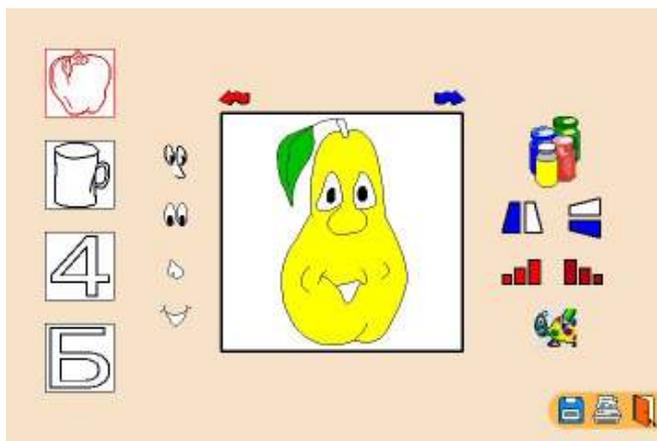


Figure 4 Programme Faces

The group **Animation and Video**, supports children in getting acquainted with the opportunities of the computer to re-produce video images (**Video**) and to create animation images that combine a sequence of slides (**Animator**).

The group **Programmes for sound** contains applications for listening sounds coming from the loudspeaker (**Music**) or the sound card (**Sounds**). Besides, they can record their own voices with a microphone and create audio clips and combine them with the musical background (**Mix**).

The **Combining programmes** offers a great variety of opportunities for the children to combine different types of data in one unity. Here they can create their own animation cards (**Greeting Cards**), fairytales with pictures and texts (**Fairytales**), cartoons of several pages (**Comics**), films (**Cinema**), and show a sequence of pictures (**Slideshow**).

The group **Algorithms and Programming** collects programmes that develop the algorithm thinking (**Pouring, At the river, Towers, Paths**), mathematical knowledge / the knowledge of mathematics (**Figures, How many they are?**) and lead to the world of the turtle geometry (**Labyrinth**).

5. Characteristics of the package

The opportunity for international utilisation of the programmes is an important characteristics of the software package. The child can work with some programmes for element creating, which can be used also in other programmes from ToolKID. For example, when working with graphics, the created images in the **Faces** programme (Fig. 4) can be used in the drawing programmes (**Pictures, Painter, Drawings**) as well as in the programmes for data combining (**Cards, Comics, Cinema**). When a picture has been created by the drawing programmes, it can be used in the programmes for sound using (**Sounds** – to bind a sound to a picture) as well as in those for combining (**Cards, Comics, Cinema, SlideShow**). By the sound programmes children can create sound sources that can be used not only among the programmes from this group (the composed melodies in **Piano** can be added to **Music**), but also in the programmes for data combining.

This activity is best performed when children work on projects with a higher level of difficulty, such as creating an animation movie with several scenes. In such a project, the

child is required to create several elements: sceneries, actors and speech. The development of each of these information elements requires the use of concrete programmes, due to the differences of their characteristics. The programme **Cinema** intended for such constructions makes the actual combining.

Some of the programmes allow saving the created product in a format that can be used in other applications not included in the package, for example MS Word, Paint. Most often, these are pictures created by graphics programmes or programmes for recording a sound coming from a microphone. By doing so, the teacher gains integration between the specialised software package and the standard applications used by older students. That enhances the further utilisation of the resources, created during the learning process, by programmes that children will inevitably encounter in the future as users.

5.1. Adaptivity

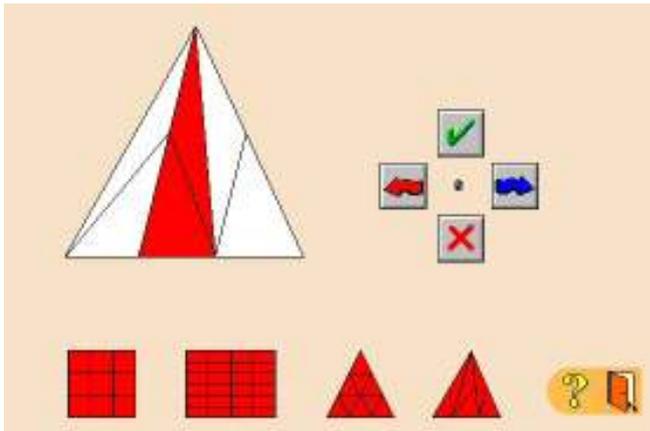
The term “adaptivity” is used to reflect on the possibilities for software products to be adapted. In ToolKID this setting refers to the possibility of determining the contents, as the child adds or changes the text, graphics or other type of programme’s contents. Referring to the text, this can be the words used by the child to build a sentence (**Gossip**) or to guess the missing letter (**Clouds**), or numerical expressions (**Calculation**), where the number of the objects to play with has to be estimated (**Towers**). Referring to the images – these are the pictures for colouring (**Colour**), constructing elements, or the cartoon characters. When we talk about different types of contents of the programme, we mean using sound sources or video sources.

The existing options to adjust the programme can be used by initialising the file of the programme or by a special application. The selection of the first option will lead to its limited usage, because it requires the user to have skills for reading and editing instructions with a fixed syntax.

The second option requires the existence of special additions, in which with the help of dialogue windows, radio buttons, pop-up menus and helpers, the teacher can determine the set of tools and their characteristics. The main part of the ToolKID programmes contains options for tuning in exactly that way. They become accessible from the Comenius Logo environment. They are showed as buttons allowing teachers not familiar with the syntax of the programme language to change the main options when using a programme. With Comenius Logo the user has access to the programme code of the applications and can change them whenever he/she wants. This option is very important when using the module “Programming” of the school programme. Then the children can see how to (?) do the programmes, they have used for different activities (Dicheva, D., Nikolov, R. and Sendova, E., 1997).

5.2. Educational capacity

The purpose of the created package is to give an appropriate environment for carrying out specially designed lessons on IT in primary school. For this reason, it contains tasks connected to this specific type of education. Most of the programmes in the group Educational games contain educational matters. Part of them comprises educational content related to the objects taught in primary school – “Bulgarian language” (**ABC...**), “Native land” (**Synoptic**), “Mathematics” (**How many they are?, Figures**) (Fig. 5), “English language” (**Cards**). In other parts, the educational content is linked to the development of such knowledge skills, as activity planning and structuring, information searching, and using, decision making, etc. (**At the river**) (Fig. 6)

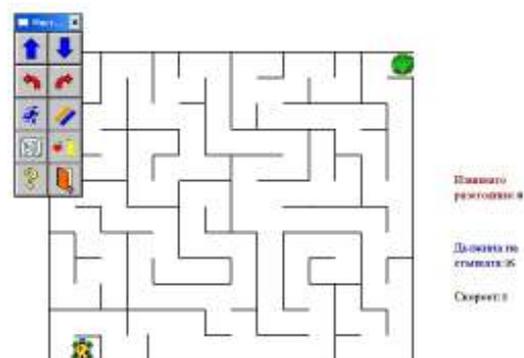
Figure 5 Programme **Figures**Figure 6 Programme **At the river**

6. Graphical design of ToolKID

Image buttons present all commands that have to be performed in order to facilitate the programme utilisation and avoid the use of reading skills very weak in children at this age. The main images are:



The work screen of the programmes has a similar structure. (Fig. 4, 5, 6) – a bar is situated on the downright corner with the main tools used when working with a document. The main part is occupied by the work area of the programme. In some of the programmes (**Creating Cards**, **Labyrinth**) the tools are situated on a moving bar (Fig. 7, 8) because of the specific of the programme.

Figure 7 Programme **Greeting Cards**Figure 8 Programme **Labirinth**

The keyboard keys have the same use in different programmes. For example, the ESC key is the key for exiting the programme or any of its levels. All programmes provide children with a help button supporting them to perform the activity required.

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