ELECTRONIC DIDACTIC TOOL FOR PRIMARY SCHOOLS IN CZECH REPUBLIC

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Abstract

The purpose of the paper was to create some electronic education tool for the elementary school in the Czech Republic and to implement it there. Through multimedia courses the graphics programs Zoner Callisto, Gimp and Picasa were presented to pupils. Created multimedia courses lead students to learn the basics of graphics programs. Courses that make up the lesson can be used as a standalone didactic tool, or as part of the teaching process in the primary schools. The theoretical part is focused on the basic concepts that affect teaching aids and virtual learning environments. In the practical part, the own tool for the given programs is presented. It is concluded with the evaluation of the quantitative research of the created didactic tool.

1. Introduction

Children nowadays grow up with computers and they use new technologies, so they have a lot of experience with them and spend a lot of time with them. Teaching process in schools tries to bring these new trends, the usage of computers.

Therefore didactic systems are of big interest during last years. The role of didactic communication in educational activity was presented by Blândul [7] and also verified by questionnaire. Theoretical background, design and implementation of didactic system was done for example by Vizgirdaite and Juceviciene [10]. Didactic approach could be also implemented in new curriculum as was done for example by Trepule et al. [8] or just in one subject to make it more attractive. The usage of augmented reality was proven as a good approach [9].

Our task was to create a teaching aid in the form of a multimedia course. Through lessons the created aid introduces primary school pupils to work with Zoner Callisto, Gimp and Picasa. The new form of the curriculum go through the basic operations and later advanced features that offer selected programs. To create multimedia courses for students we approached the response of the pupils taking into account their age, interests, perceptions and experience of working with computers.

Individual lessons with the created aid for students must represent an attractive alternative to the classical way of teaching. The created tool might be used not only in school but also in the pupils´ extracurricular activities and maybe even later in the process. Therefore are demonstrated the best features of the used graphical programs.
Interesting paper about pupils ICT competences was published by Aesaert et al. [5]. Analysis of classroom practices with ICT resousce was done by Ramírez et al. [5].

The theoretical part is focused on the basic concepts related to virtual teaching environment. It will introduce Zoner Callisto, Gimp and Picasa. In the practical part, we presented created videos and individual lessons that form together the complex electronic teaching aid for the students of the primary schools. Finally, the quantitative research is presented.

2. Theoretical Part

2.1. Educational resources

They are represented by the objects and phenomena, which are used to achieve the objectives. They include everything that is necessary to meet the educational objectives.
Educational resources serve teachers and students. They work to secure and optimize educational process. Their development is an important part of the development of culture, technology and society.

The basic teaching resources include teaching aids. They have different functions and the teachers need to choose the right ones in their work. Proper selection and its application leads the pupils to be active, creative and provides greater autonomy.
Educational resources are:

Material
- Classrooms + Equipment
- Educational Technology
- Teaching Aids
- Pupil Aids

Not material

- Teaching Methods
- Organizational Forms
- Teaching Principles

2.2. Teaching techniques

Among didactic techniques, we include equipment and technical installations that provide information into didactic process, through images and sound. They must be easily accessible and easy to handle. These techniques include computer equipment.

The computer at school is one of the options of teaching resources that a teacher has available.
Teaching regulated programs, algorithms, guidelines and procedures are called the regulatory plan in the Czech Republic. Choosing the right educational program is very important because the teacher must submit to a certain extent. Although the technology is constantly evolving, the teacher remains a key determinant of teaching.

2.3. The method of discovery and managed discovery

We went through teaching methods that are commonly used at schools.We choose the method of exploring and discovering although for novice and inexperienced teachers it is not suitable.

In traditional classes, students are lead in the class by a teacher. Teachers transmit the information, explain concepts and pupils they are expected to remember and use information.

When using methods of discovery and managed discovery is expected that students will be present in the curriculum, but methods and principles come alone although with some help and after special training.

The method of discovery must be well planned and verified. It represents the active form of learning, challenging but fun task that pupils are able to handle.

It motivates all students and those who are not very active. We must emphasize that if the subject matter on this method is set incorrectly or inappropriately it may happen that the student won´t learn anything, he or she will be confused and finally it might be a waste of time. [4]

Seven principles how to use the discovery method correctly:
1. All the essential basic knowledge and skills that will be needed for successful management should be available.
2. To understand properly the system of education.
3. The ability to create the partially tasks.
4. Ability to follow the work of pupils.
5. When the topic is selected, everyone should know it well.
6. Enough time available.
7. To carry out summary and analysis of the knowledge.

Pupils accustomed to the traditional teaching method of discovery must practice beforehand. We should always respect the existing knowledge and skills of students.

The main advantages of discovery learning method are:
- It is an active, motivating and fun
- It leads to a clear understanding of the subject through the previous knowledge and experience.
- Requires reviews from students, creative thinking, problem solving and analysis. When compared to the traditional method, it requires attention and mostly understanding.
- Pupils should be seen as a part of the learning activity which is held by themselves.
- Pupils are pleased that they solve things by themselves and it increases their intrinsic motivation.

Pupils need to have theoretical knowledge in the field of science that is related to the work programs and manage the technical side of the program. It is important to show them how to work with the graphical editors. In the video it is necessary to explain how to guide the learner and how to use the various technical issues. They need a lot of time and opportunity to repeat the task.

2.4. Creativity and ingenuity

To work with computer programs it is very important to have the creativity and ingenuity.
Creativity is not just for people oriented in arts, but it is also essential for normal life and must be nurtured and coaching.

Creative work is needed in the school for all disciplines.
- It develops the ability for creative thinking
- It increases the motivation
- It promotes expressing and exploring the feelings and ideas

The creative process goes through several phases. The task of the teacher is to perform and help the students to pass all stages of the creative process. The teacher must choose one activity that would overcome the shortage of ideas to help the student to decide how to continue the work. Creative work is not exactly to plan ahead, so it is not easy to use in the classroom. Working in graphic editors requires a creative job with a certain amount of skill.

2.5. Older school age

We would like to briefly mention the target group of students for whom the electronic didactic aid was created. It is for the children from 11 to 15 years old. They are so-called pre-teen, or even puberty. In this period, the children are in the large psychological, biological and social changes. Aside from the biological changes, when the children become adults and handle the difficult stage of life is not easy.

Together with the parents, the teachers play important role in this age. For adolescence are typical immaturity attitudes, they need social contact with peers. Child seeks other authority than parents. The authority may be a famous hockey player, but also a great teacher. The child tends to become independent. He plays a big role in leisure. The child begins to be interested in reading more complicated games, sports, mystery, art and romance.

Perception is manifested primarily in the area of intellectual and gradually equalized adults. Children do not have the optimal state of attention, they have difficulties with concentration. But imagination and the ability to think abstractly rapidly increases together with the cognitive abilities. Thinking becomes independent. The child has a need to freely and independently develop his or her wishes. [4]

3. Short characteristics of graphical programs which are presented in the created teaching aid

3.1. Zoner callisto

Zoner Callisto is a vector graphics editor from the Czech company Zoner Software Ltd. It is designed for processing vector graphics. Its properties and method of operation can be measured with global programs Adobe Illustrator and Corel Draw. It does not have as many features as software mentioned before, but is affordable and adequate for normal use. It is used in many areas.

We meet with pictures or any other graphics every day. It is not briefly possible to list all the options that Zoner Draw offers. It can be used everywhere where something needs to write or draw on paper.

Here are some of the areas in which Zoner Draw is used:
- Business companies - the substantial use of graphic editor. From the logo, through promotion, invitations, presentations on the web, charts, labels to sign on the door.
- Manufacturing companies - they can use Zoner Draw for product assembly instructions, materials list, simpler plans, drawings and more.
- Private use - business cards, wishes and congratulations, invitations, scrapbooks of photographs, graphic design of the elements in the interior.
- For children - we can create coloring books, drawings, children's themes, and more.
- Use for schools and educational facilities.

Preparation of teaching materials, exams and tests, blank maps, road signs, evaluation sheets, timetables, decoration boards, information materials, invitations etc. [3]

3.2. Gimp

GIMP is an acronym for Graphic Image Manipulation Program - a free program for image editing. It represents a raster, bitmap editor. It contains a number of tools for editing and graphics creation. It is available for free, so it is very popular and widespread.
Some tools we introduce here:
- Extensive range of drawing tools - brush, pencil, ink and gum.
- Working with layers - a selection with a range of basic tools. From rectangular areas to the intelligent selection tools scissors.
- Editing and creating graphics - using the built-in filters, automatic creation of shadows, lighting effects and rendering textures and shapes.
- Self native XCF format - for saving unfinished graphics. [2]

3.3. Google picasa

Picasa belongs to the family of software for image management. It helps us to sort a large number of photos and perform simple editing on images. You can view them using Picasa Photo Viewer or share it with friends on the Internet. It belongs to the group of the programs that are available free of charge (freeware) and their advantage is that they are multiplatform. It can be installed on multiple operating systems.

Google bought the application from Idealab. It was originally designed only for Windows. From the other versions of operating systems running on the Linux kernel, Picasa has become a very popular program for its simplicity, range of applications, as well as accessibility.

First, it has become popular especially among photographers. It got a quick and easy utility. The advantage was multifunctionality. Photos are sorted, edited and then displayed. [1]

4. Description of new multimedia courses

One of the tasks was to create multimedia courses for three graphic programs. Zoner Callisto, Gimp, and any image viewer, we chose Google Picasa. In each lesson students should become familiar with the programs and to learn how to work with them.

4.1. Zoner callisto

Lesson 1 - Introduction to Zoner Callisto

Zoner Callisto is the program from the family of the programs for processing vector graphics.
Lesson describes opening your file, using the command in the main menu, creating new blank document: File -> New
Lesson continues by the description of the working environment
- Main menu - a list of all functions.
- First toolbar - buttons that are associated with the currently selected tool or function.
- The second panel - text modification.
- The left edge of the window - the most commonly used tools for working with the program.
- Standard toolbar - creating the most basic objects and edit them.
- Lower half of the main window - tools designed to scale and perspective to the desktop document.
- The bottom part of the program - color palette by which adjusts the color of objects.

Sample and examples:
- Drawing objects.
- General operations with objects.
- Settings colors of objects.

More attention in first lesson deals with text and working with text.
- The text is inserted as a new object - text frame.
- On the left of the toolbar, click the icon letter A.
- Create a text box to type text. We can work with it, resize, rotate etc.
- Text adjustments using the toolbar.

Sample text on a curve
- Create a curve or object.
- Click the left toolbar icon in the form of the letter A. The mouse cursor will change to a mouse with a letter.
- Click on the curve, the cursor, and we can start writing.
- Editing text on a curve is the same as editing text in a classical text frame.

Lesson 2 - Draw basic objects

All forms of objects can be found using the icons object. Bar appears where you can choose from the shapes. We have three options to draw the object.

a) 1st option how to draw an object
- Select the icon of the object.
- The appearance of mouse cursor changes to cross a symbol of the selected shape.
- Set into the area where you wish to place the object.
- Press and hold the left mouse button and slowly drag designated direction. At the same time on the desktop is created a selected shape.

b) 2nd option how to draw an object
- Select an object and a way of drawing, there is a change on the icon on the top toolbar.
- The icon of the arrow coming out of the corner of the square - a new object is created from the corner to the other corner.
- The icon of the arrow coming from the center - object is created in the middle.
- The icon of the squares with a circular arrow - the object is created from the center with the possibility of rotation of the object.
- Finally the object is drawn.

c) 3rd option how to draw an object
- Select the icon of the object.
- Set into the area where you wish to place the object.
- Open the window in the document and set its parameters.
  Each object has different parameters, eg. the height, width, angle, etc.
- Confirm a setting.
- The object is drawn to the designated place.

Lesson includes several separate tasks to practice the subject matter.

Lesson 3 - General operations with objects

Relocation of the facility
- Set the mouse to the space object that you want to move.
- Press and hold the left mouse button and drag the object in the desired direction. Press release.

Resizing
- Click the object for which you want to resize, once the left mouse button.
  At the edge of the object appears as a group of small squares (gripping points). Using them perform resizing.
- Set the gripping corner point, so that the shape of the mouse changed to double-headed arrow.
- Use the mouse to drag toward the object, or the object out. The building is currently changing.
- The size of an object varies evenly and prevents deformation. If you drag the point on the sides and resize the object is deformed.

Rotate and skew the object
- Click on the object twice and squares instead of arrows are displayed, plus a circle with a cross. This is the mode in which the object may be rotated. The rotation axis is a circle with a cross in the middle.
- Click on the object twice.
- Press and hold the left mouse button on the arrow that appears at the long side of the object. The object skew in the direction.
- Clicking on any corner arrows rotates the object.
- The position of the pivot point or angle can be changed.

Lesson 4 - Drawing lines and curves

The lines and curves are designed by the instrument panel that appears when you click the icon, curves and lines (Fig. 1) We have three types of lines.
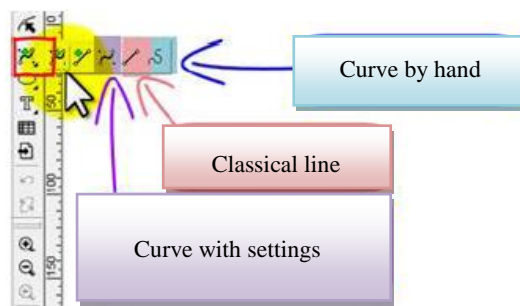

Fig. 1. Button curve lines in Zoner Callisto

Classic Line
- Click the icon Lines.
- Set the position in the document where the line will start - the starting point of the line.
- Using the left mouse button, drag the desired direction. The line is drawn, and we see how it looks and the way is.
- Release the mouse button and the line is complete.
- We can always build on the end of the line and draw from the place where she ended up. In this way, we create a pattern.

Curve "by hand"
- Click the icon for drawing curves freehand.
- Set the desktop, press and hold the left mouse button and draw.
- If we connect the start and end point of the line, there will be an object that has not only the line but also filler.

Curve with setting the vector
- Click the icon Curves.
- Move the mouse, as in the creation of other lines.

- At the first point of the curve arises dotted line. It determines the shape vector which will define the curve.
- Click the endpoint future curves and set parameters for the direction vector. We see the future shape of the curve.

Lesson includes practicing subject matter, but also repetition of general operations with objects. We find that the general operations can be applied to curves and lines.

Lesson 5 - Setting the color of objects

For vector objects, you can set the foreground color (usually lines) and the background color (usually fillings). How to adjust the color palette of colors is presented here.
- The color palette can be displayed using the command: View -> Color.
- Denote an object to display gripping squares.
- Change the color line - Left-click on the desired color and it will be set.
- To change the fill color - use the right mouse button.
- Another method is the application of color by dragging a color to an object.
- Zoner Callisto offers other options for coloring objects.

Lesson 6 - Specific settings of some objects

Each object is something specific and it can be variously modified.

Setting the edges of the rectangle and square

At rectangle and square, you can set several types of bevels. The corners may be chamfered, rounded or undercut.
- Mark the object
- Select the toolbar at one of the edges.
- Amount of rounding is set in dialogue by numerical precipitation.
- The first icon from left, which represents uncut edge, cancels the operation.

Setting the number of peaks with n-angle
- Select an object.
- Bar icons adapts to the object.

Sharping the object

The object can be changed using special gripping points, up to the level curves from which the object is composed.
- Select an object.
- Click the arrow icon in the left toolbar.
- There will be a larger number of smaller snap points.
- Left click, drag and drop point in the desired direction. Related curves or edges to move together with the gripped point.
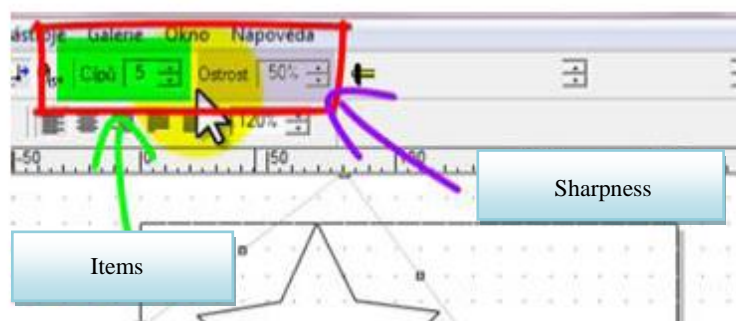- Release the button and the object has a new shape.

Fig. 2. Items and sharpness in the corners, Zoner Callisto

Improving the skills acquired

In the next lesson, we summarize what we have learned. Our little project includes repetition and practice, but there's something new.

Lesson 7 - Color caterpillar. (Fig. 3)
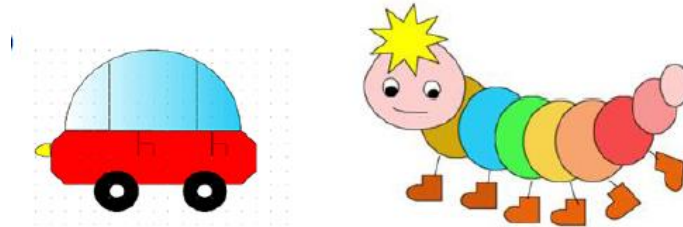
Lesson 8 - Red toy car. (Fig. 3)

Fig. 3. Red car and colorful caterpillar in Zoner Callisto

For the next lessons, we chose a pyramid construction layout. We wanted to show the practical part of our work. It can be used in lessons in mathematics or physics.

Lesson 9 - Drawing pyramid. (Fig. 4)

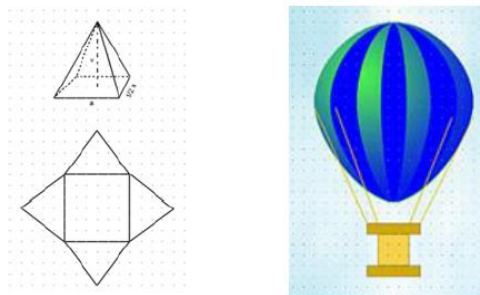**Lesson 10 - Hot air balloon. (Fig. 4)**

Fig. 4. The pyramid and a hot air balloon, Zoner Callisto

The courses for Gimp and Google Picasa are organized in the same way.

5. Verification in practice

We have worked with students in sixth grade of elementary school. The aim was to identify shortcomings and disadvantages of working with a multimedia course, as a teaching aid. Using a teaching method of multimedia courses was new for all students. They had different experiences with computers. It was difficult to align the work of the whole class.

Initially they would rather return to textbooks. They needed more time to get accustomed to and understand a new form of teaching. In the last lessons, they were most interested in processing photos and applying effects. Pupils liked very much the new multimedia course. They would welcome more time to perform the tasks.

6. Conclusion

The main aim of the paper was to create new didactic tool which introduces the basics of the given graphics programs to the elementary school students. This tool was created because students used only textbooks. As a a part of the didactic tool, we created multimedia courses. Through the courses we have familiarized the students with the basics of work in the programs Zoner Callisto, Gimp and Google Picasa. Pupils after few lessons became familiar with the programs. Courses may be used as separate teaching aids or as part of the teaching process. The teaching aid was verified at school and finally positively evaluated by pupils in the questionnaire. The future work will enlarge the set of existing practices. After that, we will create new didactic tool for another subject from the curriculum.

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