

Software aiding children's logopedic therapy based on Logomocja-Imagine

Aleksandra Skarbińska

Educational Technology Group NCU

87-100 Toruń ul. Asnyka 2a

skarbin@ped.uni.torun.pl

Abstract

The presented program is designed for a computer therapy, aiding logopedic treatment of two speech defects: sigmatism and rhotacism. It has been created in Logomocja-Imagine environment, as a licentiate thesis under the supervision of the author, during the course "Information Technology in Education" at Nicolas Copernicus University in Toruń. It has been completed according to an original conception (by licentiate Alexandra Prusak) with regard to the principles of logopedic treatment and principles of creating computer therapy programs. It consists of tens of LI projects, each of which is a separate set of original programming ideas.

1. Introduction

In accordance with the above mentioned principles, each project contains elaborate graphics, animation, layered animated turtles which give the impression of three-dimensional pictures, and sound effects, all of which makes the program interesting and activates the child to work.

In each project appears an animated character - narrator who gives instructions to each task. The child has an option of replaying the instructions.

As it is a program aiding logopedic treatment, each exercise is a stage of this therapy. Each stage has got recorded words or sounds which can be played and repeated by the child.

The elements of each game are arranged randomly which avoids the possibility of doing the exercise "by heart" when done repeatedly and makes the child think. The games are not confined to time, the speed of carrying out each task can be fit in with the individual needs of the child. If the task is carried out correctly, it is awarded with an applause and a point in shape of an animated star, otherwise a comment is made: "you have made a mistake". In each project, the program "recognises" when the child displays the toolbar and then, by choosing one of the icons decides what to do next.

The Polish market lacks software which could be used in therapy of common among children speech defects such as sigmatism and rhotacism. According to the logopedists, the presented software can fill this market niche.

2. The program structure

As mentioned before, the program aids the therapy of two speech defects, therefore it consists of two packages, one of them concerns sigmatism and the other one, rhotacism. The first

project consists of seven projects created in Logomocja - Imagine, where each project aids the therapy of an individual speech - sound defectively articulated in this disfunction, whereas the other one, concerning rhotacism consists of five projects where each project concerns one stage of the therapy of this speech defect.

Both versions of the program, the www site and an application for Windows have the same structure. On figure 1, a diagram of the www pages has been shown. This version of the program consists of standard html files and Imagine projects written as *.html files.

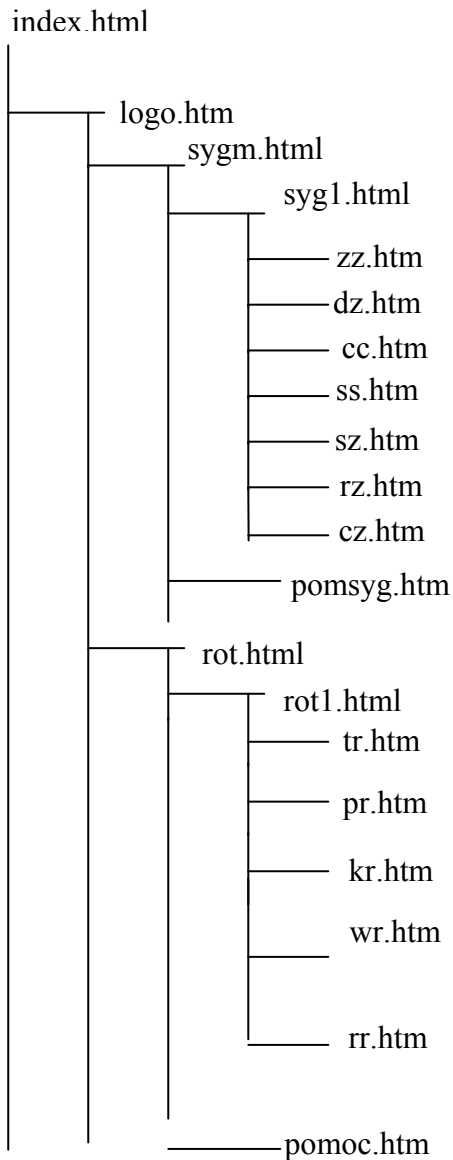


Figure 1. Structure of the program for logopedic therapy

On the diagram presented on figure 1, the files: zz.htm, dz.htm, cc.htm, ss.htm, sz.htm, rz.htm, cz.htm, tr.htm, pr.htm, kr.htm, wr.htm, rr.htm, (and in the application for Windows, the same files but with an extension *.exe) have in addition their own structure. The above

mentioned pages open from two interfaces, the first one for projects on sigmatism (fig. 2) and the other one -rhotacism (fig. 3). In the program written as www, these interfaces are www pages of course. By clicking on the animated character we move onto the project with a chosen letter (in sigmatism) or with a chosen stage of the therapy (in rhotacism).



Figure 2. Interface concerning sigmatism including the command: find the hidden letters, in order to begin the game with the chosen letter click on the place where you found it



Figure 3. Interface concerning rhotacism including the command: Find the hidden letters, chose the therapy stage by clicking on the place where you found them.

2.1 Software concerning sigmatism

In the part of the program concerning sigmatism, each project has got the same structure.

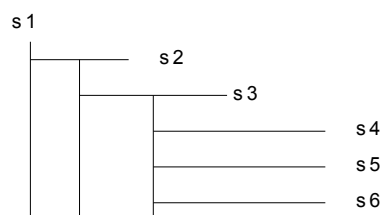


Figure 4. Scheme of one of the projects concerning sigmatism; where s_i for $i = 1, \dots, 6$; means i page of Imagine.

On the first page - s1 the letter, which the project concerns introduces itself and the child writes in his name. (e.g. fig. 5).



Figure 5. Project concerning sigmatism – speech-sound *z*; first page

The second page - s2 concerns a very important stage of the logopedic therapy of sigmatism, which is to provoke individual speech - sounds. On page s2 always appears a microphone icon, which indicates, that the speech - sound should be spoken into the microphone. Through the voice commands defined on this page, the child by imitating the given speech - sounds into the microphone will set off the action of the project. Next, in order to move onto another page, the child must grab some object.

For the *speech - sound sz* (fig. 6) the child by imitating the rustling of a forest into the microphone causes that the trees begin to move from side to side and the squirrel begins to jump. In order to move onto another page, the child must catch the squirrel. For the *speech - sound c* the child must imitate a clock ticking, for the *speech sound s* - snake hissing, for the *speech sound z* - fly buzzing, for the *speech - sound dz* - bell ringing, for the *speech - sound sz* - forest rustling, for the *speech - sound cz* - speeding train, for the *speech - sound ż* - flying plane.

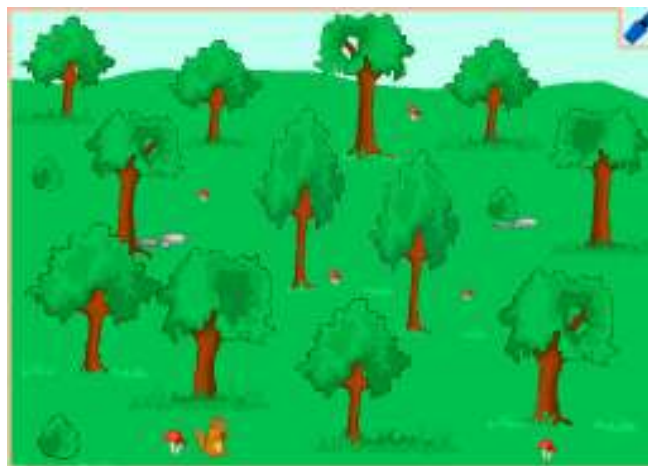


Figure 6. Project concerning sigmatism – speech-sound *sz*; how to provoke this speech-sound

On the third page - s3 (e.g. figure 7), the next stage of the therapy should be chosen: the initial sound, (which is the speech - sound in the beginning of the word), the middle sound, (the speech - sound in the middle of the word) or the final sound (which is the speech - sound in the end of the word).



Figure 7. Project concerning sigmatism – speech-sound sz; choice of the stage of the therapy

The choice should be made by clicking on the correct picture. A board with a task will then appear. On this stage, the tasks usually require clicking, which is catching a moving object. Once the child has carried out this task, he moves onto another one, which concerns the chosen stage of the therapy.

The next three pages: s4, s5, s6, are tasks concerning the following therapy stages of the chosen speech- sound in the initial, middle or final sound.

The whole project is accompanied by a sound track which can be turned on and off at any stage. An animated letter occurs on each page - the narrator, which reads the commands, depending on the speech - sound chosen, it takes shape as on figure 8.

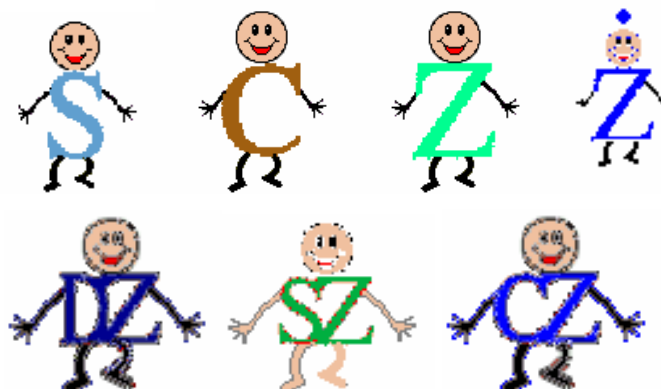


Figure 8. Shapes of the letters

On each page, there is a blue animated arrow, if we click on it, a toolbar will appear (e.g. fig. 9). A steering function is assigned to each icon from the toolbar:



Figure 9. Toolbar

Each task, if done correctly is awarded with a point in a shape of an animated star. The score is added up and can be observed on the board, (e.g. fig. 10) after clicking on an appropriate icon on the toolbar.



Figure 10. Board with the score

1.2. Software concerning rhotacism

The structure of the program concerning rhotacism, regarding the dissimilarity of this therapy, differs from the structure of the software concerning sigmatism, but there are some identical elements in both packages. One of them is the blue arrow and the appearing toolbar which work in the same way as in the first, described part of the program. What needs to be clarified is that the narrator, now has the shape of an animated girl. Just like in the program concerning sigmatism, the tasks done correctly are awarded with points in shape of animated stars. The sound track is also the same and so are the rules concerning it. In the part concerning rhotacism each project consists of two pages. The first one concerns the therapy stage involving the pronunciation of the speech - sounds (figure 11). There are four boards on this page, after indicating one of them with a mouse, the given board moves forward on top of the others. Whereas after indicating a particular speech - sound, we can hear a tone and the animated girl “jumps” onto this speech - sound. In order to move onto another page, we need to click on the blue arrow and then, on the toolbar, which shall appear, choose the appropriate icon. On the second page we have a game involving pronunciation of the words containing speech - sounds suitable for each stage of the rhotacism therapy. Help is also attached, which explains the functions of the icons on the toolbar.



Figure 11. Project concerning rhotacism: pronunciation of speech-sounds

2. The methods applied

Original methods have been used in the projects, all of them created for the program use. The methods are following: “The sliding board method”, “The dancing letter method”, “The voice activated action method”, “The random object scattering (turtles or boards) on the page or board method”, “The ‘catch me’ method”, “The ‘grab and let go’ method”, “The jigsaw puzzle method”, “The colouring book method”, “The join the dots method”, “The memo method”, “The memorising the sequence of pictures method”, “The domino method”, “The labyrinth method”, “The hot-cold method”, “The scattered pictures method”, “The riddles method”, “The description of the animated pictures method”, and so on. Each method required separate programming solutions.

Some of the methods are used several times in the program in reference to various speech - sounds, on different stages of the therapy. However, because of the time limit of this lecture, I shall present only a few of the methods which best show the potential of Logomocja - Imagine.

2.1 The “memo” method

The “memo” method is retracing into the Logomocja - Imagine environment of a well known picture game, which consists of uncovering pairs of pictures. In the project presented on figure 13, we uncover the pictures by clicking on them. To uncover or to cover a picture is, in other words to show or to hide a turtle, which has a shape of a curtain. When two pictures which are not a pair are uncovered, and we click on a third one, the other two are covered. Of course if only one picture is uncovered, then with revealing of the second picture, the covering does not take place. It is so because each uncovering of a picture assigns to the adequately determined variables, appropriate values which then are verified. Each found pair is revealed and awarded with a point in a shape of a star. Below is a set of procedures and the contents of one of them, used in this method. This application is quite advanced programmatically. Of course this is just one of the pages of the project concerning the third stage of the “r” speech - sound therapy.

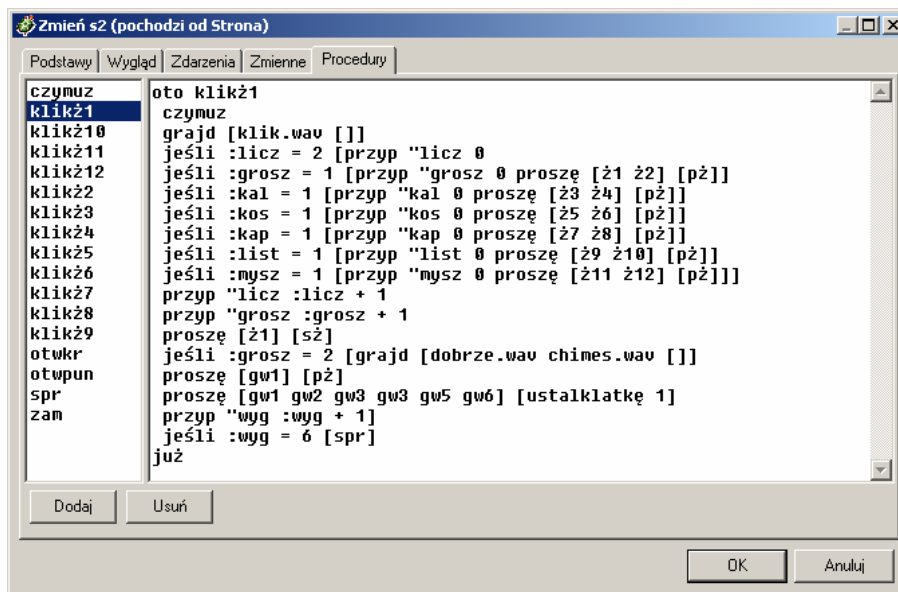


Figure 12. Set of procedures and contents of one of them, used in the „Memo method” concerning page shown below



Figure 13. Project concerning the third stage of the therapy of rhotacism

2.3. The memorising the sequence of the pictures method

This method has been presented in two options. In the project shown on the figure 14 the pictures - turtles in the front row, with the **tasuj** command, are put in a random sequence. A child must memorise the sequence, and cover up the pictures by clicking on the ‘cover’ key and then must draw the pictures, which are also turtles, from the bottom of the screen and put them in the correct order into the coloured spaces. After drawing all the turtles into the coloured spaces the program verifies the task by identifying a space for each turtle on the list generated by **tasuj**, and the colour of the space with the already known **kolpkt** function.

Whereas in the second option of this method, presented on figure 15, after pressing on the ‘start’ key the figure of the girl jumps on randomly chosen pictures, which are turtles. The child must memorise the sequence and then show the pictures in the correct order by clicking on them. The program verifies the task by comparing the values of the appropriate variables which have been assigned randomly to the values assigned to the appropriate variables while clicking on individual turtles.



Figure 14. Project concerning the first stage of the rhotacism therapy

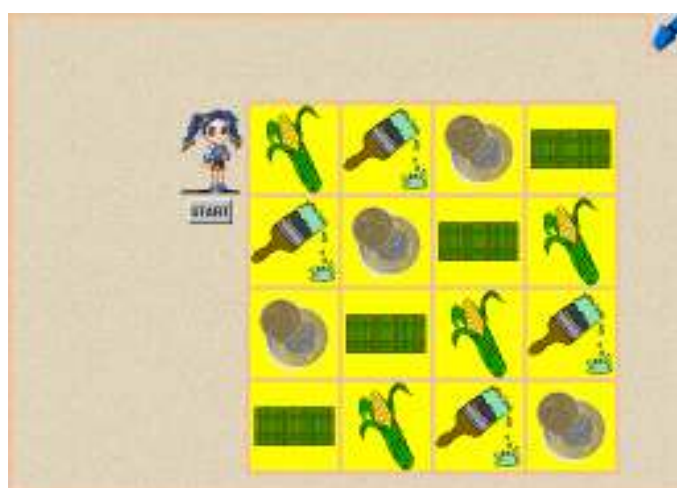


Figure 15. Project concerning sigmatism – speech sound dz i n the middle-sound

2.4 The domino method

The “domino method” presented on figure 17, involves drawing domino tiles into coloured areas, so that each tile is situated next to its shadow. Each tile is a turtle consisting of four phases (figure 16) where each phase is a different position of the tile. A change in the position of the tile, is in fact a change of the phase of a given turtle. In this project we can do it with the right mouse key, and the following code is responsible for it: `ufa faza + 1`

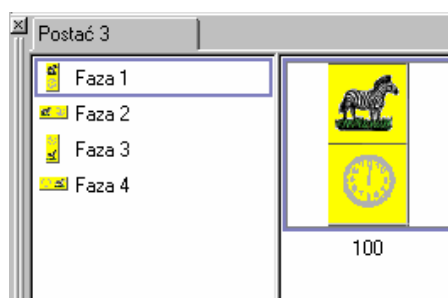


Figure 16. Phases of the domino tile

One of the domino tiles is always situated on the top of the screen, which makes the assessment of the task easier. The computer, knowing the position of one of the turtles, verifies using the **kolpkt** function, whether the other turtles are in the correct area and, apart from that, if they have appropriate phases.

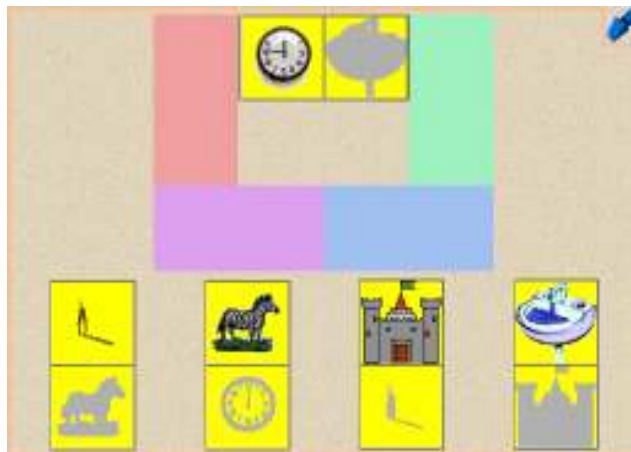


Figure 17. Project concerning sigmatism – speech-sound z in the initial-sound

3. Summary

The software package presented in this lecture, owing to its attractive form, stimulates the emotional and motivational sphere of the child and eliminates discouragement and fear of talking. The tests have proven that the software, to a large extent activates the children to cooperate with the logopedist, which is the main factor showing that the program is a good therapeutic means. Since it is written a www page and an application for Windows, it can operate outside the Logomocja - Imagine environment. It can therefore be used in each logopedic practice and thanks to the growing popularity of the Internet, it can also be used at home, by each child in need of a logopedic therapy.

References

- Skarbińska A (2001), *Multimedia in Logo Comenius*,(in polish)Publisher A. Marszałek Toruń
 Skarbińska A (2002), *Computiny System Imagine as a new educational tool*, (in polish) in
 Współczesna Technologia Informacyjna i Edukacja medialna Lewowicki T, Siemieniecki B,(eds.)
 Demel G. (1987), *Elements of logopedics*,(in polish) WSIP Warszawa