Creating different didactic games for elementary school pupils

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Abstract: The article discusses about the development and creation of didactic computer games as the ideal tool for developing technical literacy of creators. Also develop different skills of users, depending on the main target of the game. Games are created in the form of a quiz to test students' knowledge of mathematical and geographical areas. The author describes what didactic computer game is, as well as its basic classification and use in educational process. Educational games and simulations are gaining popularity because technology is changing the way in which children and adults interact with technology.

Key words: technical literacy, key competence, didactic computer game, functional programming.

1. Introduction

The importance of technical education at educational process in Slovakia is not estimated enough, nor appreciated properly in society. Basic technical skills are necessary developed from the time at primary school. And so, knowledge extended within the framework section specialized subject on middle schools or college, universities as well as frame lifetime education.

Technical education does not find a suitable environment at primary schools. Subject with technical orientation at secondary grammar schools is absent too. Approximating Slovak schooling in this field to the developed countries considerably remains behind Europe and world. There seem to be very important homogeneity in aims, which correspond to the recommended aims of international educational UNESCO, OECD or other commissions. Content is adjusted to special needs of particular countries or regions.

1.1. Technical education at basic schools in Slovakia

At basic school technical education is educated as a part of the subject, which we call “Manual teaching” on first degree of the primary school. (3) On the second degree, it is educated by more wide area working activities and techniques, which we call “Man and world of job”. (4)

Educational process in technical education is focused on learners to acquire necessary technical literacy. Its practical implementation means that the learner at basic school will:

- acquire an average knowledge on technology,
- get appropriate technical skills,
- learn to solve simple technical tasks and problems,
- create positive attitude towards technology,
- understand relation between science and technology,
- learn to work individually and in a team,
- acquire other important knowledge and skills needed in everyday life.

Basic PC skills and use of information and communication technologies are almost exclusively the contents of technically oriented subjects. Technically oriented subjects in lower secondary classes in EU countries are compulsory. Upper secondary education often provides students with optional technical subjects.

International community recommends schools providing general education to train technically literate learner, who:

is ready to take up a standpoint and solve tasks and problems of everyday life,

within the general education will acquire information from all the fields of technology necessary for professional orientation and application in life,

will acquire basic knowledge about energy, energy sources, materials and technologies,

will acquire technical skills and learn principles and function of technology used at household and with small mechanisms. (6)

1.2. What is it didactic game?

Didactic game is educational tool which follows didactic aims. It has its rules; it demands continuous management and final evaluation. We rank it into innovative educational tools.

Didactic games can we use during lessons by explaining, proving, fixating of knowledge as well as to enrich the lessons and motivate students. It is possible to use them after lessons (in school clubs, during free time activities organized by school etc.), or at home to practice, fixing or studying of new knowledge. Games of high quality are played spontaneously. It can activate pupils, hold their attention and interest for long time and force them to higher performance. A game should follow the age and must follow the tasks of educational work and educational topics.

Didactic computer games we can classify from different points of view. For us is the most important classification according the abilities they develop. We classified didactic computer games into these groups:

- games which enrich knowledge, fix, broaden and improve knowledge gained during the lessons (crosswords, quizzes, and so on),
- games which develop perception, memory, ingeniousness, senses (rebuses, teasers, riddles, mazes),
- cognitional games (games concerned for concrete facts from particular area, for example games of technical character, historic, literary, geographical games),
- creative games (e.g. for communication development, topic, theme, constructive, graphic-algorithm realized e.g. in Comenius Logo environment).

From point of view in which part of educational process we use the game we know this kinds of games:

- motivation
- to gain new knowledge
- to fix the knowledge

2. Student as creator of didactic game?

Issue if a student is suitable to create, design a didactic computer game for needs of various topics deal an internationally acclaimed thought leader, speaker, writer, consultant, and game designer in the critical areas of education and learning Marc Prensky in his study. (7) In the conclusion of the study it is confirmed that a student is able to handle this task. We also agree with this opinion. We investigated this area and its practical use (crating of didactic computer games) as a part of the subject "Programming paradigms" which is taught in summer term of 2 year of bachelor degree as a part of study program: „Information technology" taught on University of St. Cyril and Method. The aim of the research was to prove if student is able by using functional approach by creating a game (taught as a part of the subject) to create didactic computer game which can be used.

The result of the analysis is that student of 2 term has sufficient knowledge to create simple didactic computer game which is based on functional approach and which also develops his technical literacy. We think that a student is able to create according to his achieved education didactic computer game of any topic, which is taught as a part of valid study plans on primary schools.

Topics and their requirement which are handled by secondary schools can be much more difficult to handle as a part of the didactic game according it's content. That's the reason why the author sees the advantage in various focus in study directions of students as well as their free time activities. It can be considered as assumption to understand wider and much more difficult coherences in relevant topics (using of knowledge and development and enhance of new knowledge). The last factor which should be involved is usage of fundamental didactic principles which should be preserved by the creation of the game. Student of the subject „Information technology" didn't handle this topic with attention and seriousness which it deserves. It is not problem for us because when the pedagogue use right methodical way it is possible to cover also this aspect. It is not necessary to study additional literature sources which handle the didactic.

We plan to test this proposal in real environment as a part of the mentioned subject "Programming paradigms" which is about logical and functional programming in the academic year 2010/2011. The stress would be in sticking to particular steps during the

preparation of the game which were defined in the text as well as graphic friendly and intuitive game environment which wasn't important for many students. For many students is important the functionality and not the visual aspect. Successful project will be used in school clubs of different primary schools (willing cooperate) to prove their application and in order to gain the feedback for the next projects.

Didactic games as a part of study topic of the subject will be developed in the environment of Comenius Logo or any part of commercial Logo application. There are more than one hundred of Logo language applications. In Slovak and Czech schools we use Imagine Logo and Comenius Logo. (1)

2.1. Demonstration of the themes of didactic games as a right manual for the creation of following games

The game „Flags" is made as a quiz and it makes possible to prove the knowledge to identify flags of countries when the pupils choose the right answer from 4 possibilities. When the right answer is marked the user will get the information if his answer was correct or incorrect. The feedback can be finding in the left part of the game. We can find here the amount of correct or incorrect answers as well as the number of not answered questions. After answering all the available questions (there are 10 questions) the user will get a message about his results and the percentage of his success as we can see at the picture. It is possible to repeat the game endless. The control of the game is based on the intuition, which is underpinned by design and by button description. A brief manual and game rules which are placed in left, lower part of the window (Fig. 1) is also very handy.

Recommendation for the future:

- add, make new questions,
- add different levels of difficulty, to generate questions randomly

Fig. 1: Basic game window „Flags“

The game „A clever owl“ is mathematical program for children which helps to exercise knowledge by simple exercises focused on adding integers. The game develops the mathematical way of thinking. The game offer different exercises and the user should input the right answer – value. The user can try it 3 times, when not the right answer will be generated by the system. The control of the program is demonstrative and the user is lead step by step to the particular actions (Fig. 2).

Recommendation for the future:

- add new examples to the program focused on operations: deviation, conjunction, division and etc.,
- to create examples on real numbers,
- add different levels of difficulty.

Fig. 2: Basic game window „A clever owl“

3. Conclusions

All the shown games were created under our direction as a part of the subject “Programming paradigms” in cooperation with our selected students. The games were used in school clubs and pupils were really interested in them. We are sure that our aim was fulfilled and we will continue in further development according to our recommendation. The advantage is that the students broaden their knowledge in implementation area (programming, logic, arrangement, graphic), topical focus of the game (development in different knowledge topics) and also in didactic. On the other hand we see that to use these games as a part of lessons or after the lessons has its sense too.

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