NEW POSSIBILITIES OF MUTE MAP GAMES ON VIRTUAL GLOBES

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ABSTRACT

These days witness a still increasing development of *Information and Communication Technology (ICT)*. Its context and importance is determinative even in schoolwork. The various computer programs play more and more important role in the education of geographic knowledge. In the past few years an exciting map game, *the Blind Mouse – mute map game* has been developed by the authors for entertainment and for education. This game based on a website is founded on a concept of edutainment (concept from words education and entertainment), which is the method of attractive teaching and learning with multimedia applications. On the other hand, it can be used to enhance the attractiveness of cartography in different age groups.

This website, originally addressed to pupils of different school levels, corresponds to the Hungarian Curriculum requirements. The developers of the website can meet two important aims of the education. First, the game itself is an attractive interface that can raise the attention of the users (pupils) in the maps and geographic concepts; on the other hand, because of the education components in the game, it can be an important way of learning and teaching as well. The currently available themes are Hungary and Turkey, while Austria and several areas are under construction. This program was implemented in Hungarian, English, German and Turkish languages. The feedbacks and the number of registrants show the real usefulness of the website.

The aim is to develop and the create a complete web application for enriching the topographic knowledge of pupils with the introduction of new functions of web mapping technology. The capacity of *WebMapping 2.0* makes it possible to collect and integrate various sources (e.g. Wikipedia, Panoramio) and visualise them on a website via an API. Another choice may be to use three-dimensional, steerable-zoomable virtual globes instead of traditional maps in these educational or entertaining programs. This solution allows us to handle global datasets in addition to national or regional data (such as world heritage, 100 wonders of the world and capitals of the world). This is important in the education of geographic content, as it helps to gain basic insight into the global dimension of many geographical issues. The pupils can learn with a virtual version of the traditional classroom globe, and this which fits well in today's expectations.

These programs and the related areas of webcartography should be of interest to anyone involved in teaching cartography or using maps in school or at university. This paper introduces *the Blind Mouse – mute map game* and its three-dimensional version with the Google Earth plug-in as well as discusses its prospective role in the education of geographic content.

KEYWORDS

web mapping, knowledge representation

1. INTRODUCTION

During the past decades, the use of computers in educational settings has increased dramatically. Since students in today's classes tend to surround themselves with technology in their daily lives, they may grow to expect it in the classroom as well. These days witness a still increasing development of *Information and Communication Technology (ICT)*. Its context and importance is determinative even in schoolwork (EURYDICE 2004).

Nowadays the number of *geographical and cartographical websites* is continuously increasing. These are e.g. geography homepages and portals, encyclopaedias, guides, methodological assistance, databases, map- and outline map catalogues. Their main aim is to raise the attention of students and teachers and anyone interested. All these provide an opportunity for teachers to introduce not only educational but playful elements as well. Beside schoolroom exercises, they mean home-schooling through personal home computers for students to practice what they have learnt previously, namely, the curriculum itself. Further, they build on the fact that everybody likes playing and testing their own knowledge. These games assist people in learning a skill as they play. *Edutainment* becomes more and more popular. As a result, the method and content of teaching expand, and new quality comes into life in teaching and training (MAKÁDI, 2006). As a new resource to help promote, enhance and facilitate learning, the computer has

fostered high expectations of more effective, more relevant, more motivating, and more innovative new learning experiences.

A website containing *map games* can be included in this category, because they are designed to entertain. At same time, these games are also able to develop the user's cartographical skills. The edutainment games have some basic elements such as educational content, interactive components and attractive interface that can draw the attention of the users. One of the most important requirements of the web map games is interactivity, which is supported by tools and languages like Flash, Java, JavaScript, and SVG. This new technique lets the developers use interactive and multimedia elements to make dynamic websites (ZENTAI, DOMBÓVÁRI, 2005). If they correspond to more school levels, they can become an important part of learning.
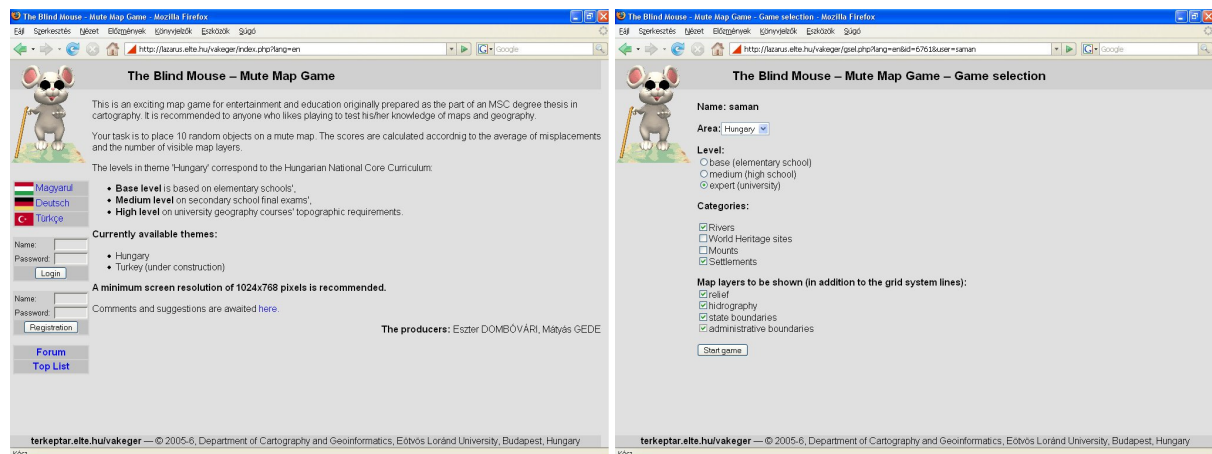
This paper introduces the Blind Mouse – mute map game and its three-dimensional version with the Google Earth plug-in. This website was originally addressed to pupils of different school levels. It corresponds to the Hungarian Curriculum requirements for primary and secondary schools and universities (OKM 2005). Therefore, its education component makes it an important way of learning and teaching at home or in the classroom.

2. THE BLIND MOUSE – A GAME FOR DEVELOPING AND POPULARIZING CARTOGRAPHICAL SKILLS

The Blind Mouse is a mute map game on the web to educate as well as to amuse, which was originally prepared as the part of an MSc degree thesis in cartography at Eötvös Loránd University in Budapest (DOMBÓVÁRI 2005). The aim was to make an online and easily usable application for anyone who likes playing and testing his/her knowledge of maps and geography. It raises the attention to geography knowledge and a more extensive use of maps.

The game can also be a great tool in education to prepare for the exams at different grade levels. The levels of the game correspond to the Hungarian National Core Curriculum. The main idea of developing the game was firstly creating a game with which you can check your knowledge of position and identifying map features that you have learnt previously. The map areas are the same as in the atlases and in schoolbooks. Secondly, developing a game that is able to promote its build-up and programming in the future. The top list with the average score of the users invite pupils to play again.

The game starts with an introduction screen (Figure 1.a). Users can select their language, can register, and log-in here. After logging in, the game settings page appears, where the themes – Hungary or Turkey –, levels – elementary school, secondary school or university – and the categories – mountains, world heritage sites, settlements or rivers – can be selected (Figure 1.b).
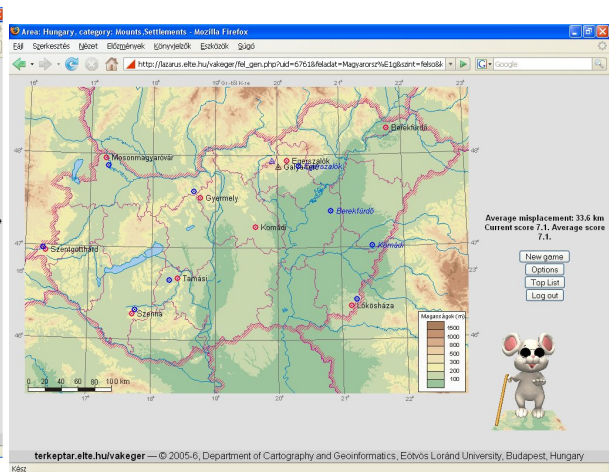

a) The introduction screen   b) Game settings page
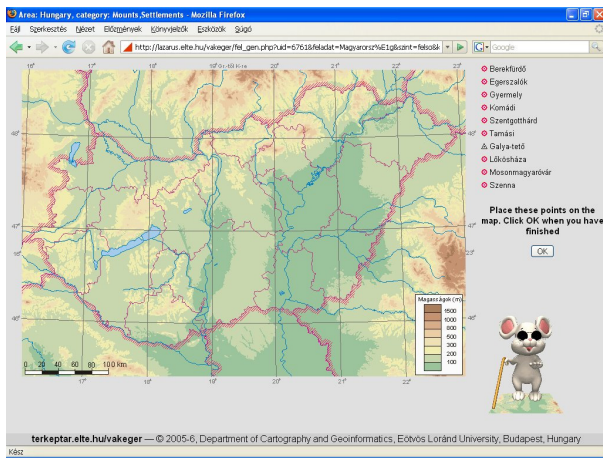
c) The game starts

d) Score evaluation page

Figure 1: The Blind Mouse – mute map game (http://vakeger.elte.hu/)

An opportunity of the map games not used so far is the choice of the map layers. It is also a part of the game. In addition to the grid lines, the user can choose other layers or variation of layers from relief, hydrology, state boundaries, and administrative boundaries (Figure 2). The maps are prepared for web browsers. Their interactivity is in the mouse-moving and deciding the mouse-positions. The difficulty of the game increases with the decreasing number of visible layers, which number is taken into account during the score calculation.
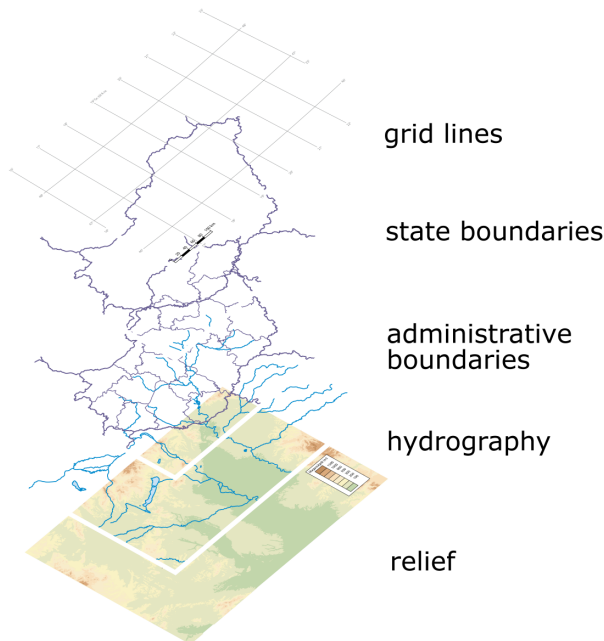

grid lines

state boundaries

administrative
boundaries

hydrography

relief

Figure 2: Layers of the Hungarian map game

After these settings the game starts (Figure 1.c). The user's task is to place ten map objects by dragging them with the mouse cursor to their place. When it is finished, the program shows the real position of the objects and calculates the actual score (Figure 1.d). The score depends on the average value of displacement (i. e. the distance between the place the user put the object to and its real position), and the number of visible layers. More layers and bigger distances mean lower scores.

After finishing the game, the user can select four options: to start a new game with the same settings, to change the settings, to view the „top list" or to log out. The top list shows the average score of the users (i. e. not the best score but the average is stored). It seems to be a more realistic measure than the best score, which can easily grow high by an eventual lucky set of objects. The scores are separately stored for each theme and difficulty level.

3. THE 3D BLIND MOUSE – A GAME FOR DEVELOPING AND POPULARIZING CARTOGRAPHICAL SKILLS WITH GOOGLE EARTH PLUG-IN

Although the Blind Mouse game is successful (there are more than 9000 registered users and the number of finished games is over 85 000 since its start in 2005), the authors voted for the further development using the new features of Web 2.0. The term Web 2.0 introduced in 2004 does not really cover a new technology but a new approach to the web using it as a social space rather than a technical service (ZENTAI, GUSZLEV, 2006). With the help of the new dynamic and interactive user interfaces and the application programming interfaces (API) people became capable of easy and fast creating and sharing of custom maps and content.

The Google Earth is a kind of virtual earth software, which projects satellite and aerial imagery and GI data to the 3D model of the Earth. It has several functions from simple "geo-browsing" to the flight simulator mode. The software was originally developed by the company Keyhole which was later acquired by Google (WIKIPEDIA, 2011). The download and installation of the software is easy and free of charge.

One of the great advantages of Google Earth is that it can be embedded into web pages as a plug-in. The new version of the game takes advantage of this opportunity by using the virtual globe instead of the former static map. The steerable-zoomable globe allows global themes in contrary to the old version, where the map extent limits the themes to specified areas.

3.1 Aims

The 3D Blind Mouse is accessible at the same web site as the old version of the game *(http://vakeger.elte.hu)* and introduces three new themes: capitals of the world, world heritage sites and 100 wonders of the world. The aims remained the same: to popularize geographic and cartographic knowledge among the users and to support the teaching of geography. This program can take part in school lessons and in home learning also. The use of the Google Earth plug-in offers new possibilities for the developers and the users too. Last but not least, it can raise the attention of the students to the game and the virtual globe and at the same time to geography.

3.2 Introducing the Game

On the introduction screen the users can select a language, register for the website and start the game with logging in (Figure 3.a). The aim of the 3D Blind Mouse game is to find the place of ten randomly chosen objects on the virtual globe (Figure 3.b). The objects appear one by one on the screen. Each object has an associated photo also to help the players, because it is usually easier to remember things when they are connected to an image. The virtual globe can be freely rotated and zoomed and the positioning of the objects can be modified and refined until the game is finished.
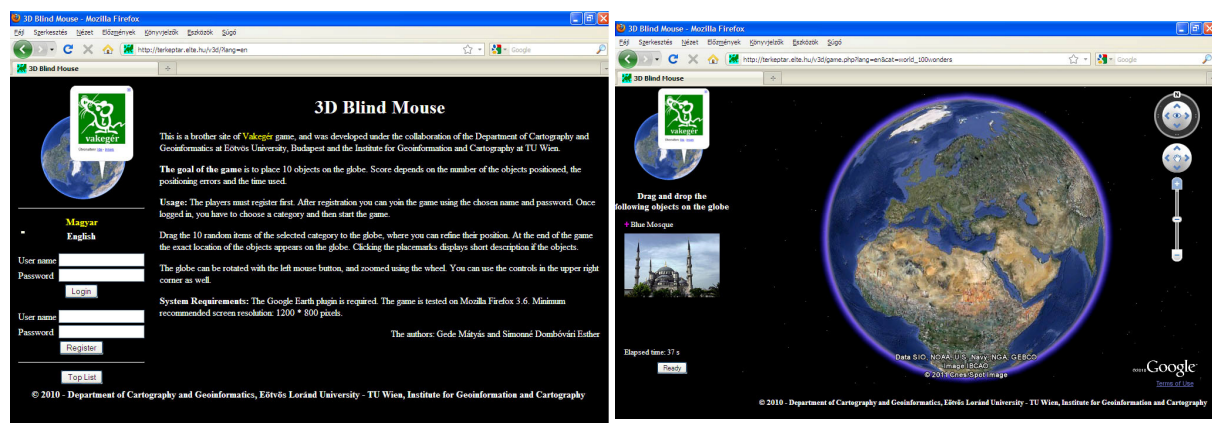
a) The introduction screen

b) The game starts
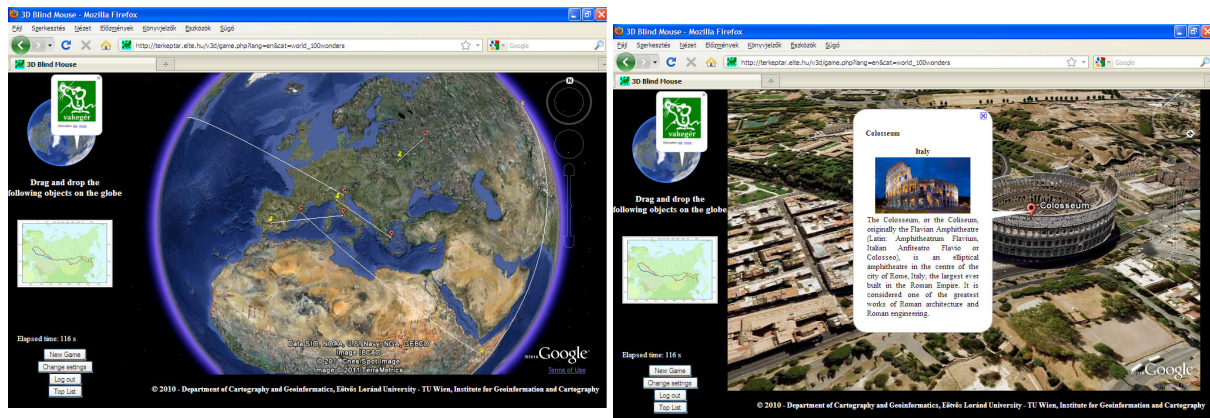
c) Result evaluation screen

d) Explanation page with descriptions and 3D objects

Figure 3: The 3D Blind Mouse – mute map game with Google Earth (http://vakeger.elte.hu/)

After finishing the game, the real positions of the objects are shown on the globe by markers (Figure 3.c). These markers are connected to the places marked by the player with lines to show the displacements. Clicking on the markers opens a balloon with the photo and the description of the object and a link to a related Wikipedia article (Figure 3.d). In this way, the players can easily get new information about previously unknown objects.

The score calculation is based on the elapsed time and the average distance between the real and the marked position of the objects. The best results of the players can be viewed on the top list.

3.3 Preparation

3.3.1 Sources

In contrary to the original game, there was no need of map editing for the 3D Blind Mouse as the Google Earth plug-in is used. It needs only the visualisation of three-dimensional, steerable-zoomable virtual globes. Naturally, all the labels and borders are switched off, but the 3D buildings are enabled to help to learn geographical knowledge.

By the choice of subjects of the game it was important to handle global datasets in addition to national or regional data (such as world heritage, 100 wonders of the world and capitals of the world). The theme data mainly came from two sources:

- the object names and positions from freely usable geodata and

- the descriptions and pictures from Wikipedia.

The use of links to various sources allows the continuous updating of the datasets. The theme, "100 wonders of the world" is an exception, because its list is based on a book (BURTON, CAVENDISH, 1992).

3.3.2 Programming

The 3D Blind Mouse was prepared with the same *server- and client-side software* as the original one (Figure 4). As the system was planned to be portable, all the codes were written in scripting languages (PHP and JavaScript). All the data (the object information, the scores and the user information) are stored in MySQL tables. This allows easy migration as PHP and MySQL are usable at most of the Internet-providers (GEDE 2007).

The server-side *PHP code* realizes the communication with the MySQL database as well as the following tasks, which are all related to the database:

- user management (registration, log in, log out),

- random object selection and

- score management (score storage, top list generating).

The language support is also made by PHP: all texts displayed during the game are stored in arrays; the script chooses the appropriate array and uses it during the game.
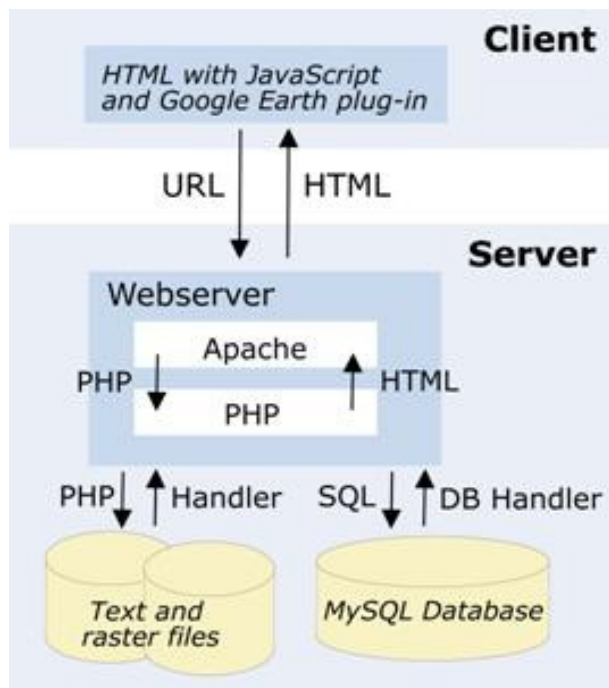
Figure 4: Programming

All themes are stored in *MySQL tables* with uniform structure. The records of these tables contain the name, the geographical position (latitude and longitude) and the description of the features, a link to the related picture and to the Wikipedia article. An additional table assigns theme names and table names. The only data stored outside the MySQL are the images of the objects. Thanks to this structure, adding new themes is rather easy: a new theme table is added to the database, the new images are copied to the appropriate directory and a new record is added to the theme description table linking the new theme name to its MySQL table.

The PHP codes generate HTML documents with *JavaScript codes*. The most important one is the "main" game page, where the client-side JavaScript loads the Google Earth plug-in API to the web page and realizes the interactivity of the game:

- drag-and-drop of the map objects outside and inside the virtual globe,

- the timer,

- the evaluation and score calculation.

4. CONCLUSION AND FUTURE PLANS

People spend more and more time hanging on the web and their attention is drawn by the new technologies. The 3D Blind Mouse takes advantages of the popularity of Google Earth and the easy programmable interface of its plug-in. Using these techniques, the authors managed to create a spectacular and easily updatable game, which is free and accessible on the Internet.

It was important to prepare not only subjects that are closely related to the geography curriculum, but also to general literacy. Therefore, all users, especially pupils can use the game for learning various themes in school or at home. The authors' aim is to develop these websites as education tools for enriching the topographic knowledge by the help of new functions of web mapping. The future plans include new themes, new languages for the user interface, and the usage of line and polygon features in addition to the currently used point objects.

5. ACKNOWLEDGEMENTS

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