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UPDATING A HUNGARIAN WEBSITE ABOUT MAPS FOR CHILDREN

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Abstract: The first website in Hungarian language dedicated to the presentation of basic cartographic concepts for children and young people was made in 2000. The making of this homepage was preceded by a study about the basic map concepts learnt by Hungarian pupils in Elementary and Secondary Schools, when (in which grades) these concepts are taught, and which subjects include the map concepts and the use of school atlases and other maps in the teaching of their themes. This research was completed with the study of international experiences during the creation of websites presenting scientific themes for pupils.

After more than 10 years from the publication of the original website, the time has arrived to update the website, considering that Internet and in particular the Web has had notable changes along this period of time and also considering possible changes in the teaching of the map concepts in the Hungarian Educational System. This decision implied not only the possible revision of the themes presented in the original website, but also the analysis of compulsory changes in the structure of the website, namely, which new programming and design tools can be used to develop the new site and which new graphic tools can be added to develop a new Web based environment.

1. Original research (1997–2000)

1.1. Theoretical research

The project was begun with the study of curricula, textbooks, workbooks and atlases used in the subjects related to Geography in the Hungarian Educational System, to determine which cartographic concepts were learnt by the pupils. The conclusion was that the majority of the cartographic concepts were taught between the 3rd and the 5th grade of Elementary School, and the posterior use of maps and school atlases in the classroom (including High School) is based on this knowledge.

Parallel to this research a study was also made about different methods of publishing educational materials on the Web, paying special attention to finding international experiences in the presentation of concepts related to maps. In the last years of the 90's, the number of homepages designed to fill this aim could be considered still low. By this reason the research was extended to homepages designed for children in interest of presenting concepts related to different sciences.

The next step was to classify the map concepts for their presentation on the Web, first dividing them into general themes, followed by their detailed description, the definition of smaller units and finally completing the themes taught in schools with other concepts.

The list of general themes presented in this website was: Map and reality, Orientation with and without maps, Map history, What kind of maps are there?, Representation of relief, Rivers and lakes on maps, Other colours on maps, Symbols on maps, Latitude and longitude, Some words about the geographical names.

1.2. Planning, design and making of the website

During the design of the website the decision taken was to follow the structure of a Web portal, not only to present the map concepts but to complete them with other options that could make more interesting the site for pupils and teachers. The title of the website was "All about maps…" and the structure was determined as follows (Figure 1):

Figure 1. "All about maps…" website welcome page

- Summing up… (Previous works related to this theme)
- As you are learning and even more… (Presentation of basic map concepts)
- What can you find on the Web? (Links to websites related to Maps and Children)
- Try out! (Demos, examples, etc. that were found in other websites)
- News and events (Information about activities related to Cartography: organization of exhibitions, Barbara Petchenik Award, meetings, interests on TV programs, etc.)
- Not only for you … but for teachers too! (Open forum for the exchange of opinions and questions)
- Learn and play! (Tasks and games related to Cartography)
- Curiosities (Section including old maps, imaginary or fantasy maps, etc.)

The website was programmed using HTML language and some JavaScripts for specific solutions (e.g. opening a separated window to show a short animation). After testing it, the website was made accessible for Hungarian pupils and teachers from July 2001.

2. Update of the website from 2001 to 2011

During the last ten years, the structure and design of the website remained changeless, but it was periodically used to keep pupils and teachers informed about activities related to cartography; especially about the annual organization of GIS Days and the organization of the Barbara Petchenik World Map Award every two years.

Between 2004 and 2006 new websites were created to complete the content of the chapter dedicated to present basic concepts. This decision was taken considering the results of a survey filled by pupils of Elementary Schools that included a question about their preferred cartographic themes. Based on their answers the two most popular themes were the history of maps and the computer cartography. Three websites were made on these topics: Map History, GIS and Multimedia Cartography (including Thematic Cartography). Its structure and design was similar to the "All about maps…" website, to be inter-connected and to create a collection dedicated to cartographic themes for children and young people. The content of this collection was composed as shown below (Figure 2).

Figure 2. Examples of pages about Map History, GIS and Multimedia Cartography

Map History website (six chapters containing 39 themes):

1. Maps from the Ancient Age: Town Plan from Catal Hüyük, rock map from Bedolina, Mesopotamian world map from Nuzi, Mesopotamian town map of Nippur, Babilonian clay tablet, Turin Papyrus.
2. Hellas and Rome: Pythagoras and the spherical Earth, Aristotle and Dicaearchus, Eratosthenes, Ptolemy, Tabula Peutingeriana, the first T-O maps.
3. Early Middle Ages: Maps from the Middle Ages, monastery maps, climatic zone maps, the Islam Atlas, Al-Idrisi's works, portolan maps, Catalan atlas, translations of Ptolemy's works.
4. The Great Discoveries: Portuguese discoveries, Christopher Columbus, discovery of the New World, Cosa worldmap, Cantino worldmap, Waldseemüller and America, Piri Reis worldmap, Magellan and the circumnavigation of the Earth.

5. The first atlases: Mercator and Ortelius, Gerhard Mercator's works, Abraham Ortelius' works, Waghenaer's atlas.
6. The first Hungarian maps: the English Saxon map, Dulcert's portolan map, Cusanus and Fra Mauro, Lázár secretary's map of Hungary, details on the first Hungarian map, actual Hungarian limits on the Lázár's map, János Zsámboky.

GIS website (six chapters containing 35 themes):

1. About GIS history: What is GIS?, the first steps, analogue GIS, the beginnings of computer sciences, Canada Land Inventory, SYMAP soft-ware, ESRI & Intergraph, MapInfo & Autodesk, GIS Day.
2. GIS data: Vector data model, raster data model, layers on the maps, fundamentals of databases, geocoding, multimedia databases.
3. GIS data sources: Surveys, aerial photos, satellite photos, GPS, source maps, thematic databases.
4. GIS processes: data collection, data input, data analysis, data output.
5. Data analysis: Overlay, buffer, classification, fuzzy.
6. Graphic outputs: webmaps, 3D models, animations, Geography Network, Hungarian websites.

Multimedia in maps website (six chapters containing 35 themes):

1. Stories about data visualization: Catalan Atlas, John Graunt, William Playfair, Alexander von Humboldt, making the diagrams popular, Bertin and the graphic theory
2. The first thematic maps: Halley's map, Valentin Seaman, early geological maps, Humboldt and Berghaus, French influence, John Snow
3. Thematic maps today: Sciences on maps, drawing symbols, drawing areas, isolines, diagrams on maps, drawing with points, choroplets and cartograms, representation of movements
4. Traditional multimedia on maps: Before the multimedia of today, what is multimedia?, maps and multimedia, multimedia in atlases, the first animated maps
5. Digital multimedia on maps: Introduction, beginnings of digital multimedia, digital maps, digital multimedia atlases
6. Multimedia in webmaps: maps in the Web, interactivity in the Web based atlases, Geographic Network, learning with outline maps, settlements on Lázár's map, "All about maps…"

3. Creation of a new website

3.1. Theoretical research

After more than 10 years from the presentation of the original website, the time arrived to update the content if needed, and to modify the structure and design of the website, considering the development experimented by the Internet and in par-

ticular by the Web during this period of time. In October of 2010, the authors decided to begin the preliminary tasks to make these changes. First of all, we studied again the content related to Geography subjects in the Hungarian Educational System, paying special attention to the basic level (Elementary Schools). This analysis began with the reading of textbooks related to Geography to determine if there were any kind of significant changes during the last 10 years. It was completed with the study of some of the School Atlases used in the Elementary and Secondary Schools of Hungary to determine the basic cartographic concepts presented or at least mentioned in the introductory pages of these atlases (Table 1).

After 2000, the number of hours/week dedicated to the teaching of Geography subjects remained the same: 3 hours at basic level (Elementary Schools) and 4 hours at secondary level (Secondary and Vocational Schools). In grades 4 and 5, Hungarian pupils learn a subject entitled "Basics about Nature", combining knowledge mainly from Geography and Biology. The concepts related to cartography have not been modified considerably, but in numerous schools the teaching of these concepts has been moved to later grades in respect to our previous research in 1997–2000. The more detailed explanation of these concepts follows being presented in the textbooks written for the 5th grade ("Basics about Nature", see Table 2), but some regional curricula planned the teaching of them in grade 6.

After revising the themes presented in the original version of the website and comparing them with the content of textbooks and school atlases, we decided to use the same map concepts without any considerable change. Based on this decision, the structure of chapters remained the same and the detailed content of the website is as follows:

- Map and reality (7 themes: Earth and former worldviews, shape of the Earth, what can we find on a globe, from the globe to a plain: how to make a map?, what is a map?, what makes a map a map?, graphic scale)
- Orientation with and without maps (8 themes: How could a cave man orient?, the first compass, compasses in Europe, cardinal points, using compass, orienteering with the Sun, in the forest and at night)
- Map history (9 themes: the first maps, maps on rocks, on clay and papyrus, Greek scholars, Roman maps, maps of the Middle Ages, portolans, maps of Discoverers, Mercator and Ortelius, the first Hungarian map)
- What kind of maps are there? (4 themes: classification of maps according to their scale and content, thematic maps, city, road and topographic maps)
- Representation of relief (3 themes: basic shapes of relief, contour lines and hypsometry, shading)
- Rivers and lakes on maps (2 themes: how to draw rivers and lakes on a map?, special features related to hydrography)
- Other colours on maps (5 themes: colours on a political map, how to draw the frontiers and roads?, colours on a topographic map, colours on a thematic map, other topics represented on maps)

- Symbols on maps (3 themes: what kind of map symbols do you know?, symbols drawing hydrography and relief, symbols in the school atlases)
- Latitude and longitude (4 themes: geographic coordinate system, latitude, longitude, orientation on the globe)
- Some words about the geographical names (5 themes: what is a geographical name?, grammar of geographical names, using fonts and placing names on a map, hydrographical and relief names, the interest of a better map reading)

At same time, we also kept the themes explained in the websites dedicated to Map History, GIS and Multimedia maps, which were developed between 2004 and 2006.

Table 1

Basic concepts related to Cartography in Hungarian School Altases		
My First Atlas (Cartographia, 2008)	**School Atlas for 10–16 year-old pupils (Cartographia, 2008)**	**Secondary School Atlas (Cartographia, 2008)**
1. Our world Rotation and translation of Earth, planets of the Solar System, Moon, coordinate system, Sun's path in the sky, cardinal points. **2. Map symbols** Legend explaining symbols used in the atlas **3. From a sketch to a map** Illustrations: the school building, the classroom, panoramic view of the school, sketch of the school and classroom, aerial photography and map of the school and surroundings. **4. Basic geographical concepts (image, map, colour and symbol)** Plain and hurst, hill, mountain, valley, plateau, basin, island and peninsula, sea and bay, river, affluent and canal, delta and estuary. Representation of relief on a map (sea, depression, plain, hill, mountain) Landscape and map **5. Maps and scales** Panoramic view, tourist map (1 : 40 000), topographic map (1 : 100 000), maps at 1 : 550 000, 1 : 1 500 000 and 1 : 20 000 000	**1. Representation of relief on a map** Panoramic view, cross-sections, contour lines, hypsometry and relief shading **2. Comparison of maps at different scales** Fragments of maps at 1 : 25 000, 1 : 50 000, 1 : 100 000, 1 : 500 000, 1 : 1 250 000 and 1 : 20 000 000 **3. Satellite image** Image at 1 : 500 000, Budapest and surroundings **4. Map symbols** Legend explaining symbols used in the atlas **5. Cartographic projections** Cylindrical, conic and azimuthal projections **6. Basic astronomical concepts** Structure of the Universe, planets of the Solar System, the visible side of the Moon, solar and lunar eclipse, the Earth and the Moon orbit, Earth bound, the Sun's apparent motion, the Earth from the Moon. **7. Types of Hungarian settlements on maps at 1 : 30 000** One street settlements, chessboard-structured settlements, conglomeration, ircular-structured settlements,	**1. Representation of relief on a map** Perspective image, cross-sections, striping, contour lines, hypsometry and relief shading **2. Comparison of maps at different scales** Fragments of maps at 1 : 25 000, 1 : 50 000, 1 : 100 000, 1 : 500 000, 1 : 1 250 000 and 1 : 20 000 000 **3. Satellite image** Image at 1 : 500 000, Budapest and surroundings **4. Map symbols** Legend explaining symbols used in the atlas **5. Cartographic projections** Cylindrical, conic and azimuthal projections **6. Basic astronomical concepts** Structure of the Universe, planets of the Solar System, the visible side of the Moon, solar and lunar eclipse, the Earth and the Moon orbit, Earth bound, the Sun's apparent motion, the Earth from the Moon.

Basic concepts related to Cartography in Hungarian School Altases		
My First Atlas (Cartographia, 2008)	**School Atlas for 10–16 year-old pupils (Cartographia, 2008)**	**Secondary School Atlas (Cartographia, 2008)**
6. Orientation on a globe Satellite image, Earth globe and geographic coordinate system **7. Orientation in Nature** Determination of cardinal points **8. Representation of relief on a map** Methods of representation on maps: contour lines, hypsometry and relief shading **9. Satellite images** False colour satellite image of Budapest: explanation **10. Types of settlements** Cíty, town and farm in an aerial photo and on a map. **11. Physical and political maps** Hungary, Europe and Earth **12. Other thematic maps** Climate, soils, political, economic, nationalities, ethnographic	settlements connected by bridge, planned industrial settlements. **8. Tourist map at 1 : 40 000 (Danube Bend)** Legend **9. Other thematic maps** Climate, soils, political, economic, nationalities, ethnographic	**7. Types of Hungarian settlements on maps at 1 : 30 000** One street settlements, chessboard-structured settlements, conglomeration, circular-structured settlements, settlements connected by bridge, planned industrial settlements. **8. Maps of landscapes** Estuary, glacier and fjord, agglomeration, agricultural and industrial region on maps **9. Tourist map at 1 : 40 000 (Danube Bend)** Legend **11. Typical weather conditions in Europe** **12. Other thematic maps** Climate, soils, political, economic, nationalities, ethnographic

Table 2

Basics about Nature (Cartographic concepts in the textbook for 5th grade)			
Title of the chapter/ themes	**National Publishing House (2002)**	**Mozaik Publishing House (2004)**	**Apáczai Publishing House (2004)**
	Our important partner: the map (p. 104–122)	**Orientation on maps (p. 34–50)**	**Orientation on maps and in Nature (p. 69–84)**
1. Map definition	Simplification, reduction, faithful representation	top view, reduction, projection to a plane	Reduction, base plan, top view
2. Scale	Scale	Large and small scale	Scale
3. Graphic scale	Explanation about its use	Explanation about its use	Explanation about its use
4. Earth globe	The reduced image of the Earth	–	–
5. Orientation	Direction, distance, cardinal points, compass, its use and principle (magnetism), Sun based orientation	Cardinal points, compass, its use and principle (magnetism), orientation of a map, orientation with the North Star	Reference system and index of names. Orientation of a map. Kilometre grid. Principle and use of a compass (magnetism) Orientation with a watch.
6. Relief	Plains (Great Hungarian Plain), hills (valley, ridge) and mountains. Regions of Hungary. Contour lines and height values.	Plains (Great Hungarian Plain), hills (hilltop) and mountains (valley, basin, peak). Regions of Hungary. Contour lines and height values.	Plains (Great Hungarian Plain), plateau, hills and mountains. Contour lines and height values.

Basics about Nature (Cartographic concepts in the textbook for 5th grade)			
Title of the chapter/ themes	**National Publishing House (2002)**	**Mozaik Publishing House (2004)**	**Apáczai Publishing House (2004)**
	Our important partner: the map (p. 104–122)	**Orientation on maps (p. 34–50)**	**Orientation on maps and in Nature (p. 69–84)**
7. Colours on physical maps	Height values (blue, green, light and dark brown) Representation of hydrography (spring, brooklet, stream, creek, river, estuary, canal, affluent, flow, left and right riverside, lake and marsh)	Mountains: brown Hydrography: blue Representation of hydrography (creek, river, canal, affluent, flow, left and right riverside, lake, reservoir, sea, ocean, marsh). Depth values	Legend (blue, green, light and dark brown) Representation of Hydrography: river, lake, sea, ocean. Depth values
8. Types of maps	Political, physical, tourist, road, city, historical, military, meteorological, phyto- and zoogeographical map. Maps of population density and dialects	Map of provinces, political map, road map, city map, tourist map, thematic maps, atlases	Thematic maps, tourist maps and road maps
9. Map symbols	–	Country and province border, settlement symbol, roads and railroads. Mining (coal, lignite, petroleum, natural gas, iron ore, bauxite) Industry (heavy, light, food)	Legend, symbols of routes for excursionists
10. Map History	–	–	Stick maps, Egyptian map of gold mines, Eratosthenes, Ptolemy, Tabula Peutingeriana, T-O maps, discoveries, Mercator, Lázár secretary, János Zsámboky
11. Others	satellite, aerial photo-graph, computer	satellite image as illustra-tion	Basic rules for excursions in Nature

3.2. Technological questions developing the website

After taking the decisions related to the structure of the new website, we faced another not less important question: which environment can be most appropriate to develop the site? Our first choice was to select PHP (Hypertext Pre-processor), which is a widely used general purpose scripting language suited for Web development and which can be inserted into HTML (HyperText Markup Language) too. Searching for other possible options the use of a Content Management System (CMS) was considered a better choice, because this kind of environment facilitates the development of a website offering pre-programmed tools, whose use is easy to learn. The next question was: which CMS should be selected? At present, there is a big number (more than 100) of freely downloadable CMS in

the Web: Wordpress, Drupal, Custom CMS, Joomla, Moodle, Typo3, e107, PHPX, PHP SiteManager, PHP SiteManager, etc. Our first condition was to choose a CMS with Hungarian support and the second one was the security that the CMS can offer, preventing our server from possible hacking attacks across the Web. Considering the different options in the market, our decision was to develop the new website in the CMS named Plone.

What is Plone? Why Plone?

Plone is an open source content management system (CMS), whose heart is the Zope (Z Object Publishing Environment) application server. Zope is an open source, object-oriented Web application server. A Zope website is usually composed of objects stored in a Zope Object Database (ZODB) and not by files in a traditional file tree system. Zope can be managed using an interactive built-in interface via a Web browser.

Plone was developed using Python and other programming languages (JavaScript, XML, CSS, etc.). It is multifunctional and can be used for the design of different Web content, e.g. blogs, Web shops, internal sites, etc. Platform-independent (available on Windows, Mac and Linux/Unix) and all its features are customizable, being easy to personalize a website using CSS (Cascading Style Sheets) and add-ons. At same time Plone is one of the fastest open-source CMS platforms on the market.

Plone has also a visual HTML editor and a "drag and drop" reordering and editing tool to create and update content. It supports the creation of backups to avoid data loss. The system has multilingual content management, portlet engine, graphical page editor and so many helpful features. Its use is totally free. These advantages were enough to choose this CMS.

Some noted users of Plone are the Federal Bureau of Investigation (FBI), Brazilian Government, Chicago History Museum, DISCOVER magazine, United Nations, European Environment Agency, NASA Science and Defending Children's rights (Figure 3).

Figure 3. Other websites created with Plone

3.3. Changes in the structure of the website

The structure of the website had to be changed too, to adapt it to the conditions derived from the use of the Plone CSM. The title of each main part was abbreviated (shortened) and the menu points were also modified and reduced from eight to six (some of them were joined and others were put under new titles), to fit into the superior section of the website (Figure 4):

- Basic concepts (As you are learning and even more…) (Alapismeretek)
- Digital collections (Curiosities and Try out!) (Digitalis gyűjtemények)
- Games (Learn and play!) (Játékok)
- Events (News and events) (Rendezvények)
- Links (What can you find on the Web?) (Hivatkozások) – including previous works in Hungarian language
- News (News and events) (Hírek)

Figure 4. Welcome page of the new website

Asking the pupils about the handling of the website, we could conclude that short texts help to keep awake the children's and young people's interest in the

content, re-affirming the principles followed during the development of the first website. However, pupils also remarked that the high number of short pages (almost hundred) causes difficulties to access a determined theme within a chapter. Considering this situation, we decided to introduce some changes in the organization of pages within the website, designing longer pages (one by each general theme) and placing more interactive fast links to the main headings (Figure 5).

Other important change made was the addition of a search tool, which is constantly accessible from the top of the website, to seek and locate information within the homepage. This is a useful tool asked very often by the user children in our meetings during the last years. Other, a most visual innovation was the graphic and dynamic (real-time) presentation of the number of visitors to the website, using an Earth globe and/or map designed and maintained across the www.revolvermaps.com website.

Figure 5. Some pages of the website

The online-glossary created in 2000 was also changed, adapting it to the new environment, but keeping the same content and assuring the fast access to the information when the user moves with the mouse over an unknown concept. The use of a glossary fills two aims:

- to explain concepts related to other sciences, concepts that children could not learn between 3rd and 6th grade of Elementary Schools (e.g. magnetite, used in the explanations related to the compass)
- to explain concepts presented in other themes, avoiding the links between different pages and themes, to keep the continuity of reading the actual page. E.g. Equator, a concept mentioned in the first theme ("Map and Reality"), but explained in more detail in the 9th theme ("Latitude and Longitude").

4. Future plans

4.1. Testing the grade of acceptation

Participants in the present project are interested to know the critics, suggestions, etc. from pupils and teachers. The more directly way of contacting us is across the website, sending their messages to our email addresses. We are also considering the option of creating at least two Web based questionnaires, one for pupils and other for teachers. These questionnaires will ask about the design (emphasizing this aspect in the questionnaire for children) and content (emphasizing this aspect in the questionnaire for teachers) of the website.

4.2. Versions in other languages

The Plone CSM includes a choice to make an automatic translation of the pages into other supported languages. The translation can be made using LinguaPlone, a tool that in March of 2009 supported more than 40 languages apart from English (French, German, Spanish, Italian, Portuguese and others).

The main difficulty of translating the original Hungarian text into other language is not the translation itself, but the correct interpretation of the text related to cartographic concepts. Other difficulty can be that children from various countries speaking the same language can use the same words with a different meaning or can name the same object using different substantives that have different meanings in each country. Specialists should also consider that a considerable percentage of the illustrations containing maps have to be substituted, because these figures were designed for Hungarian pupils after being selected from Hungarian School Atlases.

4.3. Connecting the website to social networking websites

Social networking websites play a very significant role in the more effective communication with the younger generations, which are growing living in a virtual community grouped within websites such as Facebook, Tagged, hi5, Hungarian Iwiw, etc. and websites offering social networking and microblogging services, like Twitter. Considering our interest to keep Hungarian pupils informed about the newest updates to the website, we are considering seriously to create profiles in Facebook and Twitter as “indispensable” tools to maintain young people informed.

4.4. Accessibility

The structure of the website created with Plone CSM lets us widen the content with new themes if needed and to keep the information updated in the server of the Department of Cartography and Geoinformatics (Eötvös Loránd University).

At next future, we plan to add more examples developed at the Department and more interactivity to the website, taking advantage of the choices offered by CSM as well as considering the suggestions to be made by Hungarian pupils and teachers in the interest of maintaining a website that increasingly meets their learning and teaching needs.

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