

TEACHING MAP CONCEPTS FOR CHILDREN ACROSS THE WEB: A STUDY

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Összefoglalás

Ez a tanulmány egy 1997-ben megkezdett kutatáson alapszik. Először olyan multimédiás előadás készítésének fázisait írom le, amely egyszerű módon bemutatja a térképészet különböző területeit. Ezt az előadást 1997-ben mutattam be először általános iskolai tanulóknak, készítésében több mint 40 multimédiás anyagot használtam. Az előadás címe: „A Földtől a számítógépes térképekig”, és a Térképtudományi Tanszék honlapján érhető el. (<http://lazarus.elte.hu/hun/dolgozo/jesus/970117/ea.htm>)

A kutatásnak a kezdeti célja az volt, hogy a magyar általános iskolákban tanítandó, térképekkel kapcsolatos alapismereteket tanulmányozza, és később azokat kiegészítse. A végleges cél pedig a kiegészített témának a weben való közzététele, azaz olyan honlapnak a létrehozása, amely didaktikusan és szemléletesen bemutatja ezeket a térképészeti alapismereteket a gyerekeknek.

A kutatásnak három alapvető fázisa volt:

- *A magyar közoktatási rendszerben alkalmazott tantervek tanulmányozása az oktató térképészeti alapismeretek meghatározása érdekében. Ezzel egyidejűleg a térképekkel kapcsolatos alapismeretek oktatásában fellelhető nemzetközi tapasztalatok felkutatása, illetve a tananyagoknak világszerte a weben való közzetésének tanulmányozása.*
- *A honlapban bemutatandó térképészeti alapismeretek meghatározása, témákra való osztályozása, ezeknek a témáknak a részletezése, kisebb egységekre való felbontása, valamint a témák szakmai kiegészítése újabb ismeretekkel.*
- *A honlap tervezése és megvalósítása.*

I. PRELIMINARY EXPERIENCES.

The original idea of preparing a study in relation with cartographic themes for children dated from 1996, when teachers from Elementary Schools asked me to present a lecture about maps for children. The purpose of this presentation was the completion of the map concepts expounded by them, which could be interesting for the children. I prepared a general draft about the wide fields comprehended within Cartography, from its beginnings (History of Cartography: first maps and cartographic representations) until present days (Digital Cartography). The computerized version of this work was presented at first time in January of 1997.

I divided the content into five principal themes, and included the following points (Figure 1):

1. Presentation of the Earth.

(Earth, Moon and nearest planets)

2. History of Maps.

2.1. Ideas about the shape of the Earth in the ancient civilisations.

2.2. The Babylonian World Map.

2.3. Maps from different regions of the world (Japan, Mexico and Italy).

2.4. Discovery of America: Juan de la Cosa's World Map.

2.5. The first Hungarian map (Lázár Deák, 1528).

3. Sources of actual maps.

3.1. Theodolite.

3.2. Aerial photographs.

3.3. Mapping satellites.

3.4. Space Images.

3.5. GPS.

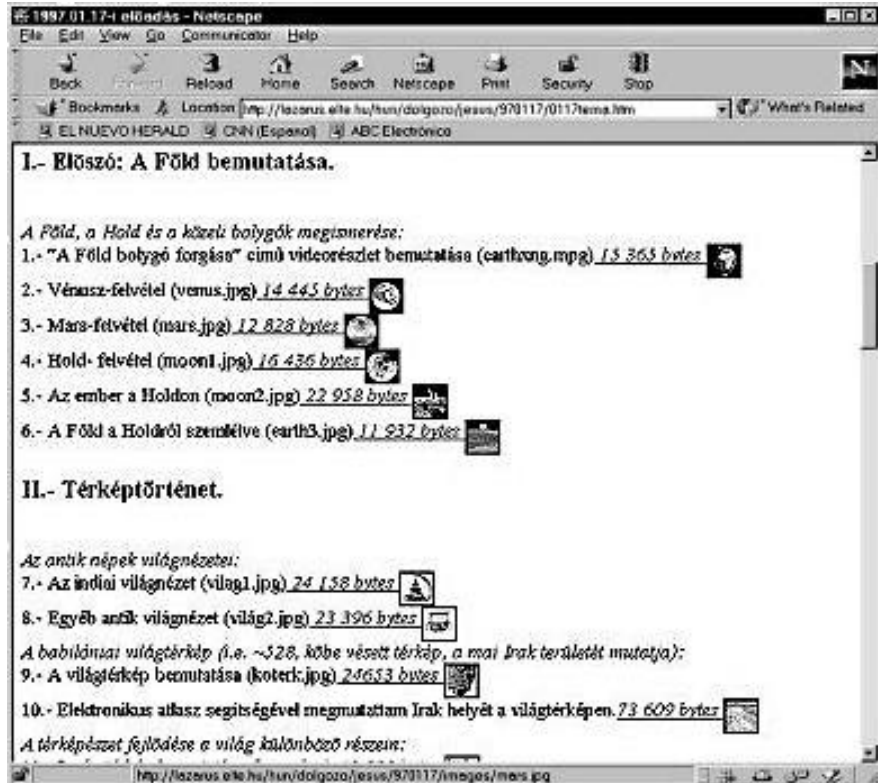


Figure 1. Presentation of the themes in the Web.

4. Principal elements of the maps.

4.1. *Scale and graphic scale.*

4.2. *Geographic Co-ordinate System.*

4.3. *Colours.*

4.4. *Symbols.*

4.5. *Geographic names.*

5. Digital Cartography.

5.1. *Remote Sensing.*

5.2. *Digital maps (animated maps and atlases).*

5.3. *Maps and data (GIS).*

5.4. *Three-dimensional models.*

5.5. *Virtual Reality.*

5.6. *Maps and Internet.*

Not all the themes listed above were exposed in a “scientifically” rigorous way. I mean that some of these themes were just mentioned (like projections), others were exposed by simplifying the explanation to the children’s language and vision. In this lecture were used (Figure 2):

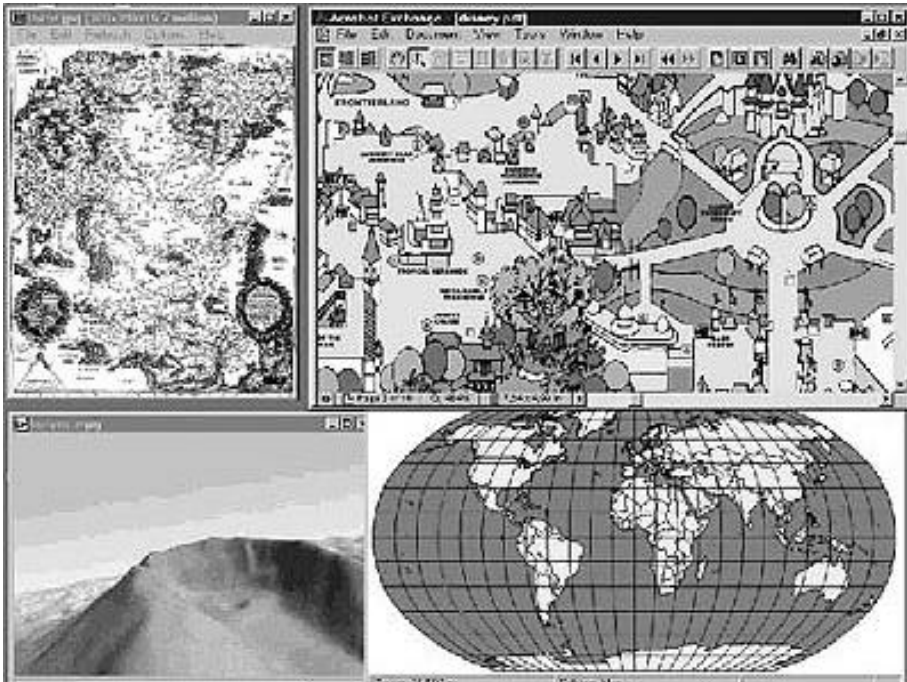


Figure 2. *Some of the materials presented during the lecture.*

- 37 images
- 4 videos
- 2 digital atlases (Hungarian Electronic World Atlas and Demo of the Centennial Historical Atlas)
- 2 shareware programs (LViewPro, VMPEG)
- Adobe Acrobat Reader (presentation of DisneyWorld in .PDF format)
- MapInfo 3.0
- Different WWW homepages.

During the definitive drafting of this material I had to prepare myself for resolving difficulties I might find along the presentation. I enumerate some of them:

1. Concept of Cartography.

The children learn concepts in relation to the principal elements and use of maps, but they don't know the concept of cartography itself. I talked about this concept only after the exposition of the first four topics of the lecture, when I was surer they could understand the overall character of this definition.

2. Presentation of the Earth.

In 3rd grade, the children begin to learn maps taking their nearest environment as their starting point: from their own classroom and school to the county and country, passing through their village or town. That is, they gradually (step by step) widen the "territory" to represent or to recognise in a map. In my lecture, I reversed this order and started from the planet Earth to Hungary, counties and cities of the country. In practice, the change of the order presented in the textbook was a success: it allowed me to arouse the children's interest in the following themes.

3. Scales of maps.

Schoolchildren learn more about it from 4th grade on. In 3rd grade they only acquire a general idea about maps like a reduced representation of the reality. I could make myself sure of the children's preference for using graphic scales, because in this way they can "visually" determine how large on territory was reduced on a map.

4. Cartographic projections.

In the Hungarian Elementary Schools children learn about geographic latitude and longitude only in 5th grade and they acquire basic knowledge of trigonometry from 8th grade onwards. They haven't got the necessary preparation to deepen in this topic, and this explains why I limited myself to point out the importance of the projections (more exactly geographic coordinates) to locate a place in a map.

At present, this lecture (presented for pupils of an Elementary School during the visit of them to the Department of Cartography in 1997) can be found on the Homepage of the Department of Cartography of Eötvös Loránd University (<http://lazarus.elte.hu/hun/dolgozo/jesus/970117/ea.htm>), under the title "From the Earth to the Digital Maps". This work is included also in the final version of the Homepage dedicated to show map concepts for children, constituting the first chapter ("Summing up") we can select on this Homepage:

(<http://lazarus.elte.hu/hun/dolgozo/jesus/gverterk/princ/terktable.htm>)



Figure 3. List of themes in the Homepage.

II. MAP CONCEPTS FOR HUNGARIAN CHILDREN ON THE WEB.

The anterior work was only an introduction to a principal research, which result was the creation of a homepage presenting the cartographic concepts taught to children in the Hungarian Elementary Schools.

In the beginning of this research my first “surprise” was that the Hungarian children acquire the majority of their cartographic concepts in the early ages, namely in the elementary school between 3rd and 5th grades. All later use of maps by other subjects in higher grades is based on this knowledge. Between these grades the pupils receive the most important lessons about using and reading maps. I consulted the textbooks edited for the subjects “Protection of the Environment” and “Geography” to determine the concepts that Hungarian children learn in Elementary Schools. The table number 1 presents a short version of the results of this research.

Based on this investigation, the list of topics presented in the Homepage is (Figure 3):

- Map and reality.
- Orientation with and without maps.
- What kind of maps is there?
- Representation of relief.
- Representation of water.
- Other colours on the maps.
- Symbols on the maps.
- Latitude and longitude.
- Some words about the geographic names.

Of course, the starting point was the content of the text- and workbooks, but the completion of these concepts was an other important task. These themes were divided into shorter units. For example, „History of Maps” was divided into 9 units:

- the first maps,
 - maps made on rock and papyrus,
 - the Greek scientists,
 - the roman maps,
 - the medieval maps,
 - the portulans,
 - the maps of the Discoveries,
 - Mercator and Ortelius and
 - the first Hungarian map,
- while the theme „Symbols on the maps” consists only of 3 units (Figure 4):
- What kinds of symbols are there?
 - Symbols for the representation of the relief and water.
 - Symbols in the Hungarian School Atlases.

THEME	3 rd GRADE	4 th GRADE	5 th GRADE
1. Natural regions.	Relief: hill, valley, basin. Hydrography: brook, river, lagoon. [I]		
2. Orientation.	Cardinal points. Compass. [I]	Orientation in the nature. Compass. [I]	Orientation without compass. Orientation of a map. [II, IV]
3. The map.	Easy definition, meaning of some colours on a map. Altitude. [I]	Measuring distances on a map. Preparation of a map sketch. Scale and graphic scale. Altitude on a map. Geographical and political maps. [I]	Definition. Scale and graphic scale. Types of maps. Representation of relief and hydrography. Hypsometry, contour-lines. Symbols on the maps. [III]
4. Geographic names.	Formation of proper nouns and adjectives. [III]		Common and proper nouns. Related nouns. Orthography of the proper nouns. [III]
5. History of the maps.			Stick-maps. Maps drawn on papyrus. Eratosthenes, Ptolemy. Roman map. Medieval maps. Mercator. Lázár and Zsámboky [II]
6. Sphere and geographic coordinate system.		Shape of the Earth. Sphere. Equator, North and South Pole. [I]	Sphere. Geographic coordinate system: latitude and longitude. Equator, Tropic of Cancer and Capricorn, Greenwich. Determining the position on a sphere. [II]
7. Mathematic concepts.	Introduction to the interpretation of easy diagrams. Exercises using illustrations related to map sketches.	Exercises about orientation and using illustrations related to map sketches.	Area. Geometric figures. Polygons. Measuring of angles. Measuring distances on maps. Orientation. Diagrams.

Sources:

[I] „Környezetismeret, környezetvédelem” textbook (2nd, 3rd and 4th grades)

[II] „Természetismeret 5. (Közvetlen környezetünk)” textbook

[III] „A magyar nyelv könyve” textbook (3rd and 5th grades)

[IV] „Matematika” textbook

Table 1. Map concepts taught in Hungarian Elementary Schools between the 3rd and 5th grades.

The division of themes in units was an important aspect that I considered during the design of the homepage: in first place, because in this way it is easier to seek a specific concept within a topic, but another important reason was the design of shorter homepages to keep awake the children's interest in the content. Parallel to this research to determinate which cartographic concepts are included in the Hungarian textbooks for Elementary Schools, I was looking for international experiences about the use of the Web in the teaching activities, principally in the Elementary Education. I visited different sites in the Web

related to Cartography for children and other related sciences (this list is included in the section dedicated to links in the Web in the Homepage). The purpose of these visits was the consultation of different points of views about how we can present scientific topics for the children and young people. I found different researches demonstrating that children prefer shorter homepages, for example one developed by Joseph L. Hoffmann and his colleagues from the Michigan University, between 1996 and 1997 [Hoffmann, 1998].

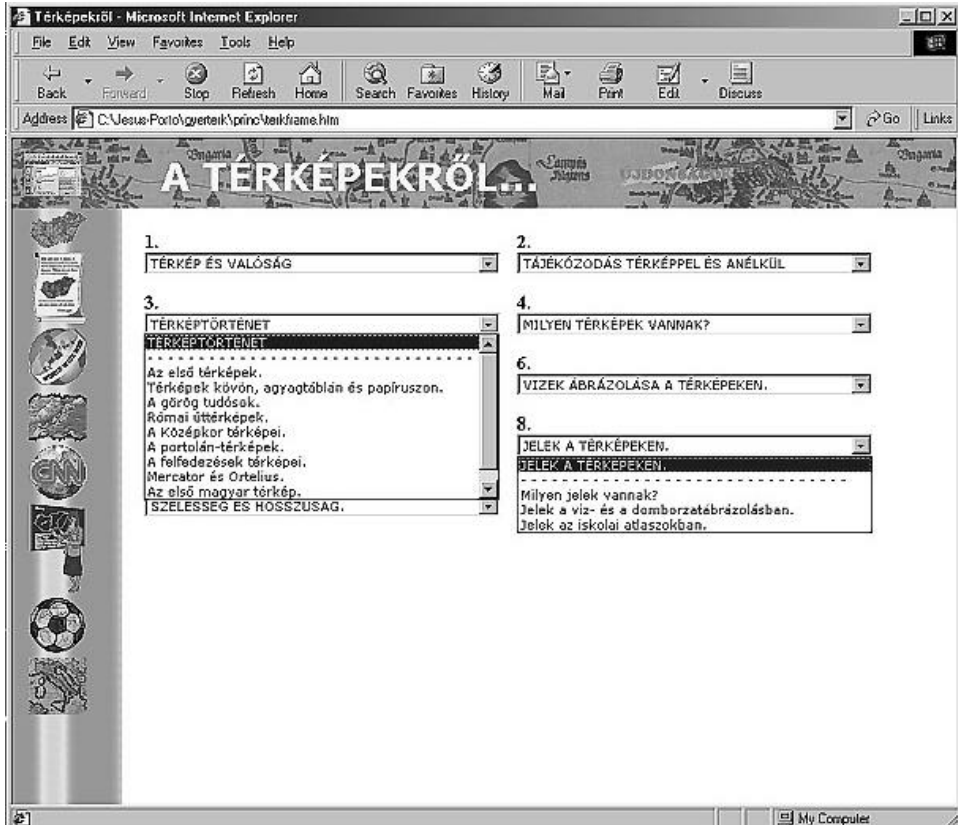


Figure 4. Units included in the cartographic themes.

Of course, this homepage does not present only these map concepts (included in one of the eight points of the principal menu, which title is „As you are learning and even more”). Following other international experiences, I decided to present and complement the basic concepts offering also an image as complete as possible about the cartography. Together with these concepts, I included also other „chapters” in this Homepage. The final structure we can find on the Web is (Figure 5):

- Summing up...(for the presentation of the lecture “From the Earth to the Digital Maps”, described in the previous chapter of this same work)
- As you are learning and even more...(to present and complement the map concepts taught in Hungarian Elementary Schools)
What can you find on the Web? (links to homepages related to Maps and Children)
- Try out! (demos, examples, etc. found in other homepages)
- News and events. (information about organization of exhibitions, interests on TV-programmes, Barbara Petchenik-Award and other activities)
- Learn and play! (tasks and games related to Cartography that could be computer- or traditional games)
- Not only for teachers...(exchange of opinions, questions, suggestions, etc)
- Curiosities. (this section is divided in three parts: “old maps”, “imaginary or fantasy maps” and “are these maps?”, but in the future can be complete with other interesting topics)

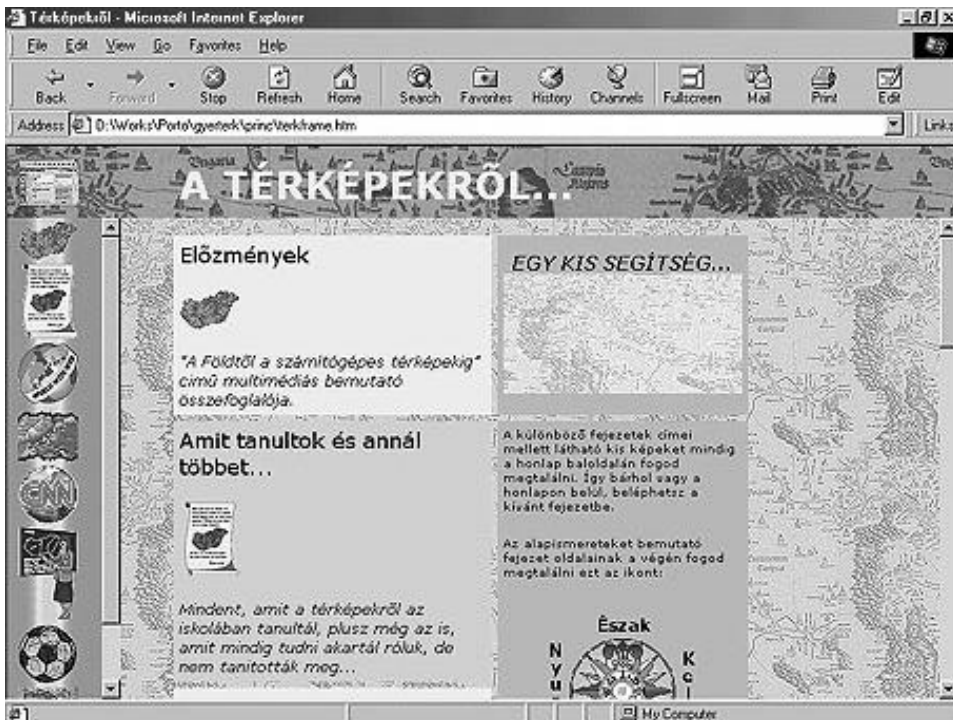


Figure 5. Principal menu of the homepage.

This homepage is under “permanent” renovation, offering new demos, graphic applications, etc. We dedicate special attention to the section for the teachers, which will be periodically

updated with their opinions and questions: it is possible to include a section with tips and hints for the teachers and to deepen some topics presented in the second chapter of the homepage.

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