Electronic Educational Atlas for Schools in Kazakhstan

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Abstract: In the article the methodology of the research which is carried out within scientific project, the analysis of scientific and methodological literature concerning the creation and application of electronic educational atlas on Geography are considered. The content of the electronic educational atlases and the maps of Kazakhstan, and also interface screenshots of the electronic atlas showing functions of navigation on the maps of the atlas, scaling, preview and the printing of maps, export of maps in the graphic editor, saving of maps in the raster file and opening external and additional shape files are presented in the article. In the main part of the article the didactic functions and educational problems are described which a teacher and a pupil can solve using electronic educational atlas in the Kazakh, Russian and English languages. In the concluding part of the article the technology of the creation of electronic atlas is described developed by means of work with spatial data of a library Open Source MapWinGIS ActiveX Map Control and a programming language C# 5.0 in the environment Visual Studio 2013. The created atlas adapted for school education will allow to intensify process of introduction of geo-information technology in the education.

Keywords: geography, geo-information technology, didactic of electronic atlas, school education.

Introduction

The modern elementary and high school is characterized by active approach of geo-information technologies. Nowadays in some countries (the USA, Great Britain, Austria, India, Russia, Ukraine and others) the geographical information systems (GIS), in particular electronic educational atlas are widely used in school geographical education. (Demirci, 2009; Milson, Demirci, 2012; Jones, Blake, 2004; Roosaarea, Liibera, 2013). “The geo-info set of educational maps "Atlas" project is carried out at Kokshetau State University named after Sh. Ualikhanov, according to the budgetary program of the Ministry of Education and Science of the Kazakhstan at the Natural Science Department. The goal of the project is to determine the structure of the functional possibilities, content, the technology of creation of electronic educational atlas in geography. The electronic educational atlas is developed for the schools in Kazakhstan for the first time. In present there are some thematic projects to solve specialized scientific and applied problem in business and management in Kazakhstan. The analysis of specialized scientific material, pedagogical practice shows the usage of electronic educational atlases at geography lessons and in extracurricular activities prominently expands the educational activity of the teacher and the pupil of school stimulates cognitive curiosity, forms geo-information competence.

Methodology

The first stage of scientific-research work is based on the analysis methods of domestic market-resume, interview; and geo-information methods of work with electronic raster images and their transformation to the unified map system of coordinates and projecting with further vectoring. The analogues of electronic educational atlases of Commonwealth of Independent States (CIS) and the world are analyzed. (Haeberling, Baer, 2011; Sigalov, Skuratov, 2012; Барладин 2015; Лаборатория учебных..., 2015). The analysis of educational textbook and the map sets are analyzed. According to the two-year scientific study there were thematic editions for the following maps of Kazakhstan: physical map, the map of territory investigation, geological map, tectonic maps, mineral resources map, climate map, hydrographic map, natural zones, physical-geographical map of the Kazakhstan regions, economic, ecological maps. The basic sets of the maps for geological, climate cycles are developed, and also the plant and soil cover for the maps of CIS. The fine-tuning of vector layers for the maps of CIS, the rest of the world, testing, approbation of the electronic educational atlases in geography at schools, the creation of the methodical recommendation for teachers are carried out at the final stage of the work.
Results and discussion

Research work on working out e-learning school atlas begins with the analysis of equipping schools with geographical maps. The results of the questionnaire of 96 of geography teachers of Akmola region were summarized in the diagram shown in (Figure 1).

Equipping schools with geographic maps is quite low, which is evidenced by the 100% of the respondents who indicated the need for maps. 15% of teachers confirmed that they have interactive board in the geography classroom. 75% of respondents indicated the need for electronic maps, 73% in paper form, 69% indicated the need for contour maps. Among the maps on the territorial coverage 67% of respondents pointed to the need for maps of Kazakhstan, 53% - to the world maps and 45% - to the CIS maps. The need for maps for the 10th-11th grade was revealed in 69% of the respondents, 72-73% of respondents indicated the need for maps for the 7th-9th grades.

Figure 1. Results of the questionnaire of geography teachers within the project "The geo-info set of educational maps "Atlas ".

Figure 2. Screenshot in the mode of imposing of the soil map and map of spring temperatures of Kazakhstan.
Thus, after analyzing the questionnaires we had identified the need for the creation of a school atlas with in-depth thematic content for the territory of Kazakhstan.

The created electronic educational atlas in geography includes 80 vector layers for the school curriculum in geography, allows to use geo-information technologies at elementary schools. It provides to master the school geography curriculum, using interactive filling in and analysis of geographical maps, the creation of their own maps, the work with different kinds of contour maps, the creation of their own descriptions of geographical maps on the basis of the analysis of multimedia information objects.

The electronic educational atlas improves the effectiveness of the studying process, with the help of the usage of geo-information technologies in the salvation of the traditional and new geographical problems at geography lessons. Among those problems, there is comparison and analysis of the maps of different contents of the same area with the aim to find out the connection between climate and terrain, climate and vegetation (Figure 2).

Such kind of problems are difficult while using traditional maps, because they are based on several maps. The electronic educational atlas allows to solve the problem rapidly, and it helps a trainee to make such kind of analysis which developed skills of scientific work.

The developed electronic educational atlas in geography allows to help a teacher to solve the following problems in Kazakh, Russian and English:

- the usage of different models in class- digital maps, digital images;
- to put one kind of maps (layers) on the others, and also on geographical and physical map (Figure 3);
- to prepare the set of digital maps, including contour map, necessary for the practice;
- to change the size of mapping image on the screen with the goal of changing detailed placing of geographical objects and phenomena;
- to use the set of demonstration maps and diagram maps, place in the library of additional multimedia information.

While using the electronic educational atlas a pupil of school can do it in Russian, Kazakh, and English:

- to read geographical maps in digital;
- to measure on digital map;
- to fill in digital contour maps;
- to create his own digital geographical map;
- to analyze the statistics, placed in the library of additional multimedia information;
to describe the connection between geographical objects and phenomena while using digital thematic maps of different content;

to save digital map and multimedia information in a file, to print;

the developed technology of creation of electronic maps and programming of electronic educational;

to search geographical objects on digital maps (Figure 4).

Figure 4. Screenshot in the mode of search the cities of Kazakhstan.

Atlas in geography applies a consequent carrying out of the operation:

- the storage, studying and analysis of the original material for digital maps;
- the transformation of digital maps to the unified mapping system of coordinates and projecting;
- the forming of digital map, scanning, attaching of the raster sound-proofing, putting thematic layer on typical basis, digitalization of contours;
- the development of interface of program shell: the main window, menu, and tool instrument;
- the creation of data of attributive geographical information in 3 languages (Kazakh, Russian, English);
- the involvement, lightning of shape files of digital maps, placing of symbols;
- the involvement of multimedia information to digital maps of electronic atlas;
- the programming realization of legends of electronic atlas;
- the programming realization of functional navigation, searching, exporting, importing of shape files, measuring of geographical coordinates, stamps, forming and filling in contour maps.

While creating vector layers, the technical side is exact, as while working with raster all the aspects of mathematical basis of maps were taken into consideration. The system of coordinates of Pulkovo-42 with the protection-normal conical by Kavraisky was made for the maps of Kazakhstan and CIS. The developed vectoring thematic layers involve moderate generalization and object selection.

The approbation took place in schools of Kokshetau. Two groups totaling 96 students participated in the experiment: experimental - 48 students and a control group - 48 students of 8th grade of schools №1, №4 of Kokshetau. In the experimental group training was conducted with the use of an electronic atlas on geography. The results of the test in geography at the beginning of the experiment and at the end of the experiment are shown in (Figure 5).
The experimental testing of the methods of geography studying with using electronic educational atlas showed its effectiveness.

The table program shell of electronic educational atlas is made with the library funding Open Source MapWinGIS ActiveX Map Control, (Welcome to the MapWinGIS…, 2015) and a programming language C# 5.0 in the environment Visual Studio 2013.

**Conclusions**

The using of electronic educational atlas prominently increases the teaching method, pupils of school learn new methods of working, including the peculiarities of modern scientific methods of geographical studying. They get basic skills and practice experience using geo-information technologies.

The created atlas adapted for school education will allow to intensify process of introduction of geo-information technology in the education, which promote achievement of the important purpose put in standards of education to a personal result of education.

The technology of development of electronic educational atlas may be used while preparing for school history course.

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