MODERN TECHNIQUES OF STUDENT EDUCATION IN THE CARTOGRAPHIC FACULTY OF MOSCOW STATE UNIVERSITY OF GEODESY AND CARTOGRAPHY

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Abstract. Nowadays technology is growing very fast, almost faster than we can imagine. Therefore as people who are responsible for the education and training of future Cartography specialists, we should improve our educational process to keep up to date.
Students are educated in the disciplines of Cartographic drawing, Computer graphics and Desktop publishing of maps at the Cartographic Faculty, in the Department of Drawing and Map Designing. A few years ago it was decided to reconsider these educational methods.
Because the cartographic agencies have highly modern equipment the students graduated from the University should have sufficient knowledge about it. Graduating students who find employment in government or private cartographic agencies face a severe problem if they begin work without adequate training after the University.
Reconsidering the education process involved bringing the latest technology into practical training. This included improved computers, graphics pads with a stylus instead of traditional pen and ink, digitizers, digital cameras, professional scanners, Internet resources, special software used at agencies, digital manuals etc.
Reconsidering the way of lecturing involved using a multimedia projector and laptop computer for presentations, online Internet shows, cartographic animations etc.
There are some problems when trying to improve knowledge for students by modern methods. As any progress has negative and positive sides for human beings, new technologies could help us to educate people and could also introduce new and unexpected difficulties. The paper is dedicated to talking about these problems.

BACKGROUND OF GRAPHIC AND ART SCHOOL IN MOSCOW STATE UNIVERSITY OF GEODESY AND CARTOGRAPHY (MIIGAIK)

The background of graphic and art school of map design at the Moscow State University of Geodesy and Cartography (MIIGAiK) goes as far back as 1823 when the main subjects of the educational schedule in the Konstantinov Land Surveying Institute, a geodetic school, were «Drawing» and later «Calligraphy», «Art of drawing of maps and plans». Introduction of these subjects to the educational plans was connected with carrying out land measurements in Russia and their use in plans and maps. The job was done manually including picturesque design of maps and plans.
Since 1936 much attention had been paid to development of subjects of graphics and design for training cartographers-engineers at the Cartographic faculty which resulted in setting up the Department of Drawing and Map Designing in 1940. The synopsis of lectures «Topographic Drawing» was written by P. P. Levitsky (1859-1930) – one of the leaders of the graphic school of the University and in 1909 «Short practice in drawing plans, making inscriptions on them and coloring them » was issued.
The development of thematic cartography called for more profound training for specialists on map designing. Among the first teachers who contributed significantly to the theory and practice of map design was Adrianov V. N. In 1934 he supervised the design of the Large Soviet Atlas of the World (abbreviated in Russian as "BSAM") for which he worked out and designed a special font called "BSAM italics".
Art training is an integral component of education for students of the Cartographic faculty. Therefore solid traditions and the high level of artistic map production have been continued by teaching the subject of «Map design». This subject has also received further scientific development. Skvorzov P. A. and Koldaev P. K may be rightfully considered as founders of art school of map design.
The years 1935 to 1970 may be called the period of formation of a native school of artistic map design. Skvortsov P. A., a talented artist, cartographer and scientist, is rightfully considered its father. The uniqueness of design methodology of pictorial landscape maps is an organic merging of strict principles of designing cartographic products and those of landscape painting.
Skvortsov's artistic school of map designing is being extended by his numerous students and followers. His scientific and methodological ideas in the field of pictorial map designing are implemented in the courses «Color design of relief», «Artistic map design» [1].

MODERN EDUCATION BY GRAPHIC AND ART COURSES AT THE DEPARTMENT OF DRAWING AND MAP DESIGNING

Nowadays cartographic education is connected to the requirements of cartographic agencies. The computer technologies involved in map production join many processes into a single cycle which were realized separately in the past. Understanding traditional map production gives us the basis from which we make the transition to computer technology. It is important to give complex knowledge so students can solve all problems of map creation from information input to computer to ready to publish color-separated films.

Because modern technologies of map creation are based on using the latest software and equipment it was decided to reconsider disciplines at the Cartographic Faculty at Department of Drawing and Map Designing. The modification of teaching methods includes using modern technical facilities such as multimedia, electronic manuals, tests for knowledge control and new ways of lecturing. Modern educational facilities should be planned to suit the needs of students, to enhance independent study and self-testing. Independent work by students helps the quality and efficacy of study [2].

While retaining carefully the strong heritage of our graphic and art school we have started a new course: "Computer graphics" consisted of three parts, "Vector graphics", "Raster graphics" and "Map layout". In addition to new courses, we improved classical courses: "Map drawing" – "Cartographic computer fonts" and "Desktop publishing of maps" – "Pre – press".

When educating students in "Computer Graphics" we start from basics of computer graphics (Interface, Tools etc.) and finish with a completed map project.

The "Vector graphics" course has started as a discipline on choice from 1991 and later in 1998 as permanent. It is based on application of CorelDraw software to map design.

The lecturing part of the course consists of:

- Computer graphic software. Introduction to CorelDraw;
- CorelDraw interface and tools;
- Map object editing in CorelDraw;
- Text and effects in CorelDraw
- Map design in CorelDraw.

The practical part of the course consists of:

- Construction of ornamental pattern for decorative border of map;
- Map title design;
- Map symbols creation;
- Digitizing raster map;
- Vector map creation on layers.

The "Raster graphics" course started in 2002. It is based on applying Adobe Photoshop software to map design.

The lecturing part of the course consists of:

- Raster Graphic basics. Introduction to Adobe Photoshop. The use of digital cameras, scanners for inputting graphical information into the computer.
- Color presentation. Color Models. Color gamut. Bit depths.
- Rasterizing, map color separation in Adobe Photoshop

The practical part of the course consists of :

- Adobe Photoshop interface and tools;
- Creating logotype;
- Monitor calibrating. Color modes;
- Raster filters in map design effects;
- Color adjustments;
- Creating map cover on layers;
- Hill shading in Photoshop
- Text design
- Contours
- Printing map from Photoshop

The "Map layout" course started in 2004. It is based on application of Quark XPress software to map layout.

The lecturing part of the course consists of:

- Art and technical purposes of layout. Book design and layout history.
- Layout and composition of publishing. Layout ways
- Layout basics (Working with fonts, text block, layout with pictures, pictures types, working with tables etc.)
- Infographic (diagrams, graphs, charts, schemes)

The practical part of the course consists of:

- Introduction to Quark XPress. Interface and tools. Coordinate systems of text blocks, measurement units in Quark XPress.
- Creating of new layout, navigation, guides.
- Text blocks, text import
- Font characteristics, font editing, special symbols, tabulation, text orientation
- Color models in QuarkXPress, trapping
- Vector graphics in QuarkXPress
- Document styles
- Interaction of text and pictures blocks
- Master-page creation
- Booklet artwork creation in Quark XPress

The improvement of "Map drawing" – "Cartographic computer fonts" consists of improving Macromedia Fontographer Software for creation and modification of cartographic fonts.

The lecturing part of the course consists of:

- Introduction to Macromedia Fontographer.
- Computer font classification
- Vector fonts *TrueType, Type 1, Open Type*
- Bezier curve basics, PostScript, hinting
- Raster fonts
- Font management software
- Computer fonts terminology

The practical part of the course consists of:

- Macromedia Fontographer interface. Kerning and tracking
- Font drawing and transformation
- Creation of new symbols
- Creation of new fonts
- Creation of decorative ligature and diacritical symbol
- Russification of Latin font

The improvement of "Desktop publishing of maps" – "Pre – press" consist of using all studied software to make pre-press of a map project as print – file ready for color separation.

In practical courses, we use electronic manuals widely. Every student has the possibility to read the manual and to do exercises simultaneously without any assistance. This gives to students the possibility for remote education. In case of problems, he may resolve it by helping of pedagogue in class lessons. The problem of "electronic" education concludes that students can copy final test work from others very easily. To prevent this we make a defense of every lesson test work in the form of an interview. From this interview, the self-made work becomes clear. Besides that, the student shows his knowledge taken from lecturing part.

Reconsidering the way of lecturing includes using multimedia projectors and laptop computers for presentations, online Internet shows, cartographic animations etc. This equipment is necessary because of the importance of visual material in all courses at Department of Drawing and Map Designing. Besides that, it is very convenient to use computer presentation methods such as Power Point. It allows easy up-dating of lecturing information so that students can take the newest knowledge in cartography field. The other positive point is that the basic information the student should have appears on the screen long enough to write it in a notebook. There is no more need to repeat the same information three times: to hear – to understand – to write. This way of lecturing is also very convenient for people with hearing problems.

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BIOGRAPHY

Maxim V. Nyrtsov was born in 1975. He graduated from the University of Geodesy and Cartography (MIIGAiK) in 1997. His major is engineer-cartographer. He is doing his PhD and nowadays teaching students at the Department of Graphics and Cartographical Design of the University.

In 1999, he participated in the 19th International Cartographic Conference in Ottawa, Canada, as travel award winner, where he has oral presentation on the topic "Mathematical planetary cartography basis for non-spherical celestial bodies"

In 2001, he participated in the 20th International Cartographic Conference in Beijing, China, where he has oral presentation on the topic "The problem for mapping irregularly-shaped celestial bodies"

In 2003, he participated in the 21st International Cartographic Conference in Durban, South Africa, where he has oral presentation on the topic "The classification of projections of irregularly-shaped celestial bodies"

Fields of interests: Mathematical Cartography, Planetary Cartography, GIS, Cartographic design.