

# CARTOGRAPHY AND GIS FOR GEOGRAPHERS AT SOUTH-WEST UNIVERSITY

**Penka Kastreva**

***Abstract:** Here are discussed the reasons for the development of new cartographical and geoinformational subjects for the geography students at the South – West University (SWU) - the appearance of geographical informational technologies, which made a real revolution not only by the creating but also by the using of maps.*

*The most important thing learned by the geography students before the “computer era” was the developing of cartographical skills for working with maps. Nowadays the important task for the future geographers, except the simple usage of maps, is the ability to cope with a database of geographical information. As a result was given a new meaning of the concepts for the geogrspical cartography.*

*A special attention is paid to the contents of the cartographical and geoinformational subjects and also are discussed the GIS and cartography exercises. By updating the cartographical subjects are carefully considered the new trends by the digital cartography.*

*The forcing changes in the teaching, in the lectures and in the requirements to the students are well founded.*

*It is also gone into the connection between geography, GIS and Internet, their present condition and the future progress. Referring these aspects are given some ideas for the future of the geoinformational subjects and how they are thought at the university. The ideas are considered with the finances of the unviersity.*

*The mutual conditioning between the modern cartographic education, the new models of information exchange, the level and trends in the development of the geography and in particular of the cartography. On this background the basic purposes and the style, which a modern teaching of future geographers of cartography and GIS need, are discussed.*

Dr.Penka Kastreva

South-West University, Department of Geography and Ecology and environmental protection

“Ivan Mihailov” Str. 49, 2700 Blagoevgrad, Bulgaria

E-mail: [penkakastreva@hotmail.com](mailto:penkakastreva@hotmail.com)

## 1. INTRODUCTION

In 21<sup>th</sup> century modern societies expect an excellent quality of education and life. Because the education of the students is the product of the educational institution, it is the most important aim of every university. The quality of the education is the fundamental condition for skills, talents and ability to problem solving of the society.

The universities of many countries in the world have adopted accreditation procedures in their programs to raise the quality of the education by closely monitoring the quality of teaching and student learning. In this way can be evaluated the intellectual development of the students. These reasons forced the inspection of the programs for cartographical and geoinformational subjects for the Geography students.

The geography as a part of geo sciences always has been in close connection with the engineering sciences, especially with cartography. Before the “computer era” for the geography students the accent by the cartography education was put on the development of cartographical skills for working with maps. However, the appearance of the geographical informational technologies caused a real revolution not only by the creation but also by the usage of maps.

The importance of the information and the need of exchanging it is increased. A great part of the Internet information is with geographical or space origin. The maps (traditional and digital) are an important means of distributing of the geographical information in internet space in different directions, locations and spatial models. Therefore cartography literacy is not a privilege or an important index of intelligence of modern man. It became part of normal life of every individual. Nowadays the geographical informational systems(GIS) are the best known means for managing the great and dynamicaly changing flow of information. The most important function is to facilitate the user enlarging his or her database and controlling the great amount of information. It is obvious that the development of the cartography is fundamental for the new geoinformational technologies. The spreading of these technologies in our informational century and the great area of their application has imposed the necessity of educating specialists for all professional areas. More and more specialists with different occupations and qualifications keep taking participation in the creating of maps.

All the mentioned facts imposed in the last few years the giving of a new meaning to the geographical cartography and its relation to the other sciences. The basic task for the future geographers, except the simple usage of

maps, is namely the ability to cope with a database of geographical information. This preference has an essential meaning for the good prepared specialist in every management field by taking an important operating decisions

## 2. THE GEOINFORMATIONAL SUBJECTS IN SOUTH - WEST UNIVERSITY NOW

The higher geographic education was established in 1993 at the pedagogic faculty of the South - West University in Blagoevgrad. Since 2000 the department of geography and ecology and environmental protection is part of the Mathematics and natural sciences Faculty.

The task of the department of geography up to the year 1997 has mainly been the preparation of geography teachers for schools in our country. From the academic year 1997 – 1998, the department with its new teaching plans has the aim to prepare geography teachers and also geography specialists in suitable areas.

In 2004 the subject “Geography” received a new accreditation. The new accreditation valuation will provide a higher quality of geography education and will stimulate new introductions in the geographical education.

On the basis of cartography in the last few years has appeared a diversity of new scientific branches as geoinformatics, cartographic method of research, mathematical and cartographical modeling, multimedia cartography, remote sensing mapping and other. The combination of new knowledge and technologies with the traditional experience permitted the composing of electronic map products of higher quality in the cartographical practice.

In the latest educational programs for the already existing subjects is included new contents. But the basis of the traditional cartography is preserved and at the same time the digital cartography has found a place. The traditional scientific branches, learned by the geography students, like mathematical cartography, map design, map compilation and edition, measuring on the map, map use, etc. are discussed in the light of a digital cartography.

For the students of geography the subjects of cartography are simpler compared to those for the students of cartography, especially the elements of mathematical cartography and the preparation for edition and printing of maps. The themes are related to important problems treated in the subjects of geography. A great attention is paid to the methods of statistics by the creation of maps.

The lectured material of the three basic cartographical subjects is mainly related to the theoretical fundamentals of computer cartography – digital cartographical models, making and working with digital maps etc.

The three subjects will be mentioned separately:

**Mathematical geography and cartography** subject includes:

*The first part – Elements of Theoretical Cartography* – Definitions of cartography. Subject and method of cartography. Cartographical information. Geographical maps. Classification of maps. Cartographical representation. General systems of symbols. Cartographical modelling and Map generalisation. Map visualisation.

*The second part – Elements of Mathematical Cartography* - coordinate systems, theory and laws of cartographic projections, scales and distortions, classification of projections, some basic projections from category azimuthal, conic and cylindrical, the choice and usage of cartographic projections in map production.

*The third part – Map Production* – Map graphic design. Preparation for printing and edition of maps. Topographic maps. Mathematical basics on topographic maps. Topographic maps of Bulgaria. Updating.

*The fourth part – Modern Cartography*- Digital mapping. Digital maps and digital models. Map making in digital medium. Remote sensing and cartography. GPS. GIS applications in the cartography. Internet cartography.

**Thematic cartography** subject includes:

Classification of thematic maps. Subject matter of thematic maps. Methodology and techniques of creation of thematic maps. Sources data for thematic mapping. Symbolisation. The base thematic maps. Designing thematic maps. Digital thematic maps. Digital compilation worksheet.

**GIS** subject includes:

Concept for GIS. Types of systems. The meaning of GIS for cartography. Components of a GIS. Data base. Basic operations with database - Data entry, Data integrate, Data management, Data visualization and presentation.

Geographic analysis. Applications in GIS

In the cartographic education the exercises are very important for the mastering of the cartographical principle, although it is still not satisfactory especially for the functions of computer cartography. Efforts have been made recently and we hope that we will soon have a contemporary laboratory for cartography and GIS.

Until recently the projects of cartographical subjects are worked out only manually. The introduction of personal computers in the teaching activities began in 2000 year with presentation of the subject GIS. But the most important change was made in the academic 2004-2005 year, when was introduced a new curriculum. During the last years are made efforts the students to prepare their cartography projects with the aid of a computer. But this turns out to be rather difficult for the geography students, because in their curriculum are not included classes for computer drawing.

In the area of “Mathematical geography and cartography” subject the students are learning to calculate and draw map projections with computer. At present they learn also to use computer by map compilation for the “Thematic cartography” subject.

A special attention is paid to the work with source drawings with different map layers of data where the students use Arcview. Students can add data as a map layer, receive information for objects, find objects, scale maps, move map image, switch on or off visibility, choose a symbol system for objects. They can solve more difficult problems such as selecting and classifying objects, coordinating transformations and changing projection of the data source, thematic and topologic inquiries (Query), performing spatial analyses. As a result of such analyses, usually a series of maps is being worked out where the obtained data is illustrated. A very important remark is that our students work with maps of scale 1:50000.

The introduction of the new curriculum from 2004 and above mentioned changes forced the adoption of the European Credit Transfer System (ECTS) in our university. Therefore the curriculum was designed considering this fact. During the design of the new curriculum our department made efforts to introduce changes in the subject's contents. The teaching staff pays attention to the changes caused by the continuously developing technological and theoretical of digital cartography.

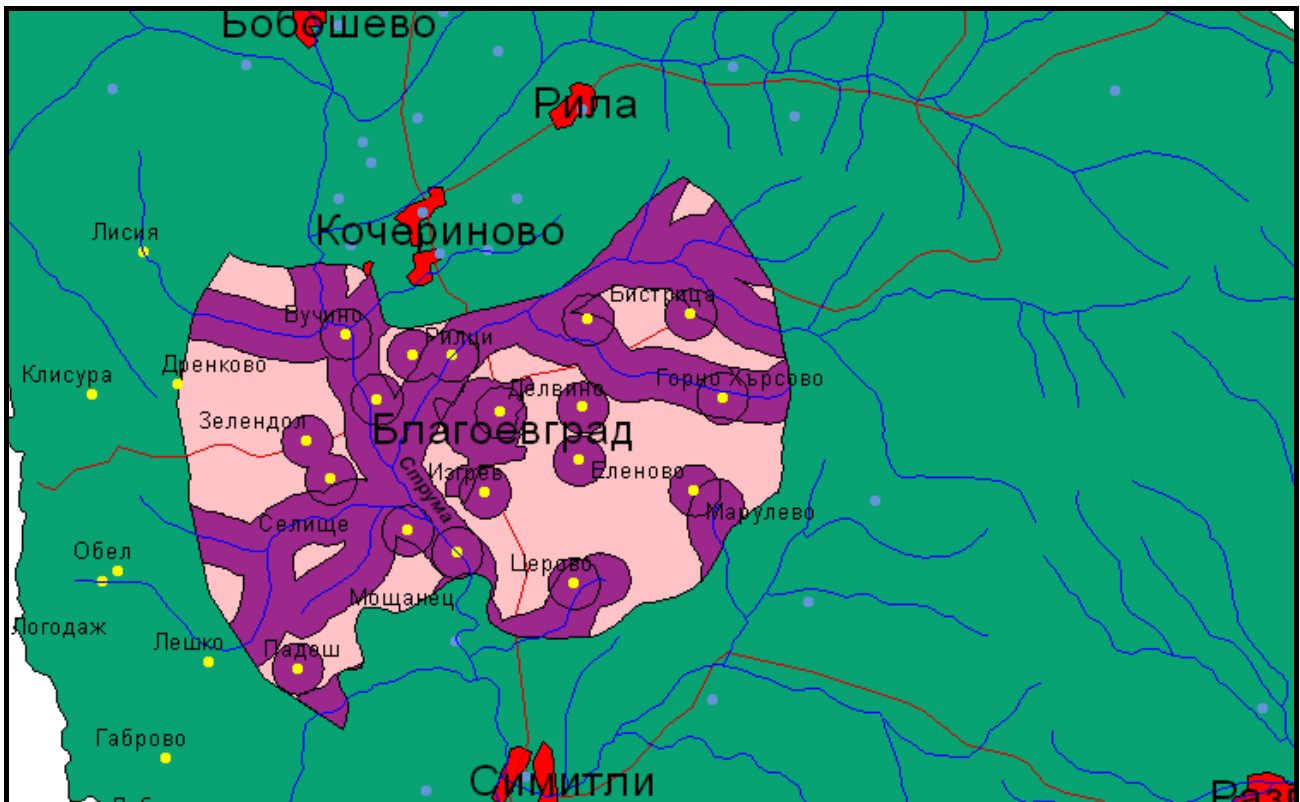


Figure 1. A part of a map drawn up by students which presents geographic analysis

### 3. GEOGRAPHY, GIS AND INTERNET

The GIS and the Internet technologies were a natural, inevitable and an expected stage. Nowadays we accept Internet only as a media for fast and effective information access. But still no one denies the influence of the GIS conception, its means and the great area of application, which continuously grows.

Many examples for the value of the Internet and the GIS integration can be mentioned. These many examples show the strength of Internet and GIS for delivering of spatial information. A special emphasis should be laid on the fact that a great amount of the geographical information is in the form of maps. On the other hand the development of the methods for mapping strictly depends on the instruments and GIS technology perfection.

Another example for the widely spread cartographical information through Internet is the “publishing” of different types of atlases.

Recently with the basic purpose of GIS to create maps using the automatic way of Internet are also spreaded the national informational systems. In this way besides the simple supplying of maps by clicking the mouse button, a great amount of the Internet based public informational systems spread not only the usage of maps but also information about the represented objects

From our point of view the modern cartography and GIS cannot be independent. Their strength is their unity. Obviously the modern cartography aims to conquer a place in the global system of the Internet.

#### **4. THE FUTURE OF GEOINFORMATIONAL SCIENCES IN SOUTH - WEST UNIVERSITY**

From all the mentioned facts it is obvious that the two technologies GIS and Internet have thoroughly changed the cartography science. It is continuously improving itself and the need of spatial data is getting more and more obvious and necessary. Naturally this requires the popularisation of GIS technologies and Internet among the Geography students mainly as a source for cartographical information.

The computers and the GIS technologies should be a priority for tourist, ecology and landscape map making and also for other subjects that allow their introduction. In the exercise lessons should be introduced computer technologies for map compilation and what's more important for the geographers the usage of maps.

According to the master's degree program GIS and the computers should be widely used into all student projects and papers. In the curriculum is also included new geoinformational subjects such as the remote sensing methods.

At present some courses for using the Internet already exist, as part of mathematical and informatical university programs, but not in aspects of cartography. There is no available cartography program for using the WWW

The curriculum includes 60 hours for individual excercises which can help the students to develop their future professional skills in the geography and ecology area where GIS technologies also take place. These methods give students the opportunity of improving their cartographical and geoinformational knowledge .

The new program for the "Geography" subject will demonstrate that graduates have competency in one or more of the following areas: digital mapping, geographic information systems, remote sensing and other related areas.

#### **5. CONCLUSION**

All the mentioned emphasizes that the modern development of the geographical sciences has been defined from the fast and widely spreading of the new methods and technologies which use the last achievements in the science and technology. As already said and explained one of the most remarkable achievements of the 20th century is without no doubt in the area of electronic communications and technologies which also includes Internet and GIS. As the base of these informational systems is the graphical information from the created digital maps. For the geographer this is important because no one can accomplish perfection and quality without such knowledge.

We believe that these first modernising steps in the curriculum will lead to a better result in the comprehending the cartography and GIS, which is really necessary for future careers of the professors and geographers. The future cartographical and GIS education are equally important and we hope that this education will define our future place in the european GIS market.

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Penka Kastreva was born in 1957. She graduated the University of Geodesy, Photogrammetry and Cartography – Sofia in 1982 (now University of Architecture, Civil Engineering and Geodesy). Since 1984 she practices as an engineer of Geodesy. She worked for the government office of cadastre. Since 1995 she works for the South - West University in Blagoevgrad as an assistant of cartography and GIS. Becomes a Doctor of Geodesy in 2001 with dissertation “Improving of existing geodetic nets”. Since 2005 she is a Associate Professor at South - West University. Her interests are in the fields of GIS and theoretical and thematical cartography.