



# **The Role and Possibilities of Geoinformatics In Education (Basic and Vocational Training)**

**Matula Györgyi**

## **Doctoral Dissertation Theses**

Eötvös Loránd University  
Department of Natural Sciences

Doctoral School of Earth Sciences  
Doctoral program leader: Dr. Gábris Gyula, D.Sc, University Teacher

Doctoral Program of Cartography  
Program leader: Dr. Klinghammer István, CMHAS, University Teacher

Supervisor: Dr. Zentai László, D.Sc, University Teacher  
Eötvös Loránd University Budapest  
Department of Cartography and Geoinformatics  
Budapest, 2009

## **The Justification of Topic Selection – The Antecedents of Research**

I have been taking part in the surveyor and cartographer vocational training at the *Varga Márton Horticultural and Surveyor Vocational Training Institute* since 1998. Looking back at the past 11 years, our education has undergone many significant changes both in the cartography and surveyor (now surveyor-geoinformatician) vocational training. It is my pleasure to have been able to be there at the starting phase of the development and to be part of the process of the progress of our vocational education. I hope I can contribute to the future and the efforts of our training program with my suggestions and with the experiences I have gained as a tutor and as an examiner over the years.

With this paper, I would like to facilitate the quality education of surveyor-geoinformatician-cartographer vocational training at intermediate level. I would like to put special emphasis on geoinformatics and computer cartography subjects. I would like to achieve this in a way that this quality education should meet the expectations of a given period irrespective of how rapid the development will be in the field of technology and informatics in the upcoming years.

The teaching of computer-aided map planning and map editing began at *Varga Márton Horticultural and Surveyor Vocational Training School* in September 1998. At secondary education level, the teaching of these subjects started decades ago. The examining system of the new competence-based modular training differs from the examining system of prior years. Besides the current written and oral exams, the new interactive exam was introduced which modified our previous system to a great extent.

Geoinformatics, our other important subject, has undergone many changes during the past 8 years. In 2001, it was only a short-term goal to integrate the practical training of geoinformatics into our education. However, by 2009 those students who took part in our new competence-based modular program received technician certificate.

During my career, I had the chance to work on *SDiLA TEMPUS* (Staff Development in Land Administration) project both as a tutor and as a consultant at the *Varga Márton Horticultural and Surveyor Vocational Training Institute*. I also taught and tested a group of 13 students who studied at *ISZTI Innovational Vocational Training and Extension School Centre and Secondary Grammar School*. This school is included in the *National Training Register* and provides informatics-geoinformatics certificate to the students.

As a teacher at a secondary school, I have to establish close cooperation with other colleagues of those 5 educational institutes that deal with cartographer-surveyor-geoinformatics training. Obviously, as these 5 schools are quite far from each other, (Békéscsaba, Budapest, Miskolc, Pécs, Szombathely) it is fairly difficult to discuss our strategies, make decisions and communicate these properly. These reasons led to a creation of a web surface that can be used mutually. I hope this webpage has great future.

We hope the efforts we have made and the aspirations we have for the future raise our intermediate cartographer and surveyor training to such a level that our graduate technicians at *Varga Márton Horticultural and Surveyor Vocational Training School* will meet the requirements of this profession. We also believe that our students get the sufficient basics they can build upon in their university or college studies.

## **The Methods of Research**

Due to the nature of my chosen topic, a huge amount of secondary literature and reference material had to be sorted and discussed. My task was to formulate the analyses, draw the conclusions and publish the results. In order to achieve this, I have consulted numerous books, articles and conference materials (both national and foreign).

I have applied the comparative-historical approach from the general methods to analyse the development of our education. I have scrutinised the pedagogical and educational plans issued by the ministries. I have also examined the purposes, tasks and requirements of other vocational subjects.

During my research, I have had many observations. On the basis of my tutorial experience, I have put forward my suggestions concerning education. I have looked at the first exam period of the newly introduced competence-based training. I have compared the interactive exam works of students who received cartographer technician, surveyor and geoinformatics certificate.

I developed and designed the formal elements of the educational website in 2009. Besides, the gathering of textual and pictorial materials was carried out this year as well. . I have supplemented the experiences I have gained in the field of IT with new pieces of knowledge. I wished to create a web surface that meets both students and tutors demands for the intermediate education of geoinformatics. This website was named GEOINFORMATICS – EDUCATION SITE.

Besides the results of my research, I have offered methodological suggestions and strategic possibilities to the intermediate education of surveyor-cartographer-geoinformatics. Though I believe these offerings can also be used in other educational institutions.

## **The purpose of the Paper**

During my tutorial activities, the Hungarian intermediate training of cartographer-geoinformatician has undergone substantial changes. I have presented the development of education from 1979 to recent times. I have shown the traditional map-planning and editing, the digital computer processing and the making of database background thematic maps. I have also made suggestions concerning the integration of the method to the existing educational system.

One of the main purposes of the dissertation was to present the educational and exam system of the computer cartography and geoinformatics subjects in this continuously changing training system based on previous experiences. Apart from that I also intended to highlight some of the advantages and difficulties we had to face in the past years.

The primary aim of my research was to improve the quality of the cartographer and surveyor-geoinformatician training and to disseminate my findings. I hope that the number of students who choose either the surveyor-geoinformatics vocational training or the new 4+2 2 year module-based technician training will increase.

I aimed at presenting the development and the results of the Hungarian intermediate level surveyor-geoinformatics-cartographer education. With this research, I would like to help those who are interested in this specialty.

I also had the task to show the intermediate educational policies and future plans of different countries. The integration of geoinformatics into the intermediate public education is included in their future intentions. During my research studies, I also got acquainted with the methods and models foreign countries use to realize their plans.

I had the intention to show the structure of the new competence-based vocational education. Based on our educational experiences, I shed light on some of the problematic points of the new system. I looked through the structure of the exam system and mapped out some modifications based upon the current exams. These modifications affect both the training and the exam system, which will hopefully be integrated into our vocational training. When creating the curricula of the central program, the geoinformatical and computer-assisted

cartographer curricula of higher educational institutes (ELTE, BME, NYME-GEO) could not be ignored. So the secondary school curriculum was made to suit the higher education syllabus.

I aimed at showing the expectations and requirements students have live up to while taking part in the Hungarian intermediate vocational training of cartographer-surveyor-geoinformatician. Besides, I presented the advantages and disadvantages of the new competence-based modular education. I also wished to show and analyse the exam papers of our students, draw conclusions and make suggestions concerning possible future changes. Hopefully, my experiences, suggestions and research results will be utilised both by leaders of educational improvement and colleagues working at other secondary educational institutes.

In the 7th chapter, I show a new, self-developed educational website which I created with the intention to help teachers and students of cartographer-surveyor-geoinformatics to receive useful pieces of information about their subjects. This website is also intended to those who show interest in geoinformatics and may want to continue their studies in this field. The name of the website is GEOINFORMATICS – EDUCATIONAL SITE. During the website development, the purpose was to create a website that meets the special needs of the 5 educational institutes (Békéscsaba, Budapest, Miskolc, Pécs, Szombathely) that offer cartographer-surveyor-geoinformatician training. I hope that the results of the research can be used when creating other forms of training.

I would like to reach a two-folded aim with my work. First, we should build a community where teachers and students of cartographer-surveyor-geoinformatics can share their own materials, lesson plans and exchange their views about educational matters or problems. Second, we would like to improve our statistics for all five schools concerning the number of students who choose our new vocational training system after the 8th grade. These vocational trainings give students a leaving certificate.

## **Summary - Conclusions**

Due to the rapid development of informational and communicational technology, a new lifestyle and mechanism has begun to take shape. The information exchange through the Internet, the establishing of connection and the raising of attention can create new chances for the students to pay attention to some of the neglected parts of this subject. In my paper, I have pointed out the necessity of this. Thus, I created a website that can establish connection among teachers and students of geoinformatics.

Foreign websites that deal with education have been growing rapidly in number. These websites offer educational materials, databases, knowledge bases and collections. Considering the immense number of foreign websites, we should make improvements in this field. We should also create websites that build on communities, deal with education and offer web2 services.

During my research on the key areas connected to education, I have realised the importance of lifelong learning and participation at school. Looking at the examined educational systems, it can be stated that the figures of these countries differ from each other. So Hungary can also make huge progresses in education to catch up with other countries.

It can be said that the science of geoinformatics can be utilised in many fields of life for making analyses or problem-solving. Thus the crucial task of the upcoming years is that the application of geoinformatics is desirable in subjects that deal with the concept of location or locality (such as History, Geography and Environmental Studies). The geoinformatical approach to education should be applied even at basic and intermediate public education. Our students should have the possibility to examine, show and handle locality data in real life by using geoinformatical systems. Postgraduate courses for teachers and tutors of geoinformatics are crucial. It has been proven that we have to improve the teaching of geoinformatics at all levels. In order to achieve this, it is inevitable to create educational programs for geoinformatics.

I have shown in my paper that the new guideline of our vocational training is the competence-based modular teaching. The guidelines of foreign trainings can be of great importance and determinative in the national vocational training. Relying on the researches I have made during my tutorial activities, it can be stated that the competence-based modular training system of cartographer technician, surveyor and geoinformatics technician should be

slightly modified, similarly to the implementation of qualifying examination. I suggest reconsidering the ruling of administrative work.

Based on my experience during this school year, I have illustrated the results of the comparative analysis of module training and module exam. We have to reconsider the distribution rate of module exams and the priorities of exam parts and lessons. In the future, I feel the necessity to modify these ratios and numbers.

During my research, I have studied the training systems of different foreign countries. I have paid careful attention to the methods they wish to apply in the future to integrate geoinformatics into public education. I find it important to get to know those methods which aim at making the students understand the world around them through geoinformatics. Besides, students should be able to do geographical and scientific analyses with the help of geoinformatical systems. I have drawn the attention to the usefulness of the adoption of foreign methods to our educational system.

I have proven that a sort of ability structure must be developed which improves the IT competence of teachers. It has become obvious that we should apply geoinformatics in other subjects that deal with the concept of location or locality (such as History, Geography and Environmental Studies). The geoinformatical approach to education should be applied even at basic and intermediate public education.

It is certain that a significant process has started in our educational system. Hopefully, we can contribute to this development with our work and research results.

## Thesis

- 1) During my tutorial activities, the Hungarian intermediate training of cartographer-geoinformatician has undergone substantial changes. I have presented the development of education from 1979 to recent times. I have shown the traditional map-planning and editing, the digital computer processing and the making of database background thematic maps. I have also made suggestions concerning the integration of the method to the existing educational system.
- 2) I have shown the structure, the advantages and disadvantages of competence-based, module system training. I have also pointed out the problems of the current system. Based on my experience, I drew special attention to the difficulties and faults of our new exam system. I will make suggestions to the modification of the training system, especially to the exam system.
- 3) I have prepared the requirements of the vocational competence-based modular trainings using national and international examples. I have integrated this into the current national educational system. I have also examined the methods the foreign educational systems use to integrate the geoinformatics into the programs of public education. Besides, I have made a proposal to adopt some models.
- 4) I have prepared a website draft of the GEOINFORMATICS – EDUCATIONAL SITE. This website is intended to improve the professional development of students. Besides, it also facilitates the contact among tutors and students at the 5 secondary schools in the country which have surveyor-cartographer trainings.



## Reference Literature

ÁGNES, AJTAY - JENŐNÉ, NAGY PÁL – JÁNOS, RINGHOFFER (1980): *Surveyor Practice*  
The Pedagogical and Educational Plan of Surveyor and Cartographer Vocational School  
Agricultural and Catering Ministry

ALIBRANDI, MARSHA (1997) *Thinking spatially: GIS in the high school classroom*.  
Green Teacher, (50)

GYÖRGY, BÖLÖNYI (1994): *The professional and examining requirements of cartographer qualification*  
Ministry of Agriculture

ÁKOS, DETREKŐI – GYÖRGY, SZABÓ (1995): *Introduction to Geoinformatics*  
National Publishing House Co., Budapest

KERSKI, JOSEPH (2003) *The Implementation and Effectiveness of Geographic Information Systems Technology in Secondary Education*  
Journal of Geography, 102(3)

ILDIKÓ, MIHÁLY: *Once More About Key Ccompetencies*  
New Pedagogical Review, 2003. 6. pp. 103–112.

KRISTÓF, DR. PÉTERY: *FrontPage 2003 basics*  
Mercator Studio

ÁRPÁD, DR. PAPP-VÁRI - ISTVÁN, DR. KLINGHAMMER (1980): *Cartography*  
The Pedagogical and Educational Plan of Surveyor and Cartographer Vocational School  
Agricultural and Catering Ministry

GÁBOR, DR. REMETÉY-FÜLÖPP: *The National Space Data Infrastructure Strategy (NTIS) – current situation*  
[www.fomi.hu](http://www.fomi.hu)

RUEPERT, G.: *GIS In Pre-Vocational Secondary Education*  
European Geography Association for Students and Young Geographers  
<http://www.herodot.net/conferences/Ayvalik/papers/geotech04.pdf>

ZWARTJES, L.: *iGuess: Introducing GIS Use in Education in Several Subjects*  
<http://www.herodot.net/conferences/Ayvalik/papers/geotech03.pdf>

## **The author's Publications in the Subject of Doctorial Dissertation**

### **Articles published in Periodicals**

GYÖRGYI, MATULA (2001): The Teaching of Computer-assisted Cartography at Secondary School

In: Geodesy and Cartography, 2001/4.

GYÖRGYI, MATULA (2007): *The First Experiences of Surveyor-Geoinformatics Training*

In: Geodesy and Cartography, 2007/2. pp. 42-44.

GYÖRGYI, MATULA (2007): The first Surveyor-Geoinformatics Classes Finished School

In: Geoinformatics, 2007/2. pp. 29.

### **Professional Lectures held at Conferences and Scientific Institutes**

GYÖRGYI, MATULA (2002): *The Practical Experiences of Teaching Geoinformatics at Intermediate Level*

Geoinformatics In Education Symposium

Department of Landscape Planning and Area Development, Corvinus University, Budapest  
HUNGIS, Budapest

### **Other Professional Materials:**

GYÖRGYI, MATULA (2000): *Computer-assisted Cartography (The application of IT in Cartography)*

Secondary School Note, Budapest

GYÖRGYI, MATULA (2002): *Geoinformatics*

Secondary School Note, Budapest

GYÖRGYI, MATULA (2004): *Geoinformatics Subject – Central Program For the Surveyor and Geoinformatician Technician Training*

In Charge of the Ministry of Agriculture and Rural Development

GYÖRGYI, MATULA (2004): *Geoinformatics Subject – Central Program For the Cartographer Technician Training*

In Charge of the Ministry of Agriculture and Rural Development

GYÖRGYI, MATULA (2004) *Computer-assisted Cartography Subject – Central Program For the Cartographer Technician Training*

In Charge of the Ministry of Agriculture and Rural Development