



**ANNALS**  
ISSN: 1584 - 2665

Faculty  
Engineering  
Hunedoara  
International  
Journal  
of Engineering



## APPLICATION OF GEOGRAPHIC INFORMATION SYSTEMS TECHNOLOGY IN ENTREPRENEURSHIP EDUCATION

Milica GERASIMOVIC<sup>1</sup>, Ljiljana STANOJEVIC<sup>2</sup>, Alempije VELJOVIC<sup>3</sup>, Natasa CVIJOVIC<sup>4</sup>

<sup>1</sup> Institute for Improvement of Education, Belgrade, SERBIA

<sup>2</sup> Faculty of International Economics, Megatrend University, Belgrade, SERBIA

<sup>3-4</sup> Technical faculty, Cacak, SERBIA

### Abstract

Considering the fact that the general development strategy for the Serbian economy is based on the principles of a market economy, the nucleus of which is the central role of small and medium size enterprises, entrepreneurship education at all school levels is of critical importance for strengthening of the country economic growth. Subject entrepreneurship in the secondary vocational schools has been introduced only in the reformed curricula - profiles. During the course of the subject entrepreneurship students acquire skills of planning, organization, analysis, communication, implementation, evaluation, capacity for teamwork, the ability to act proactively and to react positively to changes and to develop positive attitude toward changes and innovations. This paper presents current state of entrepreneurship education in secondary vocational schools by using Geographic Information Systems (GIS) technology. Research sample is consisted of three student generations, 2007/08, 2008/09, 2009/10, attending reformed vocational education. Results' insight will be available to entrepreneurs i.e. owners of small and medium enterprises in Serbia. The starting point was the assumption that the beneficiaries of entrepreneurship education small and medium enterprises (SMEs) are not informed enough about the human resources which possess entrepreneurial competencies, where are they located – in which districts, cities and municipalities and to which economy sector they belong. The aim of this paper is to improve social partnership between schools and business environment by establishing a two-way communication.

**Keywords:** communications, entrepreneurship, Geographic Information Systems, secondary vocational education, small and medium enterprises.

### 1. INTRODUCTION

Current economy requires high level of expertise and competency of the work force, flexibility and adaptability, but also continuing professional development and lifelong learning. General developmental strategy of Serbian economy is based on market economy with a core of the small and medium enterprises. Even 99,8% of the whole economy are micro, small and medium enterprises and entrepreneurial, from which 77,9%, (in private ownership 87,4%), small 18%, medium 3,2% and 1% of the large enterprises [1]. In the period 2005.-2006., municipalities started developing their own economic function more intensively. Actually, they started influencing the faster development of small and medium enterprises and entrepreneurship in their territory with the aim to increase the employment. The orientation of local authorities toward development of modern market economy requires education from the field of entrepreneurship on each school level.

### 2. ENTREPRENEURSHIP IN SECONDARY VOCATIONAL EDUCATION

Modernization and development of the system of secondary vocational education is based on principals of social partnership, decentralization, accessibility, openness, program and organizational variety, professionalisation of the teachers' and associates' work, as of outcome orientation [2]. Teaching contents have modular organization whereas modules, specific segments of learning, lead to achievement of clearly defined learning outcomes i.e. to acquirement of vocational competences (knowledge, skills and attitudes). Reformed secondary vocational education is directed to strengthening vocational knowledge and acquiring of key skills necessary to join the world of work and the whole society. Strategy of vocational education development in the Republic of Serbia (Official Gazette, 2007) foresees possibility to acquire business and entrepreneurial skills and knowledge through vocational education and training (VET).

With the reform of secondary VET, the new concept of curriculum has been introduced which, among the others, contains teaching subject entrepreneurship as a novelty. Within this subject students acquire: skills of planning, organizing, analyzing, communicating, realizing and evaluating;

abilities for team work; abilities for proactive behaviour and positive reacting to changes; abilities for risk overtaking; positive attitude toward changes and innovation. Pilot teaching curricula have been realized in 56 educational profiles within 13 fields of work. The whole reform of secondary VET has been realized in 176 schools, in 1.176 classes and 20.500 students are included.

Entrepreneurship as a subject represents consistent part of pilot curricula of all educational profiles, except in the profiles in the Economy, law and administration field of work whereas entrepreneurship contents are introduces cross curriculum (integral approach). The objectives of the subject are set as follows [3]:

- ❖ development of business and entrepreneurial knowledge, skills and behaviour;
- ❖ development of entrepreneurial values and abilities to recognize entrepreneurial opportunities in the local market and to act accordingly;
- ❖ development of business and entrepreneurial way of thinking;
- ❖ development of consciousness of own knowledge and abilities in further professional orientation;
- ❖ development of ability for active job seeking (employment and self-employment);
- ❖ development of ability to make a simple business plan of a small firm.

The program of the entrepreneurship subject is organized thematically and based on learning outcomes. Up on the end of defined themes, the student has acquired the outcomes of entrepreneurial knowledge and skills e.g. he/she will be able to [4]:

- ❖ explain the significance of motivational factors in entrepreneurship;
- ❖ develop marketing strategy for his/her business idea and to present his/her marketing plan;
- ❖ collect information needed to lead a successful business;
- ❖ compose financial reports in the most simple form (balance-sheet, cash-flow of the enterprises);
- ❖ make a simple business plan according to adopted business idea.

The concept of entrepreneurship in VET is new and still not enough explored. Just a few researches indicate on the first effects of the introduction of the subject. Students of the pilot classes compared to their companions from the non-pilot classes, which don't have a subject entrepreneurship, are a step forward when it comes to acknowledgments about what they should do to develop successful enterprise; to whom they could address for help if they have some business idea, in development their own business ideas and explore the employment possibilities in own profession [4]. However, relevant international researches indicate the fact that our students have low ability of application of practical knowledge [5]. Everything mentioned leads to the need to develop a special conceptualization of entrepreneurship in the next period, which would relates to different ages of participants in education and to educational levels (Action plan for implementation of strategy of vocational education development in the Republic of Serbia, for period 2009-2015., 2009).

### 3. OVERVIEW OF REPRESENTATION OF THE ENTREPRENEURSHIP EDUCATION BY USING GIS

Geographic information system (GIS) is an instrument of a large help for understanding the geo-space and the relations and links which rule within it. All definitions of GIS point out its most important attribute – ability to comply very different data in the new information as a base for decision making in different areas of human acts. It is a complex system which provides collection, analysis, management and presentation of spatial information [6]. The biggest advantage of GIS is a possibility to connect spatial and attributing data by which is provided to use data stored in relational data bases for the need of a spatial analysis. Having in mind the significance of entrepreneurship education, the use of GIS provides not only easier

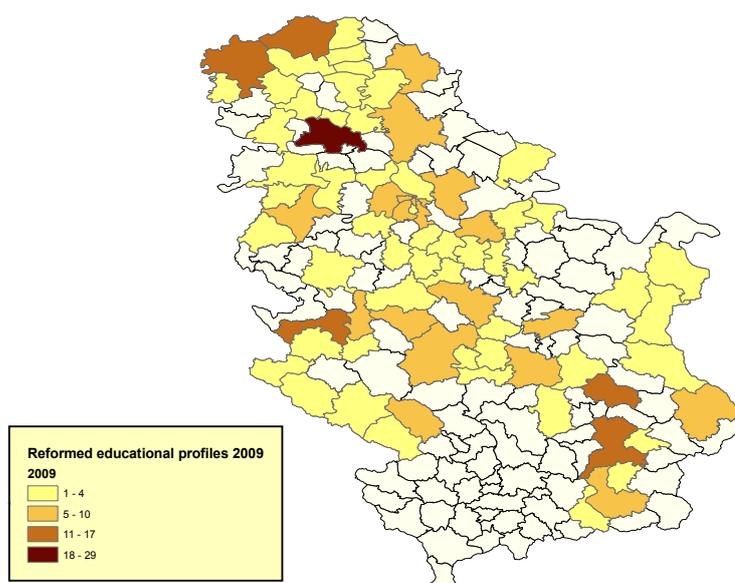


Figure 1 - Representation of educational profiles with the subject entrepreneurship by municipalities in 2009.

insight in current state of this type of education in secondary vocational schools in Serbia, but also shows a trend that exists in some municipalities.

In 2008. there are reformed educational profiles with the subject entrepreneurship in 70 municipalities, of 189 (with Kosovo), yet in 2009. the number of municipalities with the reformed educational profiles is 80 (Figure 1).

Also, there is a notable number growth of reformed educational profiles by municipalities. If we look at the example of North-Bačka district, in last three years the number of reformed educational profiles in Subotica denotes growth, while in Bačka Topola it stays at the same level (Figure 2).

In Subotica in 2009. the number of reformed educational profiles increased for 50% in comparison with 2008. Also, the interest of students i.e. the number of pupils which enrolle these profiles, denotes growth. In Subotica in 2008.

the number of enrolled students in educational profiles where they acquire entrepreneurial education is 148, and the number increased in 2009. onto 289 (Figure 3).

	Reformed educational profiles		
	2007-2008 Reformed edu. profiles	2008-2009 Reformed edu. profiles	2009-2010 Reformed edu. profiles
Bačka Topola	3	3	3
Subotica	9	8	16

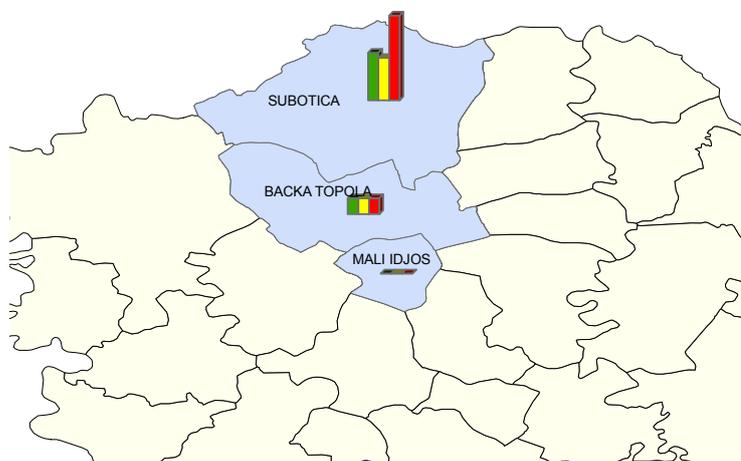


Figure 2 - The number of reformed profiles in three consequent years

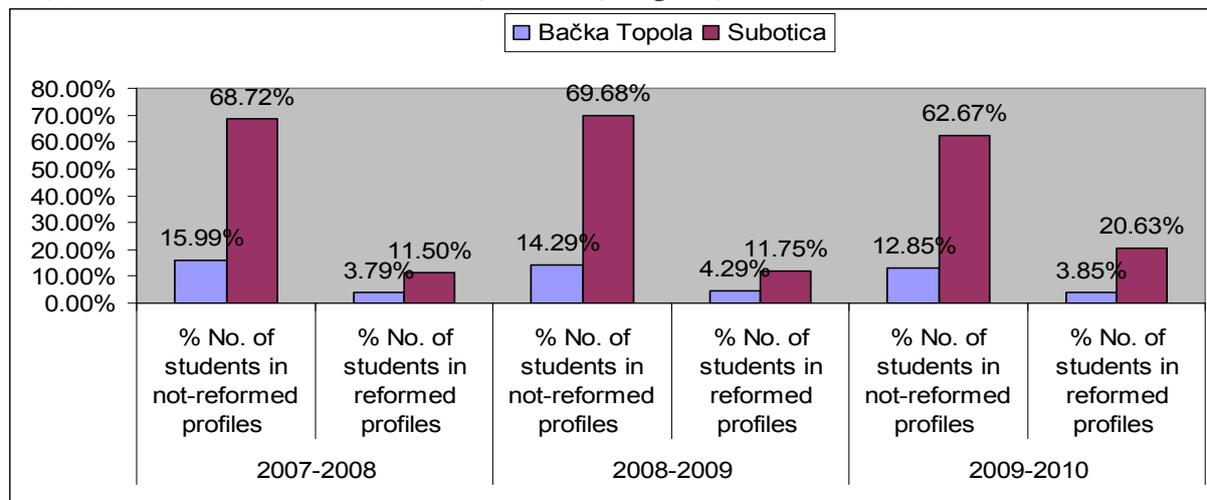


Figure 3 - Number of students in reformed and not-reformed profiles within three consequent years

In Subotica municipality in the year 2007., 168 students are enrolled. They are finishing the school in 2010. and 2011. and they represent potential work force.

Table 1 – The structure of enrolled students in the municipality of Subotica in 2007.

Educational profile	Field of work	No. of students
Bank clerk	Economy, law and administration	20
Dry construction fitter	Geodesy and civil engineering	36
Roof-tiller		
Technician for furniture design	Forestry and wood processing	36
Upholster-decorator		
Technician for design of graphic products	Chemistry, non-metals and graphic	36
Technician for graphic preparation		
Nutrition technician	Agriculture, food production and processing	18
Operator of mechanic processing	Mechanic engineering and metal processing	18

GIS base contains data about field of work, type of educational profile and number of students (Table 1).

#### 4. CONCLUSION

The use of GIS, in one hand, gives the possibility to monitor these changes in the time and space and to notice more quickly the trend that exists in some municipalities. In the other hand, it gives the information to the small and medium enterprises, as beneficiaries of entrepreneurial education, where i.e. in which cities and municipalities their future potential personnel goes to school in which they acquire entrepreneurial competences.

Cooperation between schools and enterprises represents one of the ways for development of social partnership. As it is the one of the strategic areas of secondary vocational education reform in Serbia, it needs to be improved. This improvement could be done only if the improvement happens in the two-way communications and dialogue between secondary vocational schools and enterprises, as the enterprises are beneficiaries of entrepreneurial education. In the same time, this should become the first issue on the list of the school priorities.

Necessity of this improvement represents the essential need with the tendency to become long-term sustainable model. Few of the objectives of the partnership defined in this way are:

- ❖ organization and joint efforts with the purpose of gaining wider public;
- ❖ development and improvement of the program of entrepreneurial education.

Strengthened role of entrepreneurs, as social partners in educational system and their active involvement in the creation of the entrepreneurial education program, will contribute to harmonization of the needs and demands in the employment system. Contemporary teaching methods based on the case studies' analysis, simulation of economy surrounding, establishment of social partnership with the entrepreneurs, but also based on their active involvement in the practical teaching of students in secondary vocational schools, undoubtedly will contribute to more qualitative entrepreneurial education and its implementation in practice.

#### REFERENCES

- [1.] GROZDANIĆ, R. *Analysis of the effects of entrepreneurial sector and increase of competitiveness of SMEs. Economic horizon. 2006; 11 (2): 353-70.*
- [2.] KOMLENOVIĆ, Đ. *Organization of geography teaching in secondary vocational education in Serbia. Pedagogy. 2004; 59 (4): 99-109.*
- [3.] *Official Gazzete RS – Educational Gazzete 9/2007.*
- [4.] *ETF. Key competences for lifelong learning, Serbia. Cited 2009 nov 20, Available from: [http://www.etf.europa.eu/web.nsf/pages/Publications\\_catalogue\\_EN?OpenDocument](http://www.etf.europa.eu/web.nsf/pages/Publications_catalogue_EN?OpenDocument).*
- [5.] *OECD, PISA. Program for International Student Assessment Serbia: Results., available from: <http://www.pisaserbia.org/images/stories/pdf/PISA2003%20PRVI%20IZVESTAJ.pdf> and <http://www.pisaserbia.org/images/stories/pdf/PISA2006%20PRVI%20IZVESTAJ.pdf>*
- [6.] *BUROUGH P, McDONNELL AR. Principles of Geographic Information Systems for Land Resources Assessment. Oxford, itd: Oxford University Press; 1986.*

