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# EDUCATION IN THE FIELD OF FIRE PROTECTION AND EMERGENCY RESCUE IN HIGHER EDUCATION SCHOOL IN NOVI SAD, SERBIA

This paper presents an overview of the development of education in the field of fire protection and emergency rescue in the Republic of Serbia. Since the Higher Education Technical School of Professional Studies in Novi Sad has the longest tradition and the leading role in this area, special attention is paid to the development of curricula and syllabi in its two study programmes: *Fire protection*, and *Civil protection and emergency rescue*. The importance of practical part of teaching in the curricula has been pointed out as well as directions for future improvement of the study programmes in order to obtain high-quality engineering, and specialist staff.

## 1. Introduction

Every human community has developed systems of protection against various hazards from the very beginning, and fire has been recorded as a cause of disasters and hazards in all civilisations. The risk has remained till today and with the social and technological progress potential sources of fire have increased in number and diversity.

The protection of human lives and material goods is a primary task in the defence of a community. In many countries it is the duty of the military forces, in some

it belongs to the police, whereas in others there are special ministries of semi-military character, and somewhere it is part of the civil sector and under the local government, but regardless of how the protection is organized, it is effective only if led by educated professionals. Additionally, the awareness of the society should be raised to understand the inevitability of protection, and general public should be educated and informed about potential hazards and preventive and protective measures aimed at preventing accidents and eliminating their consequences.

Nowadays, every society should invest in education in the field of protection at all levels, particularly the higher ones, in order to form a technologically and professionally educated segment of the society that would play the leading role in the system of protection.

The analyses carried out in Serbia in recent years indicate that the situation in the field of fire protection is inadequate and that the fire protection system as a whole considering its organization, competence and efficiency does not satisfy the actual needs of the technical, technological and socio-economic development. This lag is especially pronounced in comparison with the EU Member States, and the situation is similar in the area of emergency rescue. However, any community should never be satisfied with the existing protection system, since unpleasant surprises are always possible and usually do happen.

## 2. History of education in the field of protection in Serbia

There are several higher education institutions in Serbia that within their department of protection have study programmes in fire protection, and civil protection – emergency rescue. The longest tradition in this has the Higher Education Technical School of Professional Studies (VTŠ) in Novi Sad, which exists more than 50 years.

The first generation of fire protection students was enrolled in VTŠ in 1968. In former Yugoslavia it was the only higher education institution educating professionals in this area. The graduates – fire protection engineers, worked all over the country as commanders of fire-fighting or territorial units, and as managers and professionals in protection departments in companies of particular importance, as military command staff in this field, or in various other workplaces in enterprises.

Along with the education VTŠ has developed an extensive cooperation with industry working on the creation of fire protection plans and projects regarding automated systems for early fire detection and systems for automated fire extinguishing, different analyses, trainings, investigations, etc.

Fire protection has become a brand of VTŠ and today's high rating of this school comes, among other things, from the period of development of the Protection department. Many fire protection engineers enrol their children in our school, or they themselves return to continue their own education.

Following the development of the society and its needs VTŠ founded in 1971 the Civil protection department that also educated equally respected engineers. Although the then country invested a lot in the system of civil protection, unfortunately it proved inefficient in the end.

During the NATO aggression the failure of such civil protection was obvious. It was estimated that staff were not qualified enough, and consequently investments stopped, which reflected on the interest of students for enrolment in the study programme and we realized that the programme had to be changed. The society needs trained staff to act in the accident, in various types of emergencies. At the same time a political realignment began in the country that affected the recognition of some other carriers of activities in this field. Instead of the army it became the Ministry of Interior, which until then had a leading role in the field of fire protection. Therefore, these two protections were for the first time in some way unified and the newly created concept of the whole system stressed the need to establish new and different study curricula and syllabi. And this is what VTŠ has been occupied with since then in order to find better solutions.

In addition to these two study programmes in the Protection department, VTŠ founded two more study groups, one in 1986 and the other in 1988 – Occupational safety and health and Environmental protection, respectively.

VTŠ and the Faculty of Occupational Safety in Niš (which in 1993 raised this education to a university level) are the leaders of education in the field of fire protection in Serbia.

In 2007 all higher education institutions in Serbia started accrediting their study programmes according to a system based on the Bologna Declaration. VTŠ accredited 14 three-year study programmes in basic vocational studies and 7 one-year study programmes in specialist vocational studies. From the field of protection there are 4 basic and 3 specialist programmes. On completing studies in VTŠ, the title conferred is applied bachelor, or specialist – applied bachelor in the field of the study programme in question.

Fire protection is studied in both the basic and specialist vocational studies, whereas Civil protection and emergency rescue exists only as a basic vocational study programme because in that moment the system of protection was not defined in the country.

The two study programmes have undergone many changes in more than 40 years of their existence, but always in the direction of modernization and introduction of new, current content. The education process has been prolonged from two to three years. The concept of the existing programmes focuses on the acquisition of general and vocational knowledge alike, and special attention

is paid to practical work in industry, which is introduced in the final semester. Actually, this industrial placement and the practical segment of education it provides in the very profession is what distinguishes vocational studies, specifies them, and gives them a certain kind of advantage over academic studies.

### 3. Study programmes of fire protection and civil protection and emergency rescue in VTŠ

The reform of higher education study programmes in Serbia was carried out in accordance with the Bologna Declaration principles. The Ministry of Education in Serbia set standards regarding the quality and content of study programmes, and the system of grading, loading and crediting in courses, all of which allow the mobility of students in the European higher education space. The structure of study programmes follows the prescribed percentage pattern of general, vocational and professionally applicable courses, which can be seen from the following table.

**Table 1**

Year	Type of studies	General courses, %	Professionally applicable courses, %	Vocational courses, %
I	All (tech. business...)	9	81	10
II		7	45	48
III			14	86
<b>Average:</b>		<b>5.33</b>	<b>46.67</b>	<b>48.00</b>

In senior years there are more vocational courses, and the student spends the last semester at engineering placement in a company engaged in business activities from the field of the study programme. Furthermore, additional engineering practice is provided in enterprises with specific activities that cannot be seen in most other companies.

The table shows the content of the curriculum for the 6th semester, the courses and number of classes planned for the content.

*Practicum* has a weekly fund of 4+4 hours in one day offering both the theoretical and practical part of an exercise performed outside the school premises in the immediate or distant environment for it cannot be seen in VTŠ. For example, within these exercises the students of fire protection pay visits to fire

protection services operating at airports, tunnels, underground railway, and to services of large companies dealing with oil and alike.

*Theory of engineering experimentation* allows students to experiment after acquiring the theoretical basis on performing experiments during their stay in the company in order to try to theoretically process results obtained in practical experimentation.

*Engineering practical work* as a course provides students with important practical experience by their being required to perform various tasks during regular working hours in the company where they practice.

In this way, students can apply acquired knowledge and gain practical experience, do a specific project based on their practice and collect data for the final work. Engineering placement has proved extremely useful, because along with the educational function, it also provides feedback whose analysis can contribute to qualitative corrections of the study programmes in order to provide students with high-quality contemporary theoretical knowledge applicable in practice.

The tables below give the curricula of the study programmes of Fire protection and Civil protection and emergency rescue in VTS. The first year is the same for both programmes, whereas in the next two years different vocational courses are introduced.

**Table 2**

No.	Code	Courses	Term	Classes in total	ECTS credits
<b>FIRST YEAR</b>					
1.		Sociology	1	2+0	2.5
2.		Mathematics	1	2+2	7.5
3.		Physics	1	2+2	6
4.		Technical Drawing with Descriptive Geometry	1	2+2	5
5.		Chemistry	1	2+2	7.5
6.		Statistics	2	2+2	6
7.		Electrical engineering	2	2+2	5
8.		Mechanical engineering	2	2+2	6
9.		Organic chemistry	2	2+1	4
10.		Processing devices	2	2+2	6
11.		Elective	2	A	4.5
<b>Total number of classes of active teaching</b>				<b>37+A</b>	
<b>Total of ECTS</b>					<b>60</b>

Table 3

SECOND YEAR – FIRE PROTECTION				
1.	Hazardous and harmful materials	3	3+2	6
2.	Computers	3	1+2	5
3.	Occupational safety	3	2+1	5
4.	Combustion processes	3	2+2	5
5.	Environmental protection	3	2+1	5
6.	English	4	1+1	2.5
7.	Civil engineering	4	2+2	5
8.	Mobile firefighting equipment	4	3+2	7.5
9.	Preventive fire protection	4	3+2	7.5
10.	Basics of firefighting tactics	4	2+2	6
11.	Elective	4	Б	5.5
<b>Total number of classes of active teaching</b>				
<b>Total of ECTS</b>				<b>60</b>

Table 4

THIRD YEAR – FIRE PROTECTION				
1.	Management	5	2+2	6
2.	Specialist English	5	1+1	2.5
3.	Regulations in protection	5	2+1	4
4.	Stationary firefighting equipment	5	2+2	6
5.	Firefighting tactics	5	2+2	5.5
6.	Fire risk management in technological processes	5	2+2	6
7.	Practicum	6	4+4	9
8.	Theory of engineering experimentation	6	4+8	9
9.	Engineering practical work	6		3
10.	Final examination	6		9
<b>Total number of classes of active teaching</b>			<b>41</b>	
<b>Total of ECTS</b>				<b>60</b>

Table 5

SECOND YEAR – CIVIL PROTECTION AND EMERGENCY RESCUE				
1.	Hazardous and harmful materials	3	3+2	6
2.	Computers	3	1+2	5
3.	Occupational safety	3	2+1	5
4.	Physical harms	3	2+2	5
5.	Etiology of hazard in emergencies	3	2+2	5
6.	Doctrine and systems of civil protection	3	2+1	5
7.	English	4	1+1	2.5
8.	Civil engineering	4	2+2	5
9.	Fire and explosion protection	4	2+1	5
10.	Protection and rescue measures 1	4	3+2	5
11.	Monitoring in civil protection	4	2+2	5
12.	Elective	4	B	6.5
<b>Total number of classes of active teaching</b>				
<b>Total of ECTS</b>				<b>60</b>

Table 6

THIRD YEAR – CIVIL PROTECTION AND EMERGENCY RESCUE				
1.	Management	5	2+2	6
2.	Specialist English	5	1+1	2.5
3.	Regulations in protection	5	2+1	4
4.	Environmental protection	5	2+1	5
5.	Theory and methodology of education in civil protection	5	2+1	5
6.	Protection and rescue measures 2	5	2+3	7.5
7.	Practicum	6	4+4	9
8.	Theory of engineering experimentation	6	4+8	9
9.	Engineering practical work	6		3
10.	Final examination	6		9
<b>Total number of classes of active teaching</b>			<b>41</b>	
<b>Total of ECTS</b>				<b>60</b>

## 4. Possible Directions of Further Development

What is particularly important for the programmes of these study groups is the practice the students get not only in the last semester, but also in previous years .

From everything that has been mentioned earlier it is obvious that there is a need for building training grounds for practical training. It could be used not just by the students but for training other participants in the process of rescue from fire, chemical accidents, debris, height, water, etc.

On the site the students of fire protection and civil protection and emergency rescue would go through the complete practical training and learn about the dangers fire-fighters and rescue crews are daily exposed to. The construction of the facilities and their operation would complete the vision of this type of education in Serbia, which would then fulfil tasks related to the objectives of protection and rescue in emergency situations.

The construction of the Centre and its management require cooperation among all institutions involved in rescue of any kind.

The emerging solution is the unification of study programmes of Fire protection and Civil protection and emergency rescue through the content of practical exercises, which can be achieved in the sixth or eighth semester (i.e. in the second in specialist studies). We believe that the best solution is a four-year study program of 3+1, where the three-year studies should be common. The fourth year of studies, specialized studies, would direct the rescuer to a narrower field of rescue through mastering the necessary theoretical and especially practical knowledge in areas such as:

- Rescue from all types of fire,
- Rescue in winter and mountain conditions,
- Rescue under and above water,
- Rescue from height and depth,
- Surviving in the nature,
- Rescue from ruins,
- Protection against radiological, chemical and biological harms,
- First aid.

We are aware that also in this area the students of the specialist programmes lack the practical training component that can be obtained at the training grounds. Part of the facilities mentioned above would be related to chemical disasters.

Considering the current educational problems and growing social demands, what we need is a serious and thorough approach to the development of education and more intensive inter-institutional coordination and connections in higher education.



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## S U M M A R Y

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### EDUCATION IN THE FIELD OF FIRE PROTECTION AND EMERGENCY RESCUE IN HIGHER EDUCATION SCHOOL IN NOVI SAD, SERBIA

The valuation of past experience and the survey of needs and staff currently in the service dealing with protection in emergency situations give rather dissonant tones that are in collision with the general security of citizens in Serbia.

VTŠ has been actively involved in the protection of Serbia's population from the discussed types of risk because we have realized that modern protection requires an integrated approach in order to be implemented properly.

1. Through the analysis of activities of the rescuer within any rescue measure the existence of high-level risks can be observed. Numerous measures that can be applied cannot significantly reduce the risk. Experience shows that the basic measure is the training of the rescuer. Therefore, in the educational process there should be two directions of engagement, in particular:
  - a) Establishment of programmes with as much practical work as possible to gain practical experience; and
  - b) Such programmes with practical content require suitable conditions, i.e. space or training grounds for practicing.
2. There is a significant issue at the second (specialist) study level – how much time or credits are necessary to achieve quality education. The law specifies from 60 to 120 credits, or 1–2 years. Hence, this is the framework within which we should look for an answer.

From the above, it can be concluded that a detailed analysis of plans and programmes as well as their harmonization with real state and needs is necessary. Other plans and programmes in the area of protection which the School has accredited and the possibility of further development must not be forgotten. It is likely that there are possibilities of creating new study programmes in the field of protection within the overall protection system in Serbia.