

NEW AREAS AND APPROACHES IN THE TRAINING OF SECURITY AND SAFETY PROFESSIONALS

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Abstract:In the article, based on the analysis of safety and security trends, the authors defined new topics and trends that were implemented into the trajectories of the study programs of the Faculty of Security Engineering of the University of Zilina (FSE UNIZA). In addition to traditional "physical security", it is necessary to deal with new areas such as artificial intelligence, cloud computing, the Internet of Things, cyber security, fire safety of electric cars, li-ion batteries, the safety of handling them and their ecological disposal. In the article, the authors present new methods and techniques in the education of safety and security professionals.

Key words:safety, security, training, education,

1. INTRODUCTION

In connection with the global pandemic of COVID 19, the war conflict in Ukraine, but also in the context of industrial development, safety and security have become the society's absolute priority. Although we have been and continue to be affected by various threats, the need for a sense of safety and security for current generations has never been as strong as it is today. More than ever before, the society needs to have a ready system, and people with knowledge, skills and competences who will know preventive measures, master the procedures, methods and tools for reducing the vulnerability of the society and will be able to respond adequately to the latest challenges in the field of safety and security. Therefore, it is necessary to continuously implement current safety and security topics in the education and training of experts, and at the same time use new technologies in teaching.

2. NEW AREAS OF SAFETY AND SECURITY

In the process of evaluating safety and security trends, the analysis of the society's current threats and the prediction of future threats are fundamental. In the environment of an educational institution that prepares safety and security experts, feedback from authorities from professional practice, from employers, from the graduates themselves, research and other educational institutions from the domestic and foreign environment is also essential. FSE UNIZA has contractual cooperation with several authorities from practice, which have defined their requirements for graduates of study programs provided by FSE UNIZA.

The analyzes of the external and internal environment resulted in the following conclusions and identified new safety trends, which were implemented not only in the faculty's priorities focused on its long-term goal, but also in the innovative study programs at FSE UNIZA: [1]

- **increasing the level of knowledge in safety and security sciences** – converged security, cyber security, hybrid threats, creating a general theory in the area of security and tools for assessing the security environment, comprehensive assessment of risks, creating procedures for analyzing them and proposing preventive measures of a managerial and technological nature in social, business, technical, technological and natural environment,

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- **improving crisis management in business entities and in public administration** - crisis management and adaptation to climate change, risk prevention and resistance to disasters, epidemics, war conflicts, optimization of industrial safety processes, ensuring prevention and resolution of serious industrial accidents and their ecological consequences, assessment the functionality of critical infrastructure and ensuring its protection in crisis situations, solving current tasks within the integrated rescue system with an emphasis on the efficiency of deploying forces and means to deal with extraordinary events,
- **increasing the level of fire safety** - improving the fire safety of buildings, improving the effectiveness of the intervention tactics of fire and rescue services, solving the environmental impacts of intervention activities on the environment, modeling passenger motor vehicle fires and proposing measures to increase their safety, the application of fire simulation programs in the environment of rescue services.

The above-mentioned priorities were also applied to the training of university-educated experts in the field of safety and security in the form of innovation of the existing FSE UNIZA study programs. Based on them, the goals and outcomes of the education were defined, the job positions of the graduates were selected, the knowledge, skills and competencies related to them were defined, and individual study trajectories were created.[4]

3. IMPLEMENTATION OF SAFETY AND SECURITY TRENDS IN EDUCATION

Based on the results of the analyzes of the internal and external environment, FSE UNIZA modified the concept of its existing study programs. To a greater extent, it focused on the development of knowledge, skills and attitudes of students with the aim of ensuring their applicability in practice in traditional and new areas of security, which reflect the requirements of the labor market and the overall development of society and technology. (Table 1)

Tab.1 Implementation of new subjects in the study programmes at FSE UNIZA

Safety and security area	New subject in study programes	
Physical, object and information security	Audit of management systems	Cyber security
	Business continuity management	Privacy
	Protection of critical infrastructure	Security of information networks
Crisis management	Reliability of the human factor	Crisis intervention
	Applied industrial safety	Environmental safety
	Special transports	Disaster medicine
Fire safety	Intervention tactics	Fire safety of buildings
	Dynamics of fire development	Finding the causes of fires
	Fire modeling	Forensic engineering

A graduate students in the field of protection of persons, property and information has comprehensive theoretical knowledge, practical skills and experience in the areas of human

resource management and design, operation and evaluation in relation to the effectiveness, efficiency, reliability and quality of systems for the protection of persons and property, as part of crime prevention and other anti-social activity. Identifies, applies, assesses, verifies and ensures compliance with the security requirements of the legal and normative framework relating to the protection of strategic objects primarily from intentional anthropogenic physical or cyber threats. He/she knows and applies stochastic and deterministic methods of risk management processes, incident management and business continuity management. He/she knows and applies investigative and forensic methods, techniques and tactics in clarifying and solving security events and incidents. He/she defines, projects and manages personnel, organizational and technical measures of the system of protection of persons, property and information. He/she is responsible for the development, implementation and updating of complex security documentation resulting from the security requirements of legislation, standards and contractual relationships. He/she identifies, applies, assesses, verifies and ensures compliance with security management systems (e.g. physical and facility security management system, information security management system, business continuity management system). He/she knows the concepts, relationships and elements of modern information technologies, electrical security systems, emergency alarm systems, access control systems, video surveillance systems, alarm transmission systems and fire engineering equipment, which are part of physical, object and information security. He/she knows and knows how to apply the requirements for the protection of natural persons in the processing of personal data and the free movement of such data. He/she knows the issue of network security and has adequate configuration skills.[2,3]

A graduate in the field of crisis management understands and connects the context for the field of international crisis management, crisis planning, psychology and crisis intervention, disaster medicine, case studies in crisis management and other disciplines in public administration. He/she can process emergency plans and prepare measures for their application and practice. He/she controls the basic means of prevention, preparedness, quantitative methods of risk assessment and simulation of crisis phenomena in various environments. He/she can provide methodical and practical help in managing change or crisis resolution in the organization and coordinate cooperation with other sections of the organization both in state administration and local government.[2,3]

The organization's security manager possesses knowledge mainly in the field of management of operational processes and technologies, risks of industrial processes, integrated business security, applied industrial security, data analysis as well as in other disciplines in the context of internal security of the organization. He/she can assess compliance with established standards in the area of safety and represent the organization's interests in maintaining them with third parties and control authorities. He/she knows how to process company documentation, identifies, analyzes and evaluates the risks of industrial processes, proposes measures and assesses their economic complexity. He/she ensures and is responsible for reliable, economical and high-quality operation of production in accordance with valid operating regulations and in accordance with valid legal regulations, internal company regulations and established tasks, with regard to compliance with the principles of health and safety, fire protection and environmental protection.[2,3]

A graduate in the field of fire safety has knowledge related to the management of demanding interventions and the cooperation of Integrated rescue system components and in the field of fire protection, knows a wide range of preventive and repressive measures and methods of their application in specific environments and situations. He/she has knowledge of the physico-chemical nature of the processes of burning, extinguishing and the development

of fire. He/she can apply knowledge of materials and their properties, technologies and their limitations, legal norms of expert activity, causal analysis of failures, creation of expert reports and documentation in the field of industrial safety in practice. He/she knows and applies principles of safety and health protection at work, fire prevention measures and principles of emergency preparedness. He/she has the necessary knowledge about the design of fire safety of buildings and technological processes and knows how to specify fire technical and safety characteristics of materials and technical means of fire protection, the essence of the effect of radioactive, chemical and biological substances on people and material values, about protection against the effects of dangerous substances. He/she designs and projects elements of fire engineering equipment. He/she proposes systemic measures to increase the efficiency of safety and fire protection management systems and occupational health protection. He/she assesses business risks and risks of serious industrial accidents, processes emergency plans and prepares measures for their application. He/she performs fire risk analyzes and ensures their documentation. In the field of fire safety of buildings and technological processes, he/she applies the principles of risk management, he/she is able to assess buildings and technological equipment with complex fire safety solutions. [2,3]

4. NEW APPROACHES IN THE TRAINING OF SECURITY AND SAFETY PROFESSIONALS SECTION

In the context of fulfilling the requirement of connecting the knowledge, skills and competences of the graduate, all study programs include the compulsory subject "professional practice", experts from practice are included in the educational process, teaching exercises are provided in specialized training classrooms and laboratories, students have the opportunity to take several professional courses, participate in excursions, or work on projects, term papers and final theses in direct connection to the internship.

The Faculty has created a flexible educational environment supported by modern educational methods and technologies to ensure all levels and forms of higher education, so as to cover existing and new social topics in the field of safety and security.

The teaching of profile and specialist subjects is provided in specialized training classrooms and laboratories, such as the laboratory for modeling and simulation of crisis phenomena, the laboratory for researching systems for the protection of critical infrastructure objects, the fire-chemical laboratory, specialized training classrooms for fire protection, health and safety, medical training, civil protection and etc. In addition to face-to-face education, FSE UNIZA also provides courses in the face-to-face study support system – Moodle and MS Teams (e-learning).

Other innovative elements of education in the form of the use of virtual and augmented reality with implemented scenarios in the field of fire protection, fire fighting tactics, health and safety and working environment are also included in the teaching. The use of augmented reality for the training of emergency managers and firefighters represents a new approach in this field. The following scenarios are currently used: [8]

- cutting an electric car when freeing people,
- deactivation of the electric car,
- first aid for selected injuries,
- leakage of a dangerous substance from the tank.

For the rest of the period, even at FSE UNIZA, virtual reality scenarios were implemented in the teaching of health and safety and fire protection subjects. Another

dimension is mixed reality, which is rather "high tech" and requires more time when preparing scenarios and setting technical parameters for their training. It is used in laboratories, specialized in training with certain learning technologies, such as mixed reality and 360° videos, for selected scenarios of crisis managers and firefighters.[6, 12]

Interactivity provides students with another dimension to the educational process, this dimension is the independent control of processes within the practical acquisition of skills. The student interacts with holograms, which are displayed in real time after a step is performed, while completing tasks. Based on this perception from the actions, which we can consider as the implementation of practice according to E. Dale's pyramid, the acquisition of the subject matter is at the level of 75%. [7]

As part of this interactive education, Fig 1, the teacher also enters here, who, thanks to the "Dynamics 365 Remote Assist" application, can navigate the student through the possibility of directly displaying instructions such as 3D drawing, writing in the form of a hologram in space, and in this way direct the student's attention to a specific part of interest. [9, 11]



Figure 1 - Innovative elements of mixed and virtual reality in teaching at FSE UNIZA[10]

The faculty works intensively to expand the range of scenarios thanks to grant support for domestic and international projects.

5. CONCLUSION

FSE UNIZA is a management and technical faculty that develops educational and scientific research activities in the area of ensuring the comprehensive safety and security of society and individual citizens. Within this profile, it tries to connect theory with practice, to take into account the peculiarities of the safety environment and the safety and security system of Slovakia on the one hand, and the requirements of the present time and strategic partners on the other. It focuses on the education of crisis managers, workers of fire and rescue services, experts dealing with the management of processes for the protection of persons and property in all areas of social life. In the process of preparing for accreditation in accordance with the current requirements of the accreditation standards, the faculty adjusted its study programs even closer to the current needs of professional practice, thanks to the fact that it closely cooperated with graduates' employers, employers' associations, scientific research institutions and other important authorities during the review of study programs from professional practice at home and abroad.

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