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**OCCUPATIONAL SAFETY AS AN IMPORTANT ASPECT FOR  
DEVELOPMENT OF STEM-EDUCATION IN UKRAINE****ОХРАНА ТРУДА КАК ВАЖНЫЙ АСПЕКТ РАЗВИТИЯ  
STEM-ОБРАЗОВАНИЯ В УКРАИНЕ**

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**Abstract.** Today education becomes a key aspect of Ukraine's economic development. The main trend in education in the world is the STEM approach (science, technology, engineering, mathematics). Occupational Safety is a discipline that combines engineering, humanitarian, technical and natural sciences. Intensification of occupational safety education at universities is of great strategic importance for development of innovative education and strengthening of competitiveness of Ukraine.

**Key words:** occupational safety, STEM, education.

**Introduction.**

The first control systems of labor protection were developed in 80s years of the XX century in Soviet Union [1]. In the beginning of the XXI century the management for control systems of labor protection developed by ILO had appeared. However, the level of occupational injuries and occupational diseases in Ukraine is 3...4 higher than in Western Europe. According to the State Statistical Office 23.6 % of occupational accidents in 2016 are connected with non-performance of safety rules by production personnel [2]. One of the problems of the traditional occupational safety education system is that future professionals are offering information that is rapidly becoming outdated in today's changing world. The traditional direction of education for the transfer of knowledge gradually loses its sense. In connection with the wide access to information, not only general theoretical knowledge, but specific technological, which can ensure their effective practical application in the professional activity, is valuable.

**The main text.**

The urgency to improve progress of Ukrainian education is evident by educational reforms that have occurred for the last few years within a variety of disciplines including safety of activity. Many global challenges including climate change, resource management, risk management, occupational safety, declining energy and water sources and others need an international approach supported by integration of science, technology, engineering and mathematics (STEM). The main purpose of STEM-education is to implement state policy taking into account new requirements of the Law of Ukraine "On Education" regarding strengthening the development of scientific and technical potential in educational-methodical activity, creation of methodological base for improvement creative opportunities for youth and the professional competence of educators.

Conceptual approaches and practical directions of realization of STEM-



education are researched by leading scientists: G. Alshuller, S. Straw, R. Hart, D. Winckler O. Kuzmenko, O. Lisovy, Todd R. Kelley, J. Geoff Knowles, I. Slipukhina, I. Vasylashko, N. Goncharova, I. Chernetsky, Van den Bergue, M. Fieder and others. The use of integration as the main principle of STEM-education allows to carry out modernization of methodological and technical basics, to renew content and quantity of educational material of the subjects of natural-mathematical cycle. It also contributes to better qualification of young specialists for further education and successful employment.

It is generally accepted that education should ensure adequacy of labor resources' potential to modern technologies and management methods. But there is a plenty of factors that inhibit the development of education in Ukraine: low motivation of students to study technical disciplines and natural sciences, unsatisfactory level of implementation of innovative technologies, lack of modern research laboratories etc. To remain competitive in growing global economy it is imperative to raise student's achievement in STEM subjects. Instead of teaching content and skills and hoping students will see the connections to real-life application, an integrated approach seeks to locate connections between STEM subjects and provide relevant context for learning the content. Educators should remain true to the nature in which science, technology, engineering and mathematics are applied to real-world situations [3].

The STEM approach in education is based on the design of training disciplines on an interdisciplinary basis (integrated training according to certain topics, rather than individual disciplines). Such educational technology is intended to form the key professional competencies of young specialists: readiness to solve complex problems; ability to see the problem and distinguish as much as possible constituents and connections; ability to formulate research question and find ways to solve it; originality, withdrawal from the template; development of critical thinking, creativity, cognitive flexibility, cooperation, management, implementation of innovation activities and so on.

Therefore, the development of STEM education is a priority for Ukraine. At the same time practical realization of STEM-education is restrained by negative factors: insufficient number of modern educational programs that are developing competencies in technical creativity and a significant lack of skilled educators ready to organize educational process on modern equipment, using educational technologies that form engineering-technical competence of students [5].

Occupational safety provides the opportunity to locate the intersections and build connections among STEM disciplines. Occupational safety itself is an interdisciplinary STEM profession. In the discipline of occupational safety, the sciences of biology, chemistry, psychology, physiology, enforcement, hygiene, health, management and physics are combined with the utility of engineering and technology as a way to diminish the likelihood of accidents. A program of discipline "Occupational Safety" includes instructions in occupational health and safety standards and regulations, health-related aspects of various occupations and work environments, health hazard testing and evaluation, industrial toxicology, worker health and safety education, the analysis and testing of job-related equipment, behavior practices, and protective devices and procedures.



The safety profession is an occupational field concerned with the preservation of both human and material resources. “Safety Science” is a term for everything that goes into the prevention of accidents, illnesses, fires, explosions and other events which damage people, property and the environment. Today’s highly technical industrial workplace is a competitive environment that recognizes students with highly specialized skills. After the course “Occupational Safety” with the stress on STEM-approach young professionals should get following skills:

1. active listening (full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times);
2. speaking (talking to others to convey information effectively);
3. critical thinking (using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems);
4. complex problem solving (identifying complex problems and reviewing related information to develop and evaluate options and implement solutions);
5. judgment and Decision Making (considering the relative costs and benefits of potential actions to choose the most appropriate one);
6. social perceptiveness (being aware of others' reactions and understanding why they react as they do);
7. monitoring (monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action).

Environmental scientists and specialists have extensive knowledge of environmental and natural sciences. They use this knowledge to protect the environment by identifying problems and finding solutions by collecting data, conducting research and performing investigations. Specialists should also have good communication skills and problems solving abilities as information must be shared. Environmental engineering technicians should be detail-oriented and have monitoring skills. They must properly evaluate a site and recognize problems quickly. They also must be able to read and comprehend legal and technical documents, standards and requirements. Health and safety engineers investigate accidents, injuries, or occupational diseases that occur at work site. They are responsible for creating procedures and developing systems to avoid people of getting sick or injured. They review the specifications for new machinery or equipment for corresponding to safety regulation and inspect work sites to identify potential hazards. They also establish or review employee safety programs and make recommendations for improvement safety at work. Careers in environmental health, sustainability, pollution prevention are growing in need and popularity all over the world and should be rooted in STEM disciplines.

### **Summary and Conclusions.**

Many countries, such as Australia, China, Great Britain, Israel, Korea, Singapore, the United States carry out state programs in the field of STEM-education. In Ukraine, the subject of STEM-education is also gaining popularity. Implementation of STEM-education is connected with the requirement of a “new economy” to be competitive both within the country and on the international level. In the countries of the European Union it is forecasted that demand for professionals in



the field of STEM will increase by 8 % in 2025, while for others professions – only 3 % [4]. STEM education today shows a powerful scientific potential, for effective implementation of which it is necessary to pay considerable attention to the teaching of the discipline “Occupational Safety” to students as technical as humanitarian specialties.

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**Аннотация.** Образование сегодня становится ключевым аспектом развития экономики Украины. Главным трендом образования в мире является STEM-подход (S-наука, T-технология, E-инженерия, M-математика). Одной из проблем традиционной системы образования в сфере безопасности труда является то, что будущие специалисты в вузах получают информацию, которая быстро устаревает в сегодняшнем меняющемся мире. Многие глобальные проблемы, включая изменение климата, деградация природных ресурсов, управление рисками, безопасность на рабочем месте требуют комплексного подхода, интеграцией науки, техники, образования и математики (STEM). С другой стороны, охрана труда сама по себе является STEM-дисциплиной, так как объединяет инженерные, гуманитарные, технические и естественные науки. Интенсификация изучения охраны труда в вузах имеет большое стратегическое значение для развития инновационного образования и повышения конкурентоспособности Украины.

**Ключевые слова:** охрана труда, STEM, образование.

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