THE ROLE OF OCCUPATIONAL SAFETY STUDENTS IN DEVELOPING A FIRE SAFETY CULTURE

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Abstract: The formation of a fire safety culture is an important component of ensuring human safety, preventing emergencies, and developing responsible behaviour in educational institutions, industrial enterprises, and public organizations. Fire safety culture is not limited to knowledge of fire prevention regulations or the ability to use firefighting equipment. It represents a system of knowledge, professional skills, personal responsibility, preventive attitudes, and practical behaviours aimed at preventing fires and reducing their consequences. In this process, students studying occupational safety and health have a particularly important role because their professional education is directly connected with identifying workplace hazards, assessing risks, organizing preventive measures, and protecting human life. This study examines the role of occupational safety students in developing fire safety culture, with particular attention to their educational preparation, professional competencies, practical activities, and future responsibilities. The research analyses the relationship between occupational safety education and fire prevention, the importance of practical training, the development of risk assessment skills, and the use of modern educational technologies. It also proposes an educational approach through which students can become active participants in promoting fire safety culture rather than remaining passive recipients of theoretical knowledge. The findings indicate that the systematic integration of fire safety education into occupational safety programmes can strengthen students' professional readiness, improve their understanding of preventive measures, and support the development of a responsible safety culture in future workplaces.

Keywords: fire safety culture, occupational safety, university students, fire prevention, safety education, professional competence, risk assessment, emergency preparedness, evacuation, fire prevention training

Introduction. Fire safety is one of the essential conditions for protecting human life, maintaining the continuity of production processes, and ensuring the stable operation of educational, industrial, residential, and public facilities. Fires may occur in almost any environment where combustible materials, sources of ignition, electrical equipment, technological processes, or human activities are present. Their consequences may include injuries, fatalities, destruction of buildings, damage to equipment, environmental pollution, and significant economic losses.

Although modern buildings and industrial facilities increasingly use automated fire detection and suppression systems, technical equipment alone cannot guarantee complete fire safety. The effectiveness of these systems largely depends on how people behave, whether they understand potential hazards, whether they follow established safety requirements, and whether they can respond correctly during an emergency.

For this reason, the concept of fire safety culture has become increasingly important. Fire safety culture reflects the level of knowledge, attitudes, values, responsibility, and practical behaviour demonstrated by individuals and organizations in relation to fire prevention and emergency response. A person with a developed fire safety culture does not consider fire prevention merely as an

administrative requirement. Instead, they understand that preventing fire is a continuous responsibility that must be reflected in everyday activities.

Educational institutions play an important role in developing this culture because they prepare future specialists who will work in different sectors of the economy. Universities do not simply provide theoretical knowledge; they also influence students' professional attitudes, decision-making abilities, and behaviour in potentially dangerous situations.

Materials and Methods. This study is based on a theoretical and analytical examination of scientific publications, international recommendations, and educational approaches related to occupational safety, fire prevention, and the formation of safety culture.

The research considers students studying occupational safety and health as future professionals who may participate in the organization and improvement of fire safety systems at industrial enterprises, construction sites, educational institutions, and other organizations.

The following research methods were applied:

Literature analysis. Scientific publications and international materials concerning fire safety education, occupational safety training, preventive safety culture, and student participation were examined. Particular attention was given to research on fire safety education in higher education and the development of professional competencies.

Comparative analysis. Theoretical education, practical training, simulation-based learning, and independent student activities were compared to identify their contribution to the development of fire safety knowledge and behaviour.

System analysis. Fire safety culture was considered as a system consisting of knowledge, attitudes, professional skills, personal responsibility, preventive behaviour, and organizational participation.

Pedagogical analysis. Educational methods such as problem-based learning, practical demonstrations, case studies, emergency simulations, group projects, and risk assessment exercises were examined in relation to occupational safety education.

Professional competency analysis. The knowledge and skills required by future occupational safety specialists to participate in fire prevention, fire risk assessment, and emergency preparedness were identified.

The study is theoretical and analytical in nature. It does not claim to present new experimental measurements or the results of a student survey. The proposed educational approach is a conceptual framework that can be applied and evaluated in future empirical research.

3. Results

3.1. The concept and importance of fire safety culture

Fire safety culture is a combination of knowledge, personal attitudes, professional skills, organizational principles, and practical behaviour directed towards preventing fires and minimizing their consequences.

It is important to understand that fire safety culture is not formed only through memorizing fire safety rules. A student may know the location of a fire extinguisher, understand evacuation requirements, and be familiar with fire warning signals, but this knowledge does not automatically mean that the student will behave correctly in a real emergency.

A developed fire safety culture requires the ability to recognize danger, make appropriate decisions, and act responsibly.

For example, a person with an established safety culture will not ignore a damaged electrical cable, block an emergency exit, leave combustible materials near an ignition source, or disregard a

fire alarm. They will understand that seemingly minor violations may create conditions for a serious fire.

Fire safety culture can be examined through several interconnected components.

Knowledge component. This includes understanding the causes of fires, fire development mechanisms, combustible materials, ignition sources, fire protection systems, and relevant safety requirements.

Behavioural component. This reflects how individuals apply their knowledge in everyday activities. It includes following safety instructions, maintaining clear evacuation routes, reporting dangerous conditions, and avoiding unsafe actions.

Psychological and motivational component. This includes personal responsibility, awareness of possible consequences, willingness to prevent danger, and a positive attitude towards safety requirements.

Practical component. This refers to the ability to use firefighting equipment within the limits of one's training, follow evacuation procedures, recognize warning signals, and participate in emergency exercises.

Organizational component. This includes the participation of students and employees in safety inspections, training activities, risk assessment, and the improvement of fire prevention procedures.

Development of fire hazard identification and risk assessment skills. One of the most important professional competencies of occupational safety students is the ability to identify fire hazards and assess the associated risks.

Fire risk assessment involves examining the conditions that may cause a fire, the people and property that may be exposed, and the possible consequences.

Students should learn to identify three particularly important elements:

- Sources of ignition.
- Combustible materials.
- Conditions that allow fire to develop and spread.

Sources of ignition may include electrical sparks, open flames, hot surfaces, welding operations, and mechanical friction.

Combustible materials may include paper, wood, textiles, plastics, fuels, flammable liquids, gases, and combustible dust.

Conditions influencing fire development may include inadequate ventilation, improper storage of hazardous materials, ineffective fire protection systems, and the absence of suitable organizational controls.

Practical education should allow students to identify these hazards in realistic workplace situations.

The importance of practical training in developing fire safety culture. The effectiveness of fire safety education depends not only on theoretical lectures but also on practical activities.

Students may know the correct evacuation procedure in theory, but their ability to follow it under time pressure must be developed through exercises and practical training.

Practical activities can include:

Fire extinguisher familiarization. Students study the types, purpose, operating principles, and limitations of firefighting equipment. Practical operation should be conducted only under appropriate supervision and in designated training conditions.

Evacuation exercises. Students learn to follow evacuation signs, identify emergency exits, move according to established procedures, and understand the importance of keeping escape routes clear.

Fire alarm response. Students examine how to respond to warning signals, whom to notify, and why evacuation procedures must be followed without delay.

Hazard identification exercises. Students inspect training environments or simulated workplaces to identify conditions that may increase fire risk.

Emergency scenario analysis. Students examine hypothetical fire incidents and determine the appropriate preventive and organizational responses.

First aid awareness. Students learn the basic principles of obtaining emergency medical assistance and providing first aid within the limits of their training.

An important principle is that practical training should develop safe decision-making rather than encourage students to take unnecessary risks.

Modern educational technologies in the formation of fire safety culture. The development of digital technologies creates additional opportunities for improving fire safety education.

Traditional teaching methods remain important, but they can be supplemented with interactive and digital learning tools.

Virtual reality (VR). Virtual reality can create simulated fire situations in which students practise identifying hazards, selecting evacuation routes, and making decisions without being exposed to actual fire danger.

Augmented reality (AR). Augmented reality can be used to display fire safety information, evacuation signs, equipment locations, and hazard indicators in a real or simulated environment.

Interactive digital tests. Online tests can evaluate students' understanding of fire prevention requirements, emergency procedures, and professional responsibilities.

Video-based learning. Educational videos can demonstrate fire development, evacuation procedures, the consequences of unsafe behaviour, and the correct use of firefighting equipment.

Digital evacuation maps. Students can study building layouts and identify emergency exits, assembly points, and possible evacuation difficulties.

Artificial intelligence-supported learning. AI-based educational systems can generate different emergency scenarios, evaluate student responses, and provide explanations of possible mistakes.

However, digital learning should not completely replace practical training. Students must also become familiar with real equipment, actual evacuation arrangements, and the organizational procedures used in workplaces.

The most effective approach is to combine theoretical instruction, digital simulation, supervised practical exercises, and assessment of real-world safety behavior.

Development of professional competencies among occupational safety students. The formation of fire safety culture requires the development of a combination of professional, analytical, practical, and personal competencies.

For occupational safety students, these competencies can be grouped into several areas.

Competency	Main content	Expected outcome
Theoretical knowledge	Understanding fire causes, fire development, and prevention principles	Ability to explain fire hazards
Hazard identification	Recognition of ignition sources and combustible materials	Ability to identify dangerous conditions
Risk assessment	Analysis of probability and potential consequences	Ability to evaluate fire risks
Practical skills	Familiarization with firefighting equipment and evacuation procedures	Ability to follow established safety procedures

Organizational skills	Participation in inspections, training, and emergency planning	Ability to support fire prevention activities
Communication skills	Explaining safety requirements to employees and students	Ability to promote fire safety awareness
Digital competence	Use of electronic learning materials, digital maps, and simulation systems	Ability to use modern educational and monitoring tools
Personal responsibility	Compliance with safety requirements and preventive behaviour	Development of a responsible safety attitude

The development of these competencies should be gradual and continuous. At the initial stage, students acquire basic knowledge of fire hazards and prevention requirements. At the next stage, they develop practical skills and learn to assess risks. At the final stage, they apply their knowledge in complex scenarios and participate in activities that promote safety culture.

A proposed educational model for developing fire safety culture. Based on the analysis, an educational model is proposed for strengthening the role of occupational safety students in developing fire safety culture.

The model consists of five interconnected stages. Stage 1. Motivational and awareness development. The purpose of this stage is to establish a positive attitude towards fire prevention and personal responsibility.

Students should understand that fire safety is not simply a formal requirement but an important condition for protecting human life and property.

Educational activities may include discussions of real incidents, analysis of fire-related consequences, and examination of the responsibilities of occupational safety specialists.

Stage 2. Acquisition of theoretical knowledge. At this stage, students study the causes of fires, combustible materials, ignition sources, fire protection systems, evacuation procedures, and relevant safety requirements.

The teaching process should connect theoretical concepts with examples from industrial enterprises, construction sites, educational institutions, and public buildings.

Stage 3. Practical competency development. Students participate in supervised exercises, hazard identification activities, evacuation simulations, and fire prevention inspections.

The main purpose is to develop the ability to apply knowledge in practical situations.

Stage 4. Independent and collective activity. Students prepare educational materials, participate in safety campaigns, develop emergency scenarios, and identify possible improvements in fire prevention arrangements.

This stage strengthens leadership, communication, and organizational abilities.

Stage 5. Evaluation and continuous improvement. Students' progress is assessed through theoretical tests, practical tasks, scenario-based exercises, and analysis of their ability to identify and explain fire hazards.

The results are used to identify knowledge gaps and improve the educational process.

Indicators for evaluating the formation of fire safety culture. The formation of fire safety culture should be evaluated through observable indicators rather than relying exclusively on students' self-assessment.

The following indicators can be used:

- Knowledge of fire causes and prevention requirements.
- Ability to identify fire hazards in a given environment.
- Ability to explain the purpose and limitations of firefighting equipment.

- Knowledge of evacuation routes and emergency procedures.
- Ability to identify unsafe conditions and propose preventive measures.
- Participation in practical exercises and fire prevention activities.
- Ability to communicate safety information to other people.
- Demonstration of responsible behaviour during simulated emergency situations.

A university may evaluate these indicators through pre-training and post-training tests, practical observation, scenario-based assignments, and student projects.

It is important to distinguish between improvements in knowledge and improvements in actual behaviour. Higher test scores demonstrate better understanding, but they do not automatically prove that fire-related incidents will decrease. Long-term evaluation should also consider whether students consistently apply safety principles in practical activities.

Discussion. The analysis demonstrates that occupational safety students have the potential to become important participants in the formation of fire safety culture. Their role is determined by the professional orientation of their education, which combines knowledge of hazardous conditions, risk assessment, preventive measures, and the organization of safe working environments.

An important issue is the relationship between theoretical knowledge and practical behaviour. Traditional education often gives considerable attention to explaining fire safety requirements. However, students also need opportunities to apply this knowledge in realistic situations.

For example, understanding the purpose of an evacuation route is different from being able to identify a blocked exit, recognize an unsafe evacuation arrangement, and propose an appropriate corrective measure.

Similarly, knowing the purpose of a fire extinguisher does not necessarily mean that a student can select and use the appropriate equipment safely. This requires practical familiarization, supervision, and an understanding of the limitations of firefighting actions.

Research on fire safety education in higher education has highlighted the importance of structured educational programmes and the development of specialized professional competencies.

Another important issue is the need to develop a preventive approach among students. A mature safety culture is demonstrated not only during emergency situations but also through everyday behaviour. Keeping evacuation routes clear, reporting damaged electrical equipment, observing safe storage requirements, and following established procedures are examples of preventive behaviour.

The educational process should therefore encourage students to recognize that fire prevention is a continuous responsibility.

The proposed educational model also emphasizes the importance of student participation. When students prepare educational materials, conduct awareness activities, and participate in risk assessments, they gain practical experience and develop a stronger sense of professional responsibility.

This approach is consistent with international recommendations on integrating occupational safety education into the education system. The European Agency for Safety and Health at Work emphasizes that students should receive systematic safety education before entering professional employment and should actively participate in the development of preventive practices.

For higher education institutions in Uzbekistan, these approaches are relevant to improving the professional preparation of future occupational safety specialists.

Universities can strengthen this process by integrating fire safety topics into relevant subjects, organizing regular practical exercises, developing digital educational resources, and involving students in safety-related projects.

Cooperation between universities, fire safety organizations, industrial enterprises, and construction companies can provide additional opportunities for students to observe real working conditions and understand the practical responsibilities of occupational safety specialists.

Nevertheless, the proposed educational model requires empirical evaluation. Future research should examine changes in students' knowledge, practical skills, attitudes, and observed behaviour before and after structured training. Such studies would provide a stronger basis for evaluating the actual effectiveness of different educational methods.

Conclusion. The formation of fire safety culture is a continuous educational and organizational process that requires the integration of knowledge, practical skills, personal responsibility, and preventive behaviour.

Occupational safety students have a particularly important role in this process because their future professional activities are directly connected with identifying hazards, assessing risks, organizing preventive measures, and protecting human life.

The study establishes that fire safety education should not be limited to theoretical information about fire prevention regulations. It should also develop the ability to recognize dangerous conditions, evaluate potential consequences, understand evacuation procedures, participate in supervised practical exercises, and communicate safety requirements to others.

The main conclusions are as follows:

- Fire safety culture is a comprehensive system of knowledge, attitudes, professional skills, responsibility, and practical behaviour directed towards preventing fires and reducing their consequences.

- Occupational safety students are important future participants in the development of fire prevention systems because their professional education includes hazard identification, risk assessment, safety management, and emergency preparedness.

- The integration of fire safety topics into occupational safety disciplines helps students understand the relationship between technical hazards, human behaviour, and organizational preventive measures.

- Practical training, including supervised equipment familiarization, evacuation exercises, hazard identification, and emergency scenario analysis, is essential for strengthening professional readiness.

- Student participation in educational campaigns, safety inspections, and peer-to-peer learning can help extend fire safety awareness beyond the classroom.

- Digital technologies, virtual simulations, interactive learning platforms, and AI-supported educational tools can improve the learning process when combined with practical training.

- The proposed five-stage educational model provides a structured approach to developing fire safety culture among occupational safety students through motivation, theoretical education, practical training, independent activities, and continuous evaluation.

In conclusion, occupational safety students should be prepared not only as future specialists who understand fire safety requirements but also as active promoters of preventive behaviour. Their professional knowledge, personal responsibility, and ability to influence the safety awareness of others can contribute to the development of a stronger fire safety culture in educational institutions, industrial enterprises, construction organizations, and society as a whole.

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