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Realization of Occupational Health and Safety Training Modules and Topics for Musculoskeletal Disorders and Psychosocial Risks in the IT Sector

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Abstract

Musculoskeletal Disorders and psychosocial risks represent two of the most significant health challenges in modern workplaces, with wide-ranging implications for employee well-being and organizational productivity. The primary aim of this article is to explore the design of Occupational Health and Safety training modules tailored to address the dual challenges of Musculoskeletal Disorders and psychosocial risks within the IT sector. By addressing hazards proactively, OHS helps organizations reduce the risk of workplace incidents, which can result in significant financial and reputational costs. Moreover, ensuring employee safety and well-being contributes to higher morale, improved productivity, and a positive organizational culture. Our methodology in realization of occupational health and safety training modules and topics for musculoskeletal disorders and psychosocial risks in the it sectors consisted in calling on experts because safety domain of research is by excellence a domain based on expertise. The safety expert is the real cornerstone of safety and their expertise is transformed into lessons learned that are used for training and improvement of existing safety attitudes. Regarding the relevance of the results, we consider that the structure and content of the training module address key challenges faced by IT professionals in offices, particularly those linked to sedentary work and prolonged computer use. The development of this module represents a significant step toward addressing the occupational health and safety needs of IT professionals. By focusing on education, prevention, and compliance, it not only mitigates risks but also promotes a healthier, safer, and more engaged workforce. Future efforts could expand on this module by integrating digital tools, gamified training methods, or regular feedback loops to ensure the training remains effective and relevant.

Keywords: Occupational Health and Safety Training Modules, Musculoskeletal Disorders and Psychosocial Risks, IT Sector, Risk Mitigation, Prevention and Protection Measures

1. Introduction

Occupational Health and Safety (OHS) refers to the multidisciplinary practice aimed at ensuring the physical, mental, and social well-being of workers in all industries. It encompasses the identification, evaluation, and control of workplace hazards to prevent accidents, injuries, and illnesses. OHS is guided by a framework of laws, regulations, and best practices that seek to create safe and healthy working environments [1].

The significance of OHS lies in its ability to protect workers and promote sustainable business practices. By addressing hazards proactively, OHS helps organizations reduce the risk of workplace incidents, which can result in significant financial and reputational costs. Moreover, ensuring employee safety and well-being contributes to higher morale, improved productivity, and a positive organizational culture [2].

OHS plays a critical role in minimizing work-related injuries and diseases by focusing on:

- ***Hazard Identification and Risk Management*:** This involves recognizing potential physical, chemical, biological, ergonomic, and psychosocial risks and implementing measures to mitigate them.
- ***Health Promotion*:** Encouraging practices that support physical and mental health, such as ergonomic adjustments, regular health screenings, and stress management initiatives.

- ***Training and Awareness*:** Educating workers and management on safety protocols, proper use of equipment, and emergency response.
- ***Regulatory Compliance*:** Ensuring adherence to local and international safety standards to prevent legal liabilities and foster trust with employees and stakeholders.

Through the integration of OHS principles into daily operations, organizations not only protect their workforce but also contribute to the broader goal of sustainable development by fostering safe, healthy, and equitable working conditions [3].

Musculoskeletal Disorders (MSDs) and psychosocial risks represent two of the most significant health challenges in modern workplaces, with wide-ranging implications for employee well-being and organizational productivity. Both categories of risks are influenced by the nature of work, the physical and psychological demands placed on workers, and the specific characteristics of industries like IT [4].

MSDs affect the muscles, tendons, ligaments, nerves, and joints, leading to discomfort, pain, or disability. Common MSDs include carpal tunnel syndrome, tendonitis, lower back pain, and neck strain. These conditions often result from repetitive movements, awkward postures, heavy lifting, or prolonged static positions. Workers in the IT sector, such as software developers and IT support personnel, are highly susceptible to MSDs due to the sedentary and repetitive nature of their work [5].

Psychosocial risks belong to the social and psychological dimensions of work that can adversely affect employees' mental health and overall well-being. These risks include stress, anxiety, depression, and burnout, often resulting from factors like high workloads, poor communication, job insecurity, and workplace conflict. Psychosocial risks are particularly pronounced in the IT sector due to the high-pressure, fast-paced environment [6, 7].

The primary aim of this article is to explore the design of Occupational Health and Safety (OHS) training modules tailored to address the dual challenges of Musculoskeletal Disorders (MSDs) and psychosocial risks within the IT sector.

2. Materials and Methods

Our methodology in realization of occupational health and safety training modules and topics for musculoskeletal disorders and psychosocial risks in the it sectors consisted in calling on experts because safety domain of research is by excellence a domain based on expertise. Textbooks and theoretical knowledge are good but the safety expert which inspects three times a day an enterprise is the real cornerstone of safety. A lot of expertise is transformed into lessons learned that are used for training and improvement of existing safety attitudes.

The Fig 1 illustrates how a safety expert, with the necessary knowledge into the problem could improve a safety assessment process. The safety manager of a specific enterprise which performs a safety assessment will navigate through the safety assessment items, will assess the current safety situation inside his enterprise and will develop a safety improvement plan this being the outcome of the assessment.

The safety experts choose by authors to help the realisation of the training modules and topics were asked to design optimally and efficiently the items, so that should capture the real, most significant and important from the safety point of view aspects.

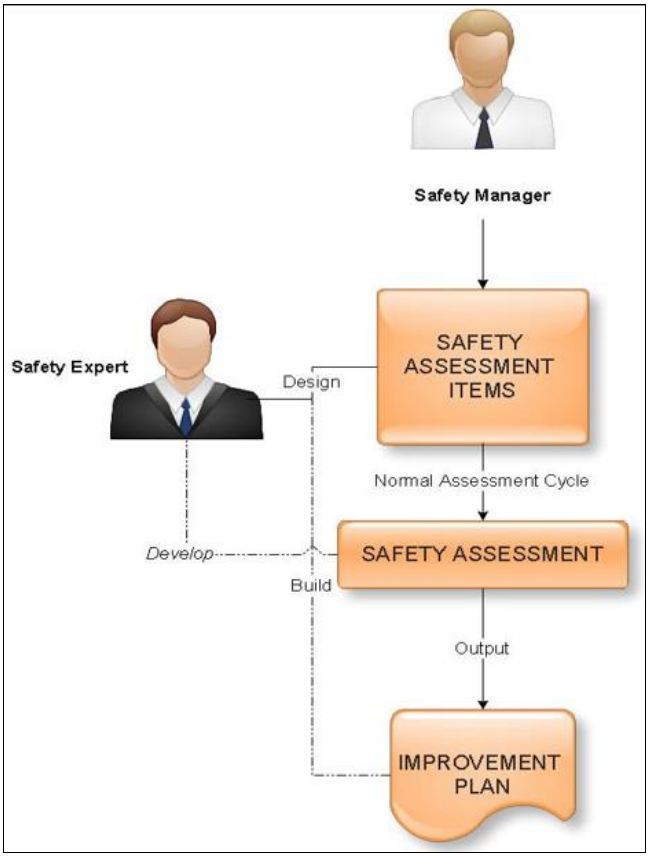

Fig 1: Safety Expert helps Safety Manager to perform a safety assessment

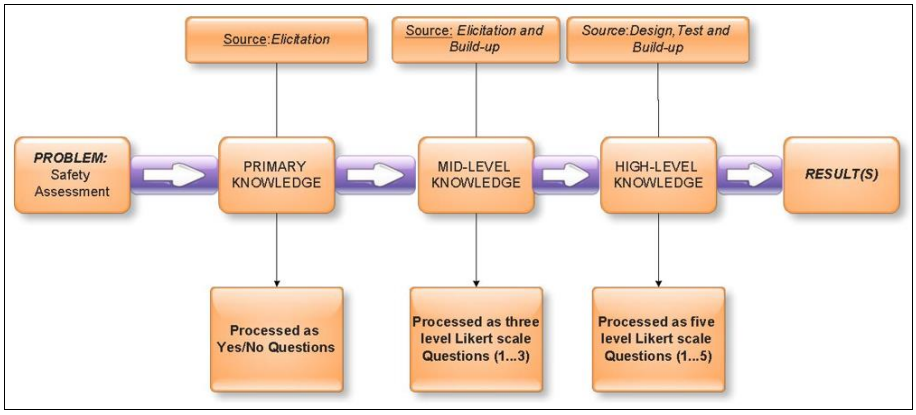

Fig 2: The schema for structuring knowledge

The schema we used for structuring knowledge is presented in the Fig 2 above.

For this study the authors were configuring the expertise required to solve the problem around a decision tree. We have constructed our decision thee as in the Fig 3 in order to catch as much as possible of primary knowledge, that is main heuristic knowledge; use mid-level knowledge, that is the knowledge managed generally by supervisors and floor level managers and use also high level knowledge.

As our main goal is to make occupational health and safety training modules and topics for musculoskeletal disorders and psychosocial risks in the IT sectors all the acquired/elicited knowledge was tailored in this respect as seen in Fig 3.

In order to design effective Occupational Health and Safety (OHS) training modules for addressing Musculoskeletal Disorders (MSDs) and psychosocial risks in the IT sector we used a structured, evidence-based approach. The first key step involved in developing sector-specific, accessible, and engaging training modules was to conduct a needs assessment by identifying key risks, analyzing workforce demographics and collaborate with employees, management, and OHS specialists to ensure the training aligns with organizational goals and worker needs. Then we defined outcome-oriented and clear training objectives.

Next steps were to design sector-specific content for IT sector, select delivery methods (blended learning, interactive tools, microlearning modules, accessible formats), develop engaging content (interactive activities, case studies and examples, gamification).

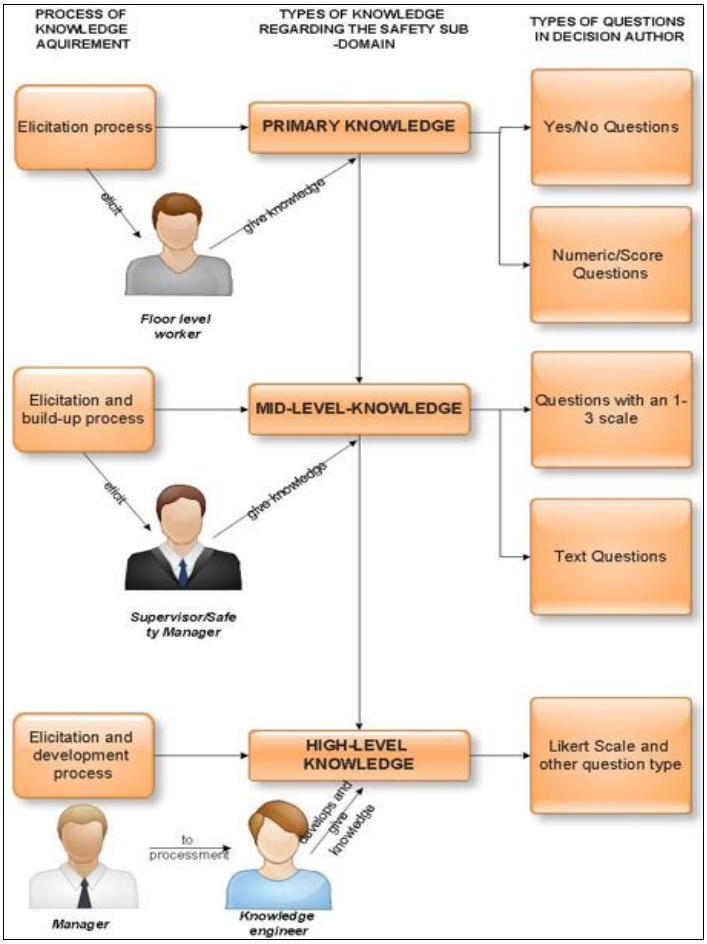

Fig 3: Knowledge coupling for the building of the decision tree

3. Results and Discussions

As an example of results obtained, we present one of module, respective MODULE 1- „OSH training for IT staff who works in offices". The first training module is designed to address the specific occupational health and safety (OSH) needs of IT professionals working in office environments. This group is particularly susceptible to musculoskeletal disorders (MSDs) and psychosocial risks due to the sedentary nature of their work and prolonged use of computers. The module aims to equip IT staff with the knowledge and skills necessary to identify risks, implement prevention strategies, and ensure compliance with OSH legislation. Below is an in-depth explanation of each component:

1. Legislation

This section emphasizes the importance of understanding national [10] and international OSH laws [11] that govern workplace safety. IT employees are introduced to the legal requirements for maintaining safe working conditions and their rights and responsibilities under these regulations:

- Law on Safety and Health at Work no. 319/17.06.2006: Art. 5-7; Art. 13-15; Art. 22-23;
- Methodological norms for the application of law 319/2006 (HG 1425/2006): Art. 1; Art. 2; Art. 74-100; Article 102; Article 106;
- Decision no. 1028 of 09/08/2006 regarding the minimum requirements for safety and health at work regarding the use of equipment with a viewing screen: Art. 9-17; Annex;
- Decision no. 1091 of 16/08/2006 regarding the minimum safety and health requirements for the workplace: Annex no. 1 or Annex no. 2;
- Government Decision no. 971/26.07.2006 regarding the minimum requirements for safety and/or health signage at the workplace Annex no. 2 – Table with signaling means.

2. Risks of accidents and occupational disease for the activity of IT (office)

Specific risks associated with IT office work are analyzed, including ergonomic challenges leading to MSDs, eye strain from prolonged screen exposure, and the potential for psychosocial risks such as burnout and stress. There were identified 26 occupational risks related to the four elements of a work system - means of productions, work environment, work load, worker, as follows:

A. Means of production

Mechanical risk factors

1. Hit by vehicles and/or CF when traveling on the normal route and duration between home and work (pedestrian travel, bicycle or scooter travel, car travel, public transport etc.), in during business trips – road traffic accidents (severe injuries).
2. Crash, explosion during air transport for domestic or international travel.
3. Overturning materials, furniture, etc. (stored without ensuring stability).
4. Design of bodies, particles (trees, pipes, windshield particles) through the windshield of the car or when passing cars, works of contractors, etc.
5. Accidental direct contact with dangerous surfaces or contours: Sharp, sharp, abrasive, slippery surfaces from the equipment structure, supplies, etc.
6. Free fall of objects from a height (eg; boxes stored at the top of the shelves, stationery, false ceiling, lighting fixtures, etc.).

Thermal risk factors

7. Fires caused by accidental damage to electrical or other insulations (technical accidents, breakdowns, explosions, natural disasters, working with paper, plastic components), fires that broke out in traffic during collisions between cars, vegetation fires, etc.
8. Accidental direct contact with surfaces, excessively heated equipment and/or hot liquids.

Electrical risk factors

9. Electrocution by direct, indirect contact: When voltage is accidentally applied to installation elements; defects in technical electrical equipment, accidental damage to electrical installations, sockets, etc. (especially the power part).

B. Work environment

Physical risk factors

10. Visual strain (sight fatigue) when working with video terminals.
11. Surprise in the building by earthquake, fire, natural calamities.
12. Air currents caused by (common or individual) air conditioning installations, air currents on the work route (between offices on different levels, between building bodies, offices and canteen, offices and parking and in the cold season in the special area arranged for smoking).

Biological risk factors

13. Diseases because of the organisms in suspension in the air – air conditioning installation (bacteria, viruses, fungus).

C. Work load

Physical strain

14. Static effort - Work positions mainly "sitting" on the chair.

Psychic strain

15. High volume of work, quick decisions with the assumption of responsibility.

D. Worker

Wrong actions

16. Execution of operations not foreseen in the work task or in a different way than the procedural provisions or those contained in the specific instructions of the position - non-compliance with the own instructions developed within the company, both in the field of safety and health at work and in emergency situations.
17. Incorrect positioning of computer system elements (keyboard, chair, monitor) without observing ergonomic rules.
18. Carrying out unauthorized interventions / improvisations on work equipment without requesting the intervention of specialized personnel.
19. Failure to comply with the traffic code while traveling by car, bicycle or scooter, crossing through unauthorized places, failure to comply with the meaning of traffic light colors, driving under the influence of alcohol and/or prohibited substances, psychotropic drugs, using a mobile phone/other means of communication while driving, not wearing a seat belt, not adapting the travel speed to the traffic and weather conditions, etc.

20. Failure to comply with legal requirements, OSH instructions and Life Saving Rules (eg: Measures to prevent contamination with SARS CoV-2, electrical safety, etc.).
21. Wrong positioning in relation to objects, suspended materials, unstable structures, etc.
22. Showing up at work/carrying out the activity in an inappropriate physical condition (under the influence of alcohol or prohibited substances (psychoactive), drugs that affect the ability to work, untreated chronic diseases, etc.
23. Traveling, parking in dangerous areas – entering dangerous areas (areas with a risk of falling from a height, motor vehicle traffic routes, areas with a risk of falling materials, under the load of lifting equipment, the area of action/movement of machinery, etc.
24. Falling on the same level by unbalancing, stumbling, slipping (on stairs, steps, electric extension cords, chair legs, wet floors), when walking on the paths in the premises or in the outer perimeter - uneven access roads, ice.
25. Falling from a low height by stepping on empty space, unbalancing, slipping, etc.
26. Unsafe, wrong behavior during activities – eg: Using open flames (matches, lit cigarettes) in places where.

3. Prevention and protection measures for the risks of accidents and occupational disease for the activity of IT (office)

Practical solutions are outlined to mitigate every identified risk. For example, for the risk number 10 *Visual strain (sight fatigue) when working with video terminals,* the prevention and protection measures recommended are:

- The necessary adjustments will be made in relation to the requirements of the work load, the environmental conditions and the individual anthropo-functional and psycho-physiological characteristics.
- Mainly the following will be adjusted: Screen luminance, contrast between characters and background, screen position (height, orientation, tilt).
- The height and inclination of the document support.
- The height of the work table (if it is adjustable).
- The height of the sitting surface of the chair, the inclination and the height of the back of the chair.
- Exercises for tired computer eyes: Regular focus of the gaze to a distant point in a different direction from the screen.

4. Own occupational safety and health instructions for IT (IPSSM IT)

This component delivers tailored guidelines for office-based IT work. It focuses on the unique risks IT staff face and provides actionable instructions to enhance safety and productivity.

5. Own safety and health instructions at work for the travel to/from work/home (route IPSSM)

Often overlooked, commuting poses its own set of risks. This section provides safety recommendations for traveling to and from work, whether by walking, cycling, or using public or private transport.

6. The possible consequences of ignorance and/or non-application of OSH legislation

Employees are made aware of the potential negative outcomes of neglecting OSH regulations. This includes personal injury, reduced productivity, legal penalties for the organization, and overall decline in workplace morale.

7. First aid in case of accident

Practical first-aid training equips employees with the skills to respond effectively in case of workplace accidents. This includes treating minor injuries and understanding the protocols for emergencies, ensuring quick and competent responses.

4. Conclusions

Regarding the relevance of the results, we consider that the structure and content of the training module address key challenges faced by IT professionals in offices, particularly those linked to sedentary work and prolonged computer use. This focus ensures that the training is practical and directly applicable to the target group. Also, the training modules add a *Proactive Risk Management dimension* by highlighting the risks and providing tailored preventive measures. The module empowers employees to proactively manage their health and safety and this not only reduces the incidence of work-related illnesses but also enhances overall productivity. The inclusion of guidelines for commuting and first-aid training reflects a holistic and comprehensive approach to OSH. It recognizes that workplace safety extends beyond the office environment, encompassing the journey to and from work and readiness to handle emergencies. The modules obtained as a results of this study are encouraging compliance and awareness. By detailing the consequences of non-compliance, the module fosters a culture of accountability and awareness among IT staff which is crucial for embedding OSH principles into daily work practices. Finally, our modules have potential for broader application. While designed for IT staff in offices, many elements of the module can be adapted for other sectors or for remote work environments, making it a versatile framework for OSH training. The development of this module represents a significant step toward addressing the occupational health and safety needs of IT professionals. By focusing on education, prevention, and compliance, it not only mitigates risks but also promotes a healthier, safer, and more engaged workforce. Future efforts could expand on this module by integrating digital tools, gamified training methods, or regular feedback loops to ensure the training remains effective and relevant.

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