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Original

Investigating the Effective Climate on Transfer of Lessons Learned and Providing Solutions to Improve the Effectiveness of HSE Training Courses

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ABSTRACT

Background: Today's businesses spend a lot of money on educating their personnel. What matters is that people use their knowledge to their jobs. The goal of this study was to look into the environment that affects learning transfer and come up with a solution to increase the effectiveness of health, safety and environment (HSE) courses. **Methods:** In 2020, a cross-sectional study was done at the Tehran Oil Refining Company. The number of samples was 200, according to Cochran's formula. The major data gathering technique was a 20-item questionnaire created by the researcher. The multivariate regression model was used to analyze the study data, which was done with IBM SPSS software. **Results:** The questionnaire's content validity and reliability were estimated to be 0.83 and 0.929, respectively. 3.68±0.22 was the atmospheric indicator that proved effective in transferring learning and providing a way to increase the effectiveness of HSE training. The climate index affecting the transfer of learning had a significant link with the parameters of work experience (p = 0.02), education (p = 0.03), and kind of employment (P = 0.01), according to the results of linear multivariate regression analysis. **Conclusion:** The atmospheric index influencing learning transfer and proposing a solution to increase the efficacy of HSE courses in the Tehran Oil Refining Company was deemed favorable. The outcomes of this study revealed that supervisors on job units in this business provide a supportive environment that is perfectly aligned with encouraging learners to enroll in training courses.

Keywords: Effective climate; Transfer of learning; Effectiveness; Oil refining company

Introduction

Having the correct rate of return and transferring new skills, knowledge, attitudes, and procedures learnt to the workplace are all part of staying competitive. Training and expanding employee expertise is a critical approach for firms to obtain a competitive advantage in today's changing world. [1]

The basic goal of training is to assist people in developing skills and talents that will help them improve their average job performance while they are employed. The proposed definition connects the acquisition of knowledge and abilities through training to their application in the job. This connection exemplifies the idea of education transfer. [2] In general, learners' ultimate goal in education is to apply what they've learned in a training course to real-world situations. Training is effective, according to research, if employees successfully transfer the

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knowledge, skills, and attitudes taught and increase their performance as a result. Employees must be able to apply the knowledge, skills, and talents they learn in training in the real world. Organizations can also increase their performance by providing staff with proper training programs. In fact, the goal of any corporate training program is to better prepare people by improving their attitudes, abilities, and knowledge so that they can execute their jobs to their full potential. Also, keep an eye on job-related issues and roadblocks. [3, 4]

Holding general and specialized trainings is not the only way to develop and improve human resources. Today, training is intended to promote the attainment of business goals by causing desirable behavioral changes in personnel. Only 15% of workers who receive new training use it in a way that results in useful performance outcomes, according to research. According to research, only around 40% of what employees learn in training programs gets transferred to the workplace immediately after training, and this percentage drops to 25% after six months and 15% after a year. One of the most essential issues in education and its optimal production is the term education transfer. [5]

Internal and external incentives, career path planning, organizational commitment, subordinate support, supervisors, and top managers have all been proven to encourage learning and effect education transfer in some studies. A wide range of work environment characteristics that have a direct impact on training efficacy can also have an impact on training transfer. Some studies point to the presence of a continuing learning culture as a facilitator of post-training behaviors, while others point to financial restrictions, departmental inconsistencies, and degrees of involvement and senior management interest, among other factors. Another person makes a reference. Variables in the workplace such as organizational conditions and work environment enhance, inhibit, or minimize education transfer. [6]

Leaders and managers are critical in addressing the problem of turning education into behavior. The transfer of training to behavior is hampered by a senior management who does not agree with the training's aims and programs. Employees will be discouraged and waste time transferring what they have learnt to their tasks if senior executives do not consent and support them. As a result, in order to get their active support and involvement, a detailed presentation on the overall objectives of the training program, desired results, cost-benefit impact, required resources, and so on should be created for management. However, due to a lack of theoretical underpinning for empirical data and models of education transfer, the question of education transfer remains unresolved [7, 8].

Organizational factors that support and lack of assistance from managers and supervisors are two of the subdivisions that affect learning transfer in firms. As a result, given the relevance of this issue, this study was created and carried out with the goal of studying the environment that affects learning transfer and developing a solution to increase the effectiveness of HSE courses.

Methods

This study was a cross-sectional study undertaken in 2020 with the goal of identifying and studying the climates that affect the transfer of lessons learnt and providing a solution to improve the efficiency of HSE courses at Tehran Oil Refining Company.

The study sample consisted of 204 participants who were computed with an accuracy of 0.04 using Cochran's formula. The unit sample size was proportionate to the population size of the unit. The method of data collection was by completing questionnaires. The steps of this study are as follows.

Preliminary data was gathered for the questionnaire by researching domestic and foreign papers and holding consultation discussions with key personnel in the Tehran Oil Refining Company's

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training department. Following the construction of the questionnaire, the content validity of the questionnaire was confirmed by approving 15 expert academics in this subject and giving solutions, and ultimately, the indicated points were taken into account in the form of the assembled questionnaire. This questionnaire's Content Validity Ratio (CVR) and Content Validity Index (CVI) were 0.83 and 0.88, respectively. Cronbach's alpha coefficient (= 0.929) was used to determine the questionnaire's reliability. The questionnaire has 20 questions in five categories: preventing environment, discouraging environment, neutral environment, encouraging environment, and required environment. 5- I strongly agree, 4- I agree, 3- I have no opinion, 2- I disagree, and 1- I severely disagree were among the responses. The questionnaire can be found at the end of this paper.

It's worth noting that the final number in each questionnaire is divided by the number of alternatives (20), resulting in a final index that ranges from 1 to 5.

The questionnaire was disseminated and collected at this point in the Tehran Oil Refining Company. In parallel with the distribution and completion of questionnaires among personnel working in the relevant unit or department, an interview with the head of the unit or their supervisor was conducted, and the answers to the interview form questions and points were recorded to be reviewed and analyzed in the following steps. Because a substantial number of personnel at this company have taken HSE training, participation in this study was done voluntarily and with the informed agreement of those who took part. Furthermore, discontent and a lack of participation were used as leave grounds.

The data was examined using IBM SPSS statistical software version 0.22 at this point. A multiple linear regression model was employed in this study to assess the link between study variables and climate factors affecting learning transfer and to propose a solution for improving the effectiveness of HSE courses. The existing data was analyzed and the input data was adjusted after entering the data into this software. It's worth noting that the statistical tests utilized in this study are two-way, with a significance level of 0.05.

Results

The current study included 200 of the 204 persons who were chosen for the study. The results of the personal information of the participants in this study revealed that 98.0 percent of the men in this study (196 people) and 0.2 percent of the women in this study were men (4 people). 86.0 percent of the people in the study were married, while 14.0 percent were single. A bachelor's degree was the most common, and almost half of the participants possessed one (45.0 percent). Following that, persons with diplomas, master's, and master's degrees accounted for 28.5 percent, 0.19 percent, and 7.5 percent, respectively. Contractual persons had the largest frequency in this survey, accounting for almost half of the participants (48.5 percent). In this survey, two types of formal employment and direct contract were represented by 39.0 percent and 12.5 percent of participants, respectively. Other forms of employment, such as contracting, were used by 48.5 percent of the other participants. The subjects' mean and standard deviation for the age variable was 39.23±7.08 years, and their mean and standard deviation for the job experience variable was 10.02±4.24 years.

The mean and standard deviation of this index in the subjects is 3.68 22 0.22 (maximum score=5), according to descriptive results of the climate effecting the transfer of learning and giving a solution to improve the efficacy of HSE courses in Tehran Oil Refining Company. The atmospheric index affecting the transfer of learning and giving a solution to improve the efficacy of HSE courses in Tehran Oil Refining Company is considered desirable based on the obtained ratio, which is higher than the average. The results of regression analysis

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based on linear multivariate regression analysis in this study revealed that the atmospheric index has a significant relationship with factors of work experience, education, and type of employment in affecting the transfer of learning and providing a solution to improve the effectiveness of HSE courses in Tehran Oil Refining Company ($p < 0.05$). The usefulness of the effective climate index of the factors of education ((B) = 2.18), kind of employment ((B) = 1.62), and work experience ((B) = 1.55) (Table 1) was demonstrated by these findings.

Table 1. Results of the analysis of variables affecting the climate affecting the transfer of lessons learned from HSE courses

Independent variable	B	Standard error	Bottom bound	Upper bound	P-value	R^2
Work experience	1.55	0.22	1.12	1.98	0.021	
Education	2.18	0.84	0.53	3.83	0.030	0.709
Type of employment	1.62	0.37	0.89	2.35	0.009	

Table 2. Climate assessment questionnaire affecting the transfer of knowledge related to HSE training courses

	Items	1	2	3	4	5
Preventing climate	I am not given a chance to reflect on what I have learned and apply it in practice. In my unit, there is resistance to change and the application of new methods. If I participate in the training course, I will be dealt with. In my unit, learning is not considered a core value.					
Discouraging climate	My colleagues discourage me from learning and applying it in practice. My unit and team are reluctant to try new ways of doing things based on what they have learned. In my unit, people who seek individual and organizational study and learning are often ridiculed. With the slightest negative result in the application of what I have learned, I receive a lot of negative and discouraging feedback.					
NUTERAL climate	My unit is indifferent to fixing performance deficiencies and covering my training needs. While I am attending training courses, I am called to the unit from the beginning of the class to do the work that has been done. Learning opportunities and training courses in the unit are not informed to me and my colleagues. In my unit, employees are not encouraged to attend training courses.					
Encouraging climate	My supervisor encourages me to publish, share and record what I have learned and experienced in the workplace with others. If I create good results based on what I have learned, I will receive positive feedback from my supervisors. My supervisor encourages me to apply training in the workplace by explaining specific goals. My principals and supervisors are actively involved in determining training topics and designing courses.					
Requiring climate	The ideas and improvements I have gained from applying what I have learned will be taken into account in evaluating my performance. The supervisor receives case feedback from the students after attending the courses. My supervisors and managers attend vital and important training courses related to my unit in person. The principal and supervisor motivate learners by expressing their expectations before learning.					

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Discussion

In a one-year study, this study was created and conducted to analyze the environment impacting learning transfer and give a solution to improve the efficiency of HSE courses at Tehran Oil Refining Company. As previously said, one of the elements affecting the transfer of learning in firms might be organizational factors, and one of its subdivisions is the support and lack of support from managers and supervisors. [9, 10] As a result, given the importance of this topic in this study, the primary goal was to investigate the environment that affects the transfer of learning, as well as the role of supervisors and managers in it.

The results of this study revealed that the analysis of four questions posed in the first group, i.e. the inhibiting environment, had a very favorable score, indicating that the climate affecting the transfer of learning by managers and heads of units in the Tehran Oil Refining Company is not a hindrance. The situation of the four questions in the second group, i.e. the discouraging environment, is also the same, indicating that the environment and climate controlling the Tehran Oil Refinery's functioning units is not discouraging or disappointing. Three of the four questions in the third group, i.e. the neutral setting, received a very desirable score, while one received a desirable score. This group has a very desirable score when it comes to estimating the scores of the questions. In regards to the last two groups' questions, namely the incentive environment and the binding environment, each question was assigned a desired score, and the total estimation of the scores of each group was deemed ideal. [10, 11]

Several studies have shown that insufficient, ineffective, and incorrect training can lead to carelessness, harmful actions, and a variety of effective human errors. Some studies have also indicated that educational interventions can increase risk detection and risk perception. [12] As a result, focusing on occupational safety and health education and enhancing training process indicators would improve understanding of existing dangers, promote safety, and minimize the frequency and severity of accidents. [13, 14] Based on the findings of the factor analysis, marker variables such as occupational safety and health training provided at the start of employment, periodic and on-the-job safety training, and post-accident safety training for workers were employed in this study. Learning from mistakes, errors, and job-related safety and health concerns, familiarity training and how to use a variety of unique personal protection equipment, and alerting workers about environmental and work discipline and its role in The hidden factor of occupational safety and health training determined the reduction of occupational accidents and injuries, the quantity or duration of safety training provided, the content or quality of these trainings, as well as the final index or ranking of occupational safety and health training. [14, 15]

Although a number of studies have focused on workers' education, competence, and awareness, some researchers have taken a broader approach and stated in their studies that while general safety training has little effect on safety hazards and risks, job training and job discipline teach people to consciously deal with work risks and hazards. [7, 11, 14]

Another important aspect of minimizing accidents and occupational injuries is ensuring a safe culture and environment. Several authors have identified a lack of managerial commitment, communication, worker participation, attitudes, competencies, and supportive and supervisory environments as barriers to developing a positive safety climate and culture. As a result, throughout the occupational risk assessment process, aspects connected to safety climate should be investigated and evaluated, as well as encouraged and enhanced through various training programs. [16-18]

One of the evident and convincing reasons for occupational accidents is a lack of or inadequate training, which involves a variety of pertinent indicator variables. [19] A worker who has not obtained the appropriate training to conduct activities properly,

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either through occupational safety and health training classes or written instructions, will be unable to recognize and avoid the dangers related with his work. [20] To guarantee that a worker is adequately trained, several criteria must be considered: First and foremost, those in charge of training workers must be knowledgeable about the type of operation being conducted. How can a person judge if a worker has received adequate training for the task if he or she has no idea what material, equipment, or method is employed at the conclusion of the operation to acquire the result required? Second, the job unit or site administrator must be knowledgeable about the training needs for the process being performed, which necessitates familiarity with the texts and instructions provided by the organizations responsible for occupational safety and health. OSHA and other organizations, for example. [21] Third, responsible personnel should have access to the worker's training record in order to determine what formal training the worker has completed in the past (if any), and fourth, to guarantee that the worker's present status is done safely. His tasks included interviewing workers, conducting examinations, and supervising workers as they worked. [22]

The conclusions of this study are based on the involvement of 200 participants, which is a significant constraint. As a result, the authors propose studies with this goal that include a much larger sample size and are based on various objectives such as evaluating the effectiveness of general and specific job-related courses, as well as safety, health, and environmental considerations in various industries to assess the resulting environment. To increase the operationalization of these trainings, they should be developed and implemented.

Conclusion

The impact of the atmospheric index on learning transfer and a strategy to increase the effectiveness of HSE courses in the Tehran Oil Refining Company were deemed beneficial. The outcomes of this study revealed that supervisors on job units in this business provide a supportive environment that is perfectly aligned with encouraging learners to enroll in training courses. The analyses demonstrate that the effective climate prevailing on the job units of the described complex by the managers and supervisors of Tehran Oil Refining Company is a supporting climate, which is perfectly consistent with encouraging students to engage in classes and courses. Collecting information for this study was extremely tough and time consuming because to the Corona scenario and the present state of industry in the country. In addition, due to the heavy workload at the oil refinery under investigation, the time required to collect data surpassed the estimate made at the start of the project.

Conflict of interest

The authors have declared that there is no conflict of interest.

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Authors contribution

All authors contributed to the final version of the manuscript, equally.

References

1. Nwaeke LI, Obiekwe O. Impact of manpower training and development on organizational productivity and performance: A theoretical review. European Journal of Business and Management. 2017;9(4):154-9.
2. Bayram M. Factors affecting employee safety productivity: an empirical study in an OHSAS 18001-certified organization. International journal of occupational safety and ergonomics. 2020:1-14.
3. Leso V, Fontana L, Iavicoli I. The occupational health and safety dimension of Industry 4.0. La Medicina del lavoro. 2018;109(5):327.

[DOI: 10.18502/aoh.v5i4.7974]

4. Loosemore M, Malouf N. Safety training and positive safety attitude formation in the Australian construction industry. Safety science. 2019;113:233-43.
5. Sevinc N, Korkut B. Relationship of occupational health and safety training with health literacy among employees working in the various lines of business. Universa Medicina. 2020;39(3):171-7.
6. Nykänen M, Puro V, Tiikkaja M, Kannisto H, Lantto E, Simpura F, et al. Evaluation of the efficacy of a virtual reality-based safety training and human factors training method: study protocol for a randomised-controlled trial. Injury prevention. 2020;26(4): 360-9.
7. Freitas AC, Silva SA, Santos CM. Safety training transfer: The roles of coworkers, supervisors, safety professionals, and felt responsibility. Journal of occupational health psychology. 2019;24(1):92.
8. Nielsen K, Shepherd R, Vignoli M, Prieto LL. The integrated migrant worker safety training evaluation model: IMSTEM. Safety science. 2021;139:105246.
9. Arendt S, Alsaleh N, Suarez O, editors. Improving HSE Culture and Leadership-How KNPC is Pursuing HSE Excellence. SPE International Conference and Exhibition on Health, Safety, Security, Environment, and Social Responsibility. 2018.
10. Manu P, Gibb A, Drake C, Jones W, Bust P, Mahamadu A-M, et al. Skills-knowledge-attitude-training-experience (SKATE) in 'designing for occupational health of construction workers'. 2019.
11. Duryan M, Smyth H, Roberts A, Rowlinson S, Sherratt F. Knowledge transfer for occupational health and safety: cultivating health and safety learning culture in construction firms. Accident Analysis & Prevention. 2020;139:105496.
12. Gunderson DE, Gloeckner GW. Superintendent competencies and attributes required for success: A national study comparing construction professionals' opinions. International Journal of Construction Education and Research. 2011;7(4):294-311.
13. Ding L, Khan F, Ji J. Risk-based safety measure allocation to prevent and mitigate storage fire hazards. Process safety and environmental protection. 2020;135:282-93.
14. Hussain R, Pedro A, Lee DY, Pham HC, Park CS. Impact of safety training and interventions on training-transfer: Targeting migrant construction workers. International journal of occupational safety and ergonomics. 2018.
15. Li M, Zhai H, Zhang J, Meng X. Research on the relationship between safety leadership, safety attitude and safety citizenship behavior of railway employees. International journal of environmental research and public health. 2020;17(6):1864.
16. Oah S, Na R, Moon K. The influence of safety climate, safety leadership, workload, and accident experiences on risk perception: A study of Korean manufacturing workers. Safety and health at work. 2018;9(4):427-33.
17. Elmoujaddidi F, Bachir A. Perceived risk, safety climate and safety behavior on Moroccan construction sites. International journal of occupational safety and ergonomics. 2020;26(1):121-8.
18. Kim NK, Rahim NFA, Iranmanesh M, Foroughi B. The role of the safety climate in the successful implementation of safety management systems. Safety science. 2019;118:48-56.
19. Soltanzadeh A, Mohammadfam I, Moghimbeygi A, Ghiasvand R. Exploring causal factors on the severity rate of occupational accidents in construction worksites. International journal of civil engineering. 2017;15(7):959-65.
20. Soltanzadeh A, Mohammadfam I, Moghimbeigi A, Akbarzadeh M, Ghiasvand R. Key factors contributing to accident severity rate in construction industry in Iran: a regression modelling approach. Arhiv za higijenu rada i toksikologiju. 2016;67(1):47-53.
21. Michaud PA. Accident prevention and OSHA compliance. CRC Press; 2017.
22. Taylor EL. Safety benefits of mandatory OSHA 10 h training. Safety Science. 2015;77:66-71.

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