Current Science Research Bulletin
Volume 02 (03), March 2025, pp. 82-94
CrossRef DOI: 10.55677/csrb/01-V02I03Y2025
Available on: https://csrbjournal.org/index.php/csrb
e-ISSN: 3050-7103
p-ISSN: 3050-709X

Assessing Occupational Health and Safety Education and OHS Awareness Among Faculty of Architecture Students

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ABSTRACT: The construction industry is inherently high-risk, necessitating heightened safety awareness among architects, construction engineers, and other professionals. The role of safety and health coordinators has become crucial due to the specialization and frequent movement of workers among multiple contracting partners, posing significant safety challenges. Occupational health and safety (OHS) education aims to create safe workplace environments, reduce occupational diseases and accidents, inform employees of their rights, and implement necessary precautions. Despite legislative efforts to include OHS courses in higher education, it is vital to evaluate the effectiveness of these programs in fostering a robust safety culture. This study assesses the level of OHS education and student awareness at Çankaya University's Faculty of Architecture. A descriptive survey model was employed, with data collected via a Likert scale-based survey administered to 287 fourth-year students in the Departments of Architecture, Interior Architecture, and Urban and Regional Planning. The survey measured students' OHS awareness across various dimensions, including theoretical knowledge, practical skills, and attitudes towards workplace safety. The findings provide insights into the current state of OHS awareness among students and inform future educational strategies.

KEYWORDS: Çankaya University, Faculty of Architecture Students, Higher Education, OHS Awareness, OHS Courses.

Highlights

• This paper focuses on assessing OHS awareness of architecture students.
• Students believe OHS education should be highly prioritized and included at every level of education.
• Students support making OHS education a mandatory course in universities and advocate for the use of virtual reality technology for experiential learning to prevent work accidents.

1. INTRODUCTION

The construction industry is inherently high-risk, necessitating heightened awareness of safety management among those responsible for overseeing construction sites—architects, construction engineers, and other civil engineering professionals. The role of the safety and health coordinator has grown increasingly important as companies now often specialize in specific tasks. This specialization results in the frequent movement of workers between various contracting partners, posing significant safety challenges, particularly on large construction sites where up to 100 contracting partners may need to be managed [1-4]. Therefore, occupational health and safety (OHS) practices have become increasingly important.

The primary objectives of OHS education include creating safe workplace environments, reducing occupational diseases and accidents, informing employees about their fundamental rights, implementing necessary precautions against potential risks [5, 6], instilling OHS awareness, transforming it into a pervasive safety culture [7], addressing the shortage of experts in the field through vocational schools, undergraduate, graduate, and doctoral programs that offer specialized OHS training; and enhancing awareness and consciousness through mandatory or elective OHS courses across various programs [8-10]. Globally, OHS is recognized as an independent scientific discipline focused on understanding, preventing, and mitigating the causes and consequences of occupational illnesses and accidents [11]. It continuously evolves in response to advancements in production tools, techniques, and technologies, underscoring the need for ongoing adaptation and education [12]. Given that lack of education and awareness is a major factor in workplace accidents, it is imperative to examine this issue at an academic level [13].

Addressing the multifaceted problem of workplace accidents requires more than just regulatory oversight and enforcement; it demands a societal embrace of OHS awareness and culture [14]. Educational institutions play a crucial role in fostering this culture

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across all levels of education—from primary schools to universities [15]. Specifically, occupational safety training in schools is fundamental to developing a safety culture [16]. Professions such as mining engineering, architecture, and civil engineering, where high-risk work is prevalent, necessitate a strong awareness of OHS principles [17]. Recognizing this importance, an amendment to the Higher Education Law No. 2547 was enacted on April 23, 2015, mandating the inclusion of OHS courses in faculties that train potential safety experts [14]. This legislative change aims to cultivate a robust safety culture. However, it remains essential to investigate whether this awareness is being effectively instilled in universities and to what extent [18, 19].

This study aims to assess the level of OHS education provided in universities and measure students' awareness of OHS. This evaluation is crucial for understanding the effectiveness of OHS training and its impact on future workplace safety. The field study focuses on the Faculty of Architecture at Çankaya University, where an awareness survey was administered to fourth-year students in the Departments of Architecture, Interior Architecture, and Urban and Regional Planning. The results will shed light on students' current level of OHS awareness and guide the development of future educational strategies.

2. LITERATURE REVIEW ON OCCUPATIONAL HEALTH AND SAFETY (OHS) EDUCATION AND AWARENESS

According to the International Labour Organization's (ILO) latest estimates, approximately three million workers die each year due to occupational accidents and work-related diseases. Table 1. shows the datas from Eurostat [20], about occupational accidents in the world between 2014-2019. In addition, Table 2 indicates the occupational accident data in Türkiye [21]. These findings are documented in the literature as evidence of the high frequency of occupational accidents worldwide. Heinrich [2] asserted that a significant majority (88%) of occupational accidents stem from unsafe acts, with a smaller proportion attributed to unsafe conditions (10%) and unpredictable factors (2%). This emphasis on human behavior as a primary cause of accidents was further underscored by Salmine and Tallberg [5], who indicated that 91% of job losses result from behavioral factors. Lutness [7] similarly highlighted human error as the cause of over 95% of all reported incidents. These findings align with Abbasi et al. [1], who emphasize unsafe behavior as a primary contributor to accidents. Results of the study of Konijn et. Al. [22] showed that workers receiving OHS training reported higher awareness levels, with the strongest effect from active training. Combined active and passive training was most effective for empowerment. OHS awareness training improves worker awareness, especially with active methods. A research study conducted in Iraq found that approximately 50% of participants indicated a low level of OHS awareness [23]. Conversely, another study reported that 84% of respondents believed that healthcare workers had a high level of OHS awareness [24]. To prevent these workplace accidents, it is essential to first increase OHS awareness. The first step to achieving this is through actively providing OHS training in universities. Studies investigating OHS awareness among university students reveal varying levels of interest across disciplines. For instance, Yu-Huei et al. [9] found that natural sciences and engineering students in Taiwan exhibit higher levels of awareness regarding OHS issues compared to other disciplines. The study at Istanbul Aydin University aimed to assess changes in students' OHS knowledge and safety culture perception before and after a compulsory OHS course. Results from 281 valid questionnaires showed significant improvement in knowledge but no demographic-based differences in safety culture perception. The study recommends mandatory OHS education for all university students [25]. Another study at Universiti Teknologi Malaysia assessed factors influencing safety awareness among students and staff, finding high overall OSH consciousness with staff scoring higher than students [26].

Table 1. Occupational Accidents in the World [20]

Country/Year	2014	2015	2016	2017	2018	2019
European Union - 27	2.976.126	2.974.943	3.057.868	3.118.816	3.124.828	-
Belgium	65.587	63.863	70.674	70.895	72.059	-
Bulgaria	2.246	2.290	2.188	2.230	2.255	2.162
Czechia	42.306	42.629	45.282	45.009	44.241	42.321
Denmark	54.157	50.282	49.439	48.842	50.185	50.179
Germany	847.370	844.541	862.983	878.525	877.501	867.533
Estonia	6.288	6.296	6.354	6.279	6.230	6.180
Ireland	18.115	16.681	14.088	22.125	18.090	13.252

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Spain	387.439	413.750	432.052	453.437	465.227	489.643
France	724.662	731.120	749.670	753.156	771.837	778.820
Croatia	11.669	13.145	13.263	14.164	12.047	10.373
Italy	313.312	295.162	295.967	294.161	291.503	289.283
Latvia	1.725	1.709	1.810	1.895	2.168	2.245
Lithuania	3.120	3.287	3.541	3.977	3.834	4.666
Luxembourg	7.183	7.359	7.152	6.684	7.315	7.270
Hungary	19.491	20.846	27.434	25.470	23.510	23.802
Netherlands	87.964	72.829	81.165	93.305	91.179	92.838
Austria	65.418	61.227	62.902	63.993	63.229	60.909
Poland	76.274	81.880	84.037	84.388	77.949	81.302
Portugal	130.153	134.378	135.033	135.488	130.434	131.717
Romania	3.396	3.913	4.188	4.491	4.623	4.709
Slovenia	12.314	12.448	12.162	13.288	13.126	13.065
Slovakia	8.552	9.247	9.814	10.091	10.145	9.666
Finland	44.434	41.825	41.106	42.025	41.038	-
Sweden	35.296	36.362	37.858	36.761	36.457	40.684
Norway	10.108	10.785	10.150	10.004	10.525	9.943
Switzerland	87.338	85.450	85.600	88.047	91.104	-
United Kingdom	244.948	237.008	227.165	225.658	220.985	-

Table 2. Occupational Accident Data in Türkiye [21]

Year	Male	Female	Total
2013	170,644	20,745	191,389
2014	193,192	28,174	221,366
2015	206,922	34,625	241,547
2016	241,115	44,953	286,068
2017	300,770	58,883	359,653
2018	354,308	76,677	430,985
2019	337,108	85,355	422,463
2020	314,897	69,365	384,262

Integrating OHS into educational frameworks is pivotal for cultivating a safety-conscious culture from an early age. The European Agency for Safety and Health at Work advocates for lifelong learning in safety and health, stressing the integration of these principles across educational settings. This includes fostering safety knowledge, attitudes, and behaviors among students and staff. In higher education, the integration of OHS remains a challenge despite its critical importance across professions such as engineering, architecture, and business management. While some universities have successfully incorporated OHS into their curricula, the approach remains inconsistent [27-30]. Research from Potsdam University demonstrated that students exposed to OHS lectures or practical experience exhibited better safety knowledge, highlighting the effectiveness of targeted educational interventions [12, 31].

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Overall, mainstreaming OHS education involves addressing key questions regarding its integration, educational methods used, disciplinary inclusion, encountered obstacles, and successful factors. Efforts are crucial in enhancing OHS awareness and competence among future professionals, ensuring safer work environments across industries, particularly in high-risk sectors like construction [32]. For this reason legislation and policy play a crucial role in shaping OHS practices. The introduction of the "Occupational Health and Safety Law" in 2012 in Türkiye, expanded responsibilities for OHS services to include job security technicians and occupational safety specialists [33]. Additionally, making OHS courses mandatory in universities through Turkey's Higher Education Law has been an important step in increasing awareness [34]. The aim of this study is to assess the extent to which occupational health and safety (OHS) education is provided in universities following regulations implemented since 2015 and measure students' awareness of OHS. Additionally, the study will investigate whether students' gender, age, class level, and GPA influence their awareness of OHS. To achieve these objectives, a field study was conducted in the architecture faculty, which graduates students who will work in highly hazardous occupations.

3. MATERIALS AND METHOD OF THE STUDY

In this study, a survey on occupational health and safety awareness levels was conducted among 287 students of the Faculty of Architecture at Çankaya University. The study included 287 students from the Faculty of Architecture at Çankaya University. This study employed a descriptive survey model, which aims to describe an existing situation without intervention [35]. Participants completed a survey designed on a 5-point Likert scale. The survey included 4 demographic questions and 20 items aimed at measuring occupational health and safety (OHS) awareness. Surveys are systematic data collection tools designed to address predetermined research problems and sub-problems [36].

Data were analyzed using SPSS (Statistical Package for the Social Sciences) 20 software. Descriptive statistical methods (frequency, percentage, mean, standard deviation) were employed to summarize the demographic characteristics of participants and their responses to the survey questions. Inferential statistics, such as correlation analysis, were employed to examine relationships between variables related to OHS awareness. Parametric or non-parametric tests were chosen based on normality analysis. Findings were evaluated at a 95% confidence level and a significance level of 5%. The study model examined the impact of students' demographic characteristics—gender, age, academic year, and GPA—on their perceptions of OHS awareness.

Based on the established model, the hypotheses of the study are as follows:

- H1: There are differences in occupational health and safety awareness perceptions based on students' gender.
- H2: There are differences in occupational health and safety awareness perceptions based on students' age.
- H3: There are differences in occupational health and safety awareness perceptions based on students' academic year.
- H4: There are differences in occupational health and safety awareness perceptions based on students' GPA.

Additionally, the study obtained ethical approval from Çankaya University Ethics Committee. Participation in the survey was voluntary, and informed consent was obtained from all participants. Confidentiality of responses was strictly maintained throughout the study [8].

4. THE RESEARCH FINDINGS AND DISCUSSION

A survey study was conducted on the occupational health and safety awareness levels of a total of 287 students from the Faculty of Architecture at Çankaya University. This study aimed to measure the students' awareness of occupational health and safety and to determine whether gender, age, academic year, and grade point average of the students cause any differences in their awareness of occupational health and safety. The data obtained were analyzed using the SPSS software package. The findings are discussed in this section (Table 3). Among the participants, 64.5% (185 individuals) are female, and 35.5% (102 individuals) are male. The age distribution of the participants is as follows: 1.4% (4 individuals) are between 18-20 years old, 64.8% (186 individuals) are between 21-23 years old, 29.6% (85 individuals) are between 24-26 years old, and 4.2% (12 individuals) are 27 years old or older. In terms of academic year, 1.7% (5 individuals) are first-year students, 3.1% (9 individuals) are second-year students, 5.6% (16 individuals) are third-year students, and 89.5% (257 individuals) are fourth-year students. Regarding grade point averages (GPA), 9.4% (27 individuals) have a GPA of 2.00 or below, 34.8% (100 individuals) have a GPA between 2.01-2.50, 33.4% (96 individuals) have a GPA between 2.51-3.00, 17.8% (51 individuals) have a GPA between 3.01-3.50, and 4.5% (13 individuals) have a GPA of 3.51 or above [8].

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Table 3. Findings Regarding Demographic Information [8]

Gender, Age, Class, Grade Average		N	%
Gender	Female	185	%64,5
	Male	102	%35,5
Total		**287**	**%100**
Age	18-20	4	%1,4
	21-23	186	%64,8
	24-26	85	%29,6
	27 and over	12	%4,2
Total		**287**	**%100**
Class	1. Class	5	%1,7
	2. Class	9	%3,1
	3. Class	16	%5,6
	4. Class	257	%89,5
Total		**287**	**%100**
Grade Average	2.00 and below	27	%9,4
	2.01-2.50	100	%34,8
	2.51-3.00	96	%33,4
	3.01-3.50	51	%17,8
	3.51 and over	13	%4,5
Toplam		**287**	**%100**

Distribution of Participants' Responses (Table 4) showed that among the students who participated in the study, the highest percentage, 56.8%, believe that occupational health and safety education should be included at every level of education to establish a culture of occupational health and safety in our country. The second highest percentage, 51.9%, believe that the occupational health and safety education they have received/will receive at school will benefit them in their working life. The third highest percentage, 51.2%, believe that occupational health and safety education should be a mandatory course in universities and that experiential learning with virtual reality technology should become widespread in our country to prevent workplace accidents. Additionally, among the participants, the highest percentage, 30.7%, believe that they know the meanings of occupational health and safety signs (warning signs). The second highest percentage, 27.5%, believe that they are aware of the physical, chemical, psychosocial, and biological risk factors they may encounter in the working life and the methods of protection against them. The third highest percentage, 27.2%, believe that the education and professional knowledge of occupational health and safety experts in our country are sufficient [8].

Table 4. Distribution of Participants' Responses [8]

Questions	1	2	3	4	5	Avarage
5- I am aware of the legal regulations brought by the Occupational Health and Safety Law No. 6331.	%21,6 (n62)	%18,1 (n52)	%24,4 (n70)	%23 (n66)	%12,9 (n37)	2,87
6- I believe that occupational health and safety education should be included at every level of education to establish a culture of occupational health and safety in our country.	%20,6 (n59)	%5,9 (n17)	%5,6 (n16)	%11,1 (n32)	%56,8 (n163)	3,78
7- I believe that occupational health and safety education should be a mandatory course in universities.	%18,1 (n52)	%6,6 (n19)	%10,5 (n30)	%13,6 (n39)	%51,2 (n147)	3,73
8- I believe that experiential learning with virtual reality technology should become widespread in our country to prevent workplace accidents.	%19,9 (n57)	%7,7 (n22)	%7,0 (n20)	%14,3 (n41)	%51,2 (n147)	3,69

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9- I believe that professional chambers give sufficient importance to occupational health and safety training to raise awareness among their members and increase public awareness.	%10,8 (n31)	%19,2 (n55)	%37,6 (n108)	%16,0 (n46)	%16,4 (n47)	3,08
10- I believe that sufficient importance is given to occupational health and safety training in our country.	%16,4 (n47)	%22,6 (n65)	%35,9 (n103)	%15,0 (n43)	%10,1 (n29)	2,80
11- I believe that sufficient occupational health and safety training is provided to raise awareness among employees in our country.	%16,7 (n48)	%23,7 (n68)	%34,5 (n99)	%17,1 (n49)	%8,0 (n23)	2,76
12- I know the meanings of occupational health and safety signs (warning signs).	%11,5 (n33)	%18,1 (n52)	%20,6 (n59)	%30,7 (n88)	%19,2 (n55)	3,28
13- I believe that I should receive fire and first aid training during my school education.	%15,7 (n45)	%9,4 (n27)	%10,1 (n29)	%18,5 (n53)	%46,3 (n133)	3,70
14- I know my legal rights and responsibilities arising from the Occupational Health and Safety Law regarding workplace accidents that I may encounter when I start working.	%15,3 (n44)	%18,8 (n54)	%24,4 (n70)	%26,5 (n76)	%15,0 (n43)	3,07
15- I am aware of the physical, chemical, psychosocial, and biological risk factors I may encounter in the working life and the methods of protection against them.	%13,6 (n39)	%18,5 (n53)	%27,5 (n79)	%27,5 (n79)	%12,9 (n37)	3,08
16- I know how to use the personal protective equipment required for my profession.	%13,6 (n39)	%16,0 (n46)	%20,9 (n60)	%24,7 (n71)	%24,7 (n71)	3,31
17- I believe that the occupational health and safety training I have received/will receive at school will benefit me in my working life.	%15,7 (n45)	%9,1 (n26)	%6,3 (n18)	%17,1 (n49)	%51,9 (n149)	3,80
18- I believe that the education and professional knowledge of occupational health and safety experts in our country are sufficient.	%8,7 (n25)	%15,7 (n45)	%37,3 (n107)	%27,2 (n78)	%11,1 (n32)	3,16
19- I believe that there are sufficient trained academics and scientific publications in the field of occupational health and safety in our country.	%8,7 (n25)	%18,1 (n52)	%43,2 (n124)	%20,9 (n60)	%9,1 (n26)	3,03
20- I believe that I may experience a workplace accident in my working life.	%8,7 (n25)	%13,2 (n38)	%30,3 (n87)	%26,1 (n75)	%21,6 (n62)	3,39
21- I believe that the media and publishing organizations in our country give sufficient importance to occupational health and safety.	%23,7 (n68)	%17,1 (n49)	%34,5 (n99)	%14,3 (n41)	%10,5 (n30)	2,71
22- I believe that workplace accidents in our country cause great damage to the national economy in addition to the loss of lives.	%16,0 (n46)	%8,7 (n25)	%17,1 (n49)	%24,7 (n71)	%33,4 (n96)	3,51
23- I believe that employers in our country give sufficient importance to occupational health and safety training and preventive measures.	%19,2 (n55)	%22,0 (n63)	%36,2 (n104)	%13,9 (n40)	%8,7 (n25)	2,71
24- I believe that I should receive training in risk analysis and emergency action plan implementation during my education.	%14,6 (n42)	%8,0 (n23)	%12,5 (n36)	%20,6 (n59)	%44,3 (n127)	3,72

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However, in addition to these, the highest percentage, 43.2%, are undecided about whether there are sufficient trained academics and scientific publications in the field of occupational health and safety in our country. The second highest percentage, 37.6%, are undecided about whether professional chambers give sufficient importance to occupational health and safety training to raise awareness among their members and increase public awareness. The third highest percentage, 37.3%, are undecided about whether the education and professional knowledge of occupational health and safety experts in our country are sufficient. The highest percentage, 41.2%, believe that employers in our country do not give sufficient importance to occupational health and safety training and preventive measures. The second highest percentage, 40.8%, believe that the media and publishing organizations in our country do not give sufficient importance to occupational health and safety. Finally, the third highest percentage, 40.4%, believe that sufficient occupational health and safety training is not provided to raise awareness among employees in our country.

Factor Analysis: As a result of the KMO (Kaiser-Meyer-Olkin) test applied to the scale, the sample adequacy value was found to be .929, indicating that the sample size is sufficient for factor analysis (Table 5). The total explained variance of the Occupational Health and Safety (OHS) awareness scale is 71.64%. The factor analysis conducted as a result of the survey aimed at measuring OHS awareness revealed that the OHS awareness scale has a three-dimensional structure [8]. The factors are named as follows: Factor I: Educational Awareness, Factor II: Cognitive Awareness, and Factor III: Informational Awareness (Table 5).

Reliability Analysis: According to Cronbach's alpha values as expressed (Yıldız and Uzunsakal, 2018: 19);

- $0 < R2 < 0.40$ is not reliable,
- $0.40 < R2 < 0.60$ is unreliable,
- $0.60 < R2 < 0.80$ is quite reliable,
- $0.80 < R2 < 1.00$ is highly reliable.

According to the analysis of reliability; Cronbach's Alpha values are between 0,853 ile 0,954. Accordingly, the scale and its sub-dimensions are highly reliable (Table 6).

Normality Analysis: The occupational health and safety awareness levels of the students participating in the study are positively oriented at 65.2%. This indicates that the OHS awareness levels of the students are moderate, not high. The highest average belongs to educational awareness. Informational awareness ranks second. Cognitive awareness ranks third. The educational awareness levels of the students participating in the study are positively oriented at 73.4%. Most of the students believe that a lot of importance should be given to OHS education. The informational awareness levels are at 62.4%. The students think they have a moderate level of OHS knowledge. The cognitive awareness levels are at 57.8%. The students think that their awareness of OHS is at a moderate level (Kalıntaş, 2022). More effort is needed to raise awareness about OHS [8]. The skewness and kurtosis values of the scale and its sub-dimensions are observed to be between -0.875 and -0.974 (Table 7).

Table 5. Factor Analysis [8]

Occupational Health and Safety Awareness Scale	**Faktör Yükü**
Educational Awareness	
6- I believe that occupational health and safety education should be included at every level of education to establish a culture of occupational health and safety in our country.	,905
7- I believe that occupational health and safety education should be a mandatory course in universities.	,892
8- I believe that experiential learning with virtual reality technology should become widespread in our country to prevent workplace accidents.	,883
13-I believe that I should receive fire and first aid training during my school education.	,860
17- I believe that the occupational health and safety training I have received/will receive at school will benefit me in my working life.	,920
20- I believe that I may experience a workplace accident in my working life.	,576
22- I believe that workplace accidents in our country cause great damage to the national economy in addition to the loss of lives.	,790
24- I believe that I should receive training in risk analysis and emergency action plan implementation during my education.	,863
Cognitive Awareness	
9- I believe that professional chambers give sufficient importance to occupational health and safety training to raise awareness among their members and increase public awareness.	,561
10- I believe that sufficient importance is given to occupational health and safety training in our country.	,769

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11- I believe that sufficient occupational health and safety training is provided to raise awareness among employees in our country.	,824
18- I believe that the education and professional knowledge of occupational health and safety experts in our country are sufficient.	,582
19- I believe that there are sufficient trained academics and scientific publications in the field of occupational health and safety in our country.	,721
21- I believe that the media and publishing organizations in our country give sufficient importance to occupational health and safety.	,826
23- I believe that employers in our country give sufficient importance to occupational health and safety training and preventive measures.	,760
Informational Awareness	
5- I am aware of the legal regulations brought by the Occupational Health and Safety Law No. 6331.	,818
12- I know the meanings of occupational health and safety signs (warning signs).	,766
14- I know my legal rights and responsibilities arising from the Occupational Health and Safety Law regarding workplace accidents that I may encounter when I start working.	,839
15- I am aware of the physical, chemical, psychosocial, and biological risk factors I may encounter in the working life and the methods of protection against them.	,873
16- I know how to use the personal protective equipment required for my profession.	,751
Assessment Details	KMO: ,929 Approx. Chi-Square: : 4883,566 Df: 190 Barlett's Test of Sphericity: ,000 Rotation Method: Varimax Total Explained Variance: 71,645

Table 6. Reliability Analysis Results [8]

Scale	Number of Statements	Cronbach's Alpha
Educational Awareness	8	,954
Cognitive Awareness	7	,853
Informational Awareness	5	,914
Occupational Health and Safety Awareness Scale	20	,905

Table 7. Normality Analysis [8]

Scale	N	Min.	Max.	Mean	Standart daviation (SD)	Skewness	Kurtosis
Educational Awareness	287	1,00	5,00	3,67	1,30	-,875	-,765
Cognitive Awareness	287	1,00	5,00	2,89	,84	,160	-,136
Informational Awareness	287	1,00	5,00	3,12	1,12	-,125	-,974
Occupational Health and Safety Awareness Scale	287	1,00	5,00	3,26	,80	-,384	-,136

According to Tabachnick and Fidell (2013), skewness and kurtosis values within the range of -1.5 to +1.5 are considered to indicate normal distribution. Therefore, parametric tests such as t-tests and ANOVA will be used in the analyses.

Difference Analyses: According to the results of the t-test conducted to understand whether there is a significant difference in occupational health and safety awareness based on university students' genders, no significant difference was observed in occupational health and safety awareness based on students' genders (Table 8). According to the results of the ANOVA analysis conducted to understand whether occupational health and safety awareness differs based on the ages, classes, and grade point

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averages of university students, no significant difference was observed in occupational health and safety awareness based on their ages, classes, and grade point averages [8]. (Table 9 and Table 10).

The majority of the participants in this study are female, constituting 64.5% of the sample. Participants aged between 21-23 make up 64.8% of the sample. Furthermore, 89.5% of the participants are in their 4th year of study, and 68.2% have a GPA between 2.01-3.00. There is no significant difference in occupational health and safety (OHS) awareness based on the students' gender, age, grade level, or GPA. The OHS awareness levels of the participating students are positively rated at 65.2%, indicating that their OHS awareness levels are moderate rather than high. [8]. The highest average awareness is in the educational aspect, followed by informational awareness, and then cognitive awareness.

The educational awareness level among the students is positively rated at 73.4%. Most students believe that OHS education should be highly prioritized. Their informational awareness level is at 62.4%, with students considering their OHS knowledge to be moderate. The cognitive awareness level is at 57.8%, indicating that students believe their OHS awareness is moderate. More effort is needed to foster awareness regarding OHS.

Table 8. Gender and Age and OHS Awereness [8]

	Scale	Gender	N	Mean	SD	t	p
Gender and OHS Awereness	Educational Awareness	Female	185	3,6872	1,34857	,379	,705
		Male	102	3,6262	1,22013		
	Cognitive Awareness	Female	185	2,8556	,87798	-1,019	,309
		Male	102	2,9622	,79143		
	Informational Awareness	Female	185	3,0908	1,17083	-,632	,528
		Male	102	3,1784	1,03174		
	Occupational Health and Safety Awareness	Female	185	3,2470	,83430	-,353	,724
		Male	102	3,2819	,73508		

	Factors	Source of Variance	Sum of Square	df	Mean Square	F	P	Significant Difference
Age and OHS Awareness	Educational Awareness	Between Groups	11,107	3	3,702	2,210	,087	-
		Within Groups	474,125	283	1,675			
		Total	485,232	286				
	Cognitive Awareness	Between Groups	,215	3	,072	,099	,961	-
		Within Groups	205,630	283	,727			
		Total	205,846	286				
	Informational Awareness	Between Groups	7,781	3	2,594	2,083	,103	-
		Within Groups	352,470	283	1,245			
		Total	360,252	286				
	Occupational Health and Safety Awareness	Between Groups	2,381	3	,794	1,245	,294	-
		Within Groups	180,348	283	,637			
		Total	182,730	286				

The participating students believe that to establish a culture of OHS in our country, OHS education should be included at every level of education. They also think that the OHS education they receive at school will benefit them in their professional lives. They strongly believe that OHS education should be a mandatory course in universities and that experiential learning with virtual reality technology should become widespread in our country to prevent work accidents. The students believe that they understand the meanings of OHS signs (warning signs), the physical, chemical, psychosocial, and biological risk factors they might encounter in the workplace, and the methods of protection against these risks. They think that the education and professional knowledge of OHS experts in our country are sufficient.

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Table 9. Class and Grade Point Average and OHS Awareness [8]

Class and OHS Awareness	Factors	Source of Variance	Sum of Square	df	Mean Square	F	P	Significant Difference
	Educational Awareness	Between Groups	5,021	3	1,674	,986	,400	-
		Within Groups	480,212	283	1,697			
		Total	485,232	286				
	Cognitive Awareness	Between Groups	,061	3	,020	,028	,994	-
		Within Groups	205,784	283	,727			
		Total	205,846	286				
	Informational Awareness	Between Groups	1,272	3	,424	,334	,801	-
		Within Groups	358,979	283	1,268			
		Total	360,252	286				
	Occupational Health and Safety Awareness	Between Groups	1,411	3	,470	,734	,532	-
		Within Groups	181,318	283	,641			
		Total	182,730	286				
Grade Point Average and OHS Awareness	**Factors**	**Source of Variance**	**Sum of Square**	**df**	**Mean Square**	**F**	**P**	**Significant Difference**
	Educational Awareness	Between Groups	4,988	4	1,247	,732	,571	-
		Within Groups	480,244	282	1,703			
		Total	485,232	286				
	Cognitive Awareness	Between Groups	5,694	4	1,423	2,006	,094	-
		Within Groups	200,152	282	,710			
		Total	205,846	286				
	Informational Awareness	Between Groups	3,984	4	,996	,788	,534	-
		Within Groups	356,268	282	1,263			
		Total	360,252	286				
	Occupational Health and Safety Awareness	Between Groups	1,878	4	,470	,732	,571	-
		Within Groups	180,852	282	,641			
		Total	182,730	286				

Tablo 10 Test Edilen Hipotez Sonuçları [8]

Hypotheses Tested	Results
H1: There are differences in occupational health and safety awareness perceptions based on students' gender.	Reject
H2: There are differences in occupational health and safety awareness perceptions based on students' age.	Reject
H3: There are differences in occupational health and safety awareness perceptions based on students' academic year.	Reject
H4: There are differences in occupational health and safety awareness perceptions based on students' GPA.	Reject

The students are undecided about whether there are enough trained academics in OHS who publish scientific works, whether professional chambers give sufficient importance to OHS education to raise awareness among their members and the community, and whether the education and professional knowledge of OHS experts in our country are adequate. The students do not believe that employers in our country give sufficient importance to OHS education and protective measures, that the media and broadcasting organizations give enough importance to OHS, or that adequate OHS education is provided to raise awareness among employees.

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5. RESULTS

Working life brings along various problems, one of which is unsafe and unhealthy working environments and conditions. If precautions are not taken in these conditions, occupational diseases or work accidents may occur. Measures and precautions taken in workplaces today to protect employees from illnesses and accidents are addressed within the scope of occupational health and safety (OHS). Lack of education, lack of knowledge, and carelessness are leading causes of occupational diseases and work accidents. Educational activities play a crucial role in preventing hazards and accidents. Every year, many workers lose their lives or become disabled due to occupational diseases and work accidents that could be easily prevented and are legally required to be prevented. Education is of great importance in creating a culture of occupational health and safety in Turkey and raising awareness about preventive and regulatory activities.

With the mandatory inclusion of occupational health and safety education in university curricula, it is aimed to contribute to the long-term development of OHS awareness and safety culture among students. The practical and theoretical education individuals receive during their educational life will increase their knowledge and practical skills about their working areas, help them foresee potential risks and hazards, and prevent many accidents and near-miss incidents from occurring.

Virtual reality is a technology that changes the perception of the real world through interactive 360° virtual (digital) environments created with computer technologies [37]. Recently, it has gained attention as a teaching tool in various fields. While making simulations more realistic in aviation, military, gaming, industry, health, sports, tourism, and education, the "virtual reality glasses" that have recently entered the market as consumer hardware have also significantly reduced application costs in these fields. Effective learning can be achieved through virtual experience, where individuals facing traumatic events for the first time can be prepared and encounter the situation in a planned manner, knowing that it can be terminated early if needed. The ability to present stimuli gradually, address each alternative situation consciously instead of the randomness of real events, and reinforce expected behaviors through repeated practice make virtual experience an effective learning tool. Therefore, virtual reality is an economical alternative to traditional educational tools, can shorten the training period, and ensure the long-term retention of knowledge and skills [38, 39].

More academics need to be trained in occupational health and safety, and scientific publications on these topics should be increased. Professional chambers should give more importance to OHS education for their members, and the quality of education and professional knowledge provided to OHS experts in our country should be improved to train competent experts.

Professional chambers are organizations established to meet the needs of their members, facilitate their professional work, protect the interests of the profession, and ensure communication and solidarity among colleagues. These organizations also have a significant role in creating a safety culture. In recent years, they have played an essential role in establishing the OHS culture in society by keeping the issue on the agenda through their publications and meetings. Activities jointly organized by professional chambers and universities with the active participation of students will yield more effective results. Furthermore, it is recommended that employers, the media, and press organizations focus more on occupational health and safety, and the OHS training provided to raise awareness among employees should be widespread and well-publicized.

In conclusion, although awareness of the importance of OHS education is growing, especially in architecture, engineering and technical disciplines, further efforts are needed to fully integrate it into university programs. Hands-on learning methods and real-world workplace experiences are crucial for fostering skills, attitudes, and behaviors, complementing theoretical knowledge.

CONFLICTS OF INTEREST

No conflict of interest was declared by the authors.

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