

ORIGINAL ARTICLE

Evaluating the Occupational Health and safety Engineering Internship Course from the Perspective of Trainees: At Developing and Validating A New Tool

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ABSTRACT

Introduction: The internship course is a very important part of each university course. The present study aimed at designing and validating a standard instrument for evaluating the internship course in the field of Occupational Health and Safety Engineering (OHSE) from the perspective of trainees. **Methods:** The dimensions and items of the tool were developed using the panel of experts, syllabus provided by the Iranian Ministry of Health and Medical Education, and literature reviews. Validity of the tool was assessed using face validity, Content Validity Ratio (CVR), Content Validity Index (CVI), and Impact Score (IS). Reliability was evaluated by test-retest reliability analyses and internal consistency (Cronbach's alpha coefficient). Finally, the internship courses were evaluated during three subsequent years (2016-2018) among 45 students of Shahroud University of Medical Sciences (SHMU) in Iran. **Results:** The final version of the tool contained five dimensions and 20 items. The CVI and CVR were 0.81 and 0.74, respectively. The ISs of all 20 items were above the minimum acceptable value (1.5). The Cronbach's alpha coefficient was 0.79 and test-retest Pearson's correlation coefficient was significant at 0.891 ($p < 0.001$). The overall mean score of evaluation was estimated to be 3.81, which was acceptable. However, poor mean scores were obtained in "access to equipment and laboratory instruments" and "familiarity with job opportunities and internship" dimensions. **Conclusions:** The results of this study led to a valid tool for evaluating the OHSE internship course. This standard tool can be used to evaluate the perspective of OHSE trainees about the training period and use the results to correct the weaknesses and reinforce the strengths of the training programs.

Keywords: Internship course, Psychometric properties, Evaluation tool, Occupational Health, Iranian students

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INTRODUCTION

As the largest and most important base of any society, higher education determines the fate of its people (1). Developing efficient and expert human resources is the main task of universities (2). In order to achieve this important goal, the educational system needs to be permanently investigated to identify its problems and obstacles (3). The goals and achievements have to be constantly assessed, as well. In this regard, students' skills and abilities have to be evaluated using standard methods (4).

Internship course is a training course that plays an

important role in achieving the goals of educational processes (5). Considering the significance and special status of this training period in the educational system, evaluation of this course aiming at identifying the strengths, weaknesses, and barriers to effective implementation of training programs should be the priority of training groups (6). This is due to the fact that evaluation is related to learning and can cause superficial or deep learning (7).

Similar to other courses, internship course needs to be evaluated from the perspective of students (8). This requires a standard and efficient instrument that can accurately measure the intended and expected goals (9). Using such a valid instrument, intervention programs can be evaluated more confidently to improve and promote the efficiency of the training period (10). Educational interventions require a precise assessment aimed at developing the educational system and removing the

weaknesses (11). On the other hand, students have the right to be involved in evaluation of their training courses (12). This will eventually empower them to identify strengths and weaknesses and ultimately enhance their individual skills (13). Review of the literature showed that no studies have been conducted on evaluation of the Occupational Health and Safety Engineering (OHSE) internship course from the perspective of trainees. This might be attributed to the lack of a standard and valid instrument for evaluating this course.

Considering the effect of proper evaluation of the training period from the perspective of trainees on assuring their scientific skills and expertise and using the results to implement purposeful interventions aimed at improving this course, the present study aims at developing and validating standard instruments for evaluating internship course in the field of OHSE from the perspective of trainees.

MATERIALS AND METHODS

Design and study population

The present study was conducted in the OHSE department of School of Public Health at Shahrood University of Medical Sciences (SHMU) in Iran during three internship courses in field training (2016-2018). It should be noted that the conditions, programs, and status of all internship courses were the same. Totally, 57 trainees (9 males and 48 females) were enrolled in these three courses. Among these trainees, 45 (4 males and 41 females) participated in the study. All student were informed about the objectives of the study and were required to sign written informed consent forms. The study was also approved by the Ethics Committee of SHMU (IR.SHMU.REC.1396.23).

Development of the initial questionnaire

The dimensions of the questionnaire were developed using the panel of experts, syllabus provided by the Iranian Ministry of Health and Medical Education regarding the internship course of the Bachelor's degree program in OHSE, and literature reviews. It should be noted that the students' own opinions were used to design and validate this tool. At the time of initial design, there were 25 questions. Accordingly, five dimensions were identified including the status of workshops and courses (3 items), scientific and practical ability of instructors / industry experts (4 items), access to equipment and laboratory instruments (4 items), improvement of individual skills, management, and internship (6 items), and overall status of the internship course (3 items). The items were scored via a 5-point Likert scale with the following options: very weak (1), weak (2), moderate (3), good (4), and very good (5). Due to the fact that the internship course is offered in two semesters, then the survey of students is done in two semesters according to the final questionnaire.

Methods used for assessing the validity and reliability of the questionnaire

Validity

Face and content validity were used to assess validity of the questionnaire used in this study. In order to determine the face validity of the questionnaire, it was reviewed by 12 experts and the ambiguities and deficiencies were resolved. Additionally, 14 participants were asked to comment on ambiguity and understandability of the items. The content validity was assessed based on Content Validity Ratio (CVR), Content Validity Index (CVI), and Impact Score (IS). Totally, 12 experts rated the 20 items of the questionnaire. To calculate CVI, they rated each item based on a 4-point Likert scale ranging from 1 (not relevant) to 4 (very relevant) (15). In order to calculate CVR, the experts rated each item on a 3-point scale (1 = essential, 2 = useful but not essential, and 3 = not essential) (16). After assessment of content validity by the experts and removing the items without appropriate index scores, 14 students were asked to comment on the importance of the remaining items to examine the IS (17). Accordingly, items with $IS \geq 1.5$ were retained.

Reliability

The Internal Consistency of the questionnaire was estimated using the coefficient alpha. For test-retest reliability, forty five student completed the questioner twice in 4 weeks. Pearson's correlation coefficient was used to assess the relationship between mean scores two time intervals.

Evaluating the internship course and statistical analysis

After collecting the required data, descriptive and analytical statistics were used for data analysis. Since the data followed normal distribution (Kolmogorov-Smirnov test), t-test was used to determine the relationship between the mean score of the trainees' internship course and their sociodemographic and educational variables, including gender, grade, place of the internship course, purposeful selection of internship courses, communication and counseling with instructors during the course (at least once a week), attending the briefing sessions, and having a clear schedule and its precise follow-up. The collected data were recorded in Microsoft Excel software and were analyzed using the IBM SPSS 23 (USA, SPSS Inc.). $P < 0.05$ was considered to be statistically significant.

RESULTS

The means of CVI and CVR were 0.81 and 0.77, respectively that indicated appropriate content validity from the experts' perspective. Indeed, ISs of all items were higher than 1.5. Additionally, the Cronbach's alpha coefficient of the questionnaire was 0.79, indicating appropriate reliability. Test-retest Pearson's correlation coefficient was also significant at 0.891 ($p < 0.001$).

Based on the results, 20% of the trainees had started their internship courses in medical centers and the rest in industries. Approximately 35% of them had started their internship courses in their hometowns and the rest in a city other than their place of residence. Indeed, 92% of the trainees participating in the project were present at the briefing sessions. The relationship between the trainees' internship course mean scores and their sociodemographic and educational variables have been presented in Table I.

The results demonstrated that 19 trainees (42.2%) scored question No. 6 (the amount of effort and follow-up of instructors in improving their practical skills) as 'very good'. However, none of the trainees scored 'very good' for question No. 9 (level of access to the required equipment and laboratory) as well as for question No. 17 (familiarity with job opportunities and internship related to the field of study). The highest frequency of the 'very poor' score was related to question No. 17 (Table II).

Table I: The relationship between the trainees' internship course mean scores and their sociodemographic and educational variables (n=45)

Variables	Groups	Mean score	Standard deviation	t	P-value
Gender	Male	3.68	0.35	-1.027	0.31
	Female	3.82	0.26		
Place of the internship course	Industries and workshops	3.8	0.27	0.158	0.875
	Health centers	3.82	0.24		
In the city of residence	Yes	3.94	0.18	0.081	0.356
	No	3.73	0.28		
Purposeful selection of internship courses	Yes	3.98	0.20	6.81	0.021
	No	3.59	0.16		
Communication and counseling with instructors during the course (at least once a week)	Yes	4	0.20	7.01	0.012
	No	3.61	0.17		
Attending briefing sessions	Yes	3.83	0.27	1.03	0.109
	No	3.60	0.19		
Top student (total grade = 17 and above)	Yes	4.01	0.19	3.27	0.032
	No	3.75	0.25		
Having a clear schedule and its precise follow-up (for doing training affairs)	Yes	3.96	0.23	5.12	< 0.001
	No	3.62	0.19		

Table II: Frequency distribution (relative) of the perspectives of OHSE students regarding the internship course (n=45)

Dimensions and questions	Very good	Good	Medium	Weak	Very weak
Workshops and courses					
1- Students' satisfaction with briefing sessions and workshops	16 (35.6)	20 (44.4)	9 (20)	0	0
2. The scientific status and efficiency of workshops held by the centers	10 (22.2)	21 (46.7)	14 (31.1)	0	0
3. Scientific status and efficiency of specialized workshops held by the group	11 (24.4)	24 (53.3)	5 (11.1)	5 (11.1)	0
Scientific and practical ability of instructors / industry experts					
4. Academic ability of the department instructors	16 (35.6)	24 (53.3)	4 (8.9)	1 (2.2)	0
5. The scientific ability of experts in centers and industries	10 (22.2)	19 (42.2)	16 (35.6)	0	0
6. The rate of effort and follow-up of instructors in enhancing practical skills	19 (42.2)	22 (48.9)	4 (8.9)	0	0
7- The continuous and effective presence of instructors at the training site	17 (37.8)	21 (46.7)	4 (8.9)	2 (4.4)	1 (2.2)
Educational facilities and access					
8. The quality of the existing equipment and apparatuses	5 (11.1)	29 (64.4)	10 (22.2)	1 (2.2)	0
9. Accessibility of necessary laboratory equipment	0	8 (17.8)	19 (42.2)	17 (37.8)	1 (2.2)
10. Access rate of instructors to answer questions in a variety of ways	16 (35.6)	12 (26.7)	17 (37.8)	0	0
11. The degree of cooperation of the occupational health / HSE centers and industries	2 (4.4)	25 (55.6)	18 (40)	0	0
Improving individual, managerial, and internship skills by passing the course					
12. Rate of individual talents and abilities	10 (22.2)	16 (35.6)	19 (42.2)	0	0
13. Rate of reinforcement in motivations and self-confidence	3 (6.7)	20 (44.4)	21 (46.7)	1 (2.2)	0
14. Rate of acquisition and strengthening of management skills	15 (33.3)	13 (28.9)	15 (33.3)	2 (4.4)	0
15. Rate of improvement of individual skills for establishing social and public relations	4 (8.9)	35 (77.8)	5 (11.1)	1 (2.2)	0
16. Rate of improvement of individual skills for group and team work	1 (2.2)	13 (28.9)	31 (68.9)	0	0
17. Rate of familiarity with job opportunities and internship related to the field of study	0	6 (13.3)	22 (48.9)	13 (28.9)	4 (8.9)
General plan of training program					
18. Duration of the course implementation	18 (40)	16 (35.6)	8 (17.8)	1 (2.2)	2 (4.4)
19. Accuracy and equity in final evaluation of trainees	6 (13.3)	15 (33.3)	18 (40)	5 (11.1)	1 (2.2)
20. Overall satisfaction with the course	5 (11.1)	27 (60)	9 (20)	4 (8.9)	0
Total	187 (20.78)	388 (43.11)	268 (29.78)	51 (5.67)	6 (0.067)

The highest mean score was related to the second dimension (scientific and practical ability of instructors/industry experts), while the lowest one was related to the fourth dimension (improvement of individual, managerial, and internship skills by passing the course) (Figure 1).

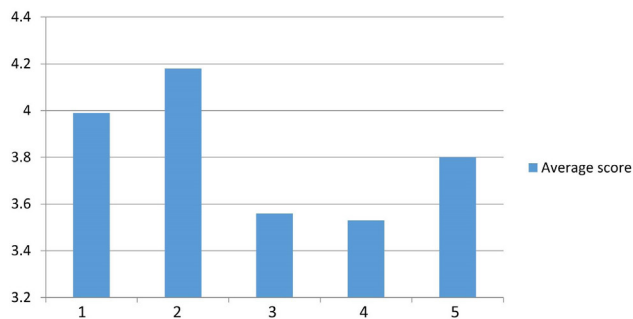


Figure 1: The mean scores of the dimensions of the apprenticeship assessment questionnaire from the trainees' viewpoints. 1-Worshop and courses, 2-Scientific and practical ability of instructors/industry experts, 3- Educational abilities and access, 4-imporving individual, maanagerial and internship skills by passing the course and 5-general plan of the raining program

DISCUSSION

The present study aimed at developing and validating a standard instrument for evaluating the training course in the field of OHSE from the perspective of trainees. In so doing, the mean score of OHSE trainees of a traineeship program in SHMU was computed as 3.81 (out of 5) during three subsequent years (2015-2018), which was an acceptable and appropriate value. Approximately 63% of the trainees rated the training period as 'very good' and 'good'. Indeed, more than 93% of the participants rated the training period as 'very good', 'good', or 'medium'. In other words, less than 7% of the trainees evaluated the training period as 'weak' and 'very weak', which seems to be quite favorable. These findings as well as the satisfaction of more than 70% of the trainees of the general traineeship program revealed the positive status of academic achievement. Different studies have confirmed the significant and direct relationship between learners' satisfaction with their academic progress and their academic achievement (18, 19).

In the only study conducted on the status of the OHSE training program at Shiraz University of Medical Sciences, the students' satisfaction rate reached 76% after interventional measures. It should be noted that those results were reported in general and no standard instruments were introduced (20). Various results have been reported in other studies performed in different universities of medical sciences. For instance, 61% of Medical Records students in Kashan reported a desirable performance for their training program (21). However, the occupational competencies of nursing students

were not desirable in a traineeship at Tabriz University of Medical Sciences (22). Undesirable results were also obtained regarding the effectiveness of the PhD course in the field of Health Services Management in Ahvaz Jondishapur University (23) as well as the level of satisfaction of trainees in the Faculty of Nursing and Midwifery in the study by Ahanchian et al. (24).

The scores of the questions pertaining to access to equipment and educational facilities indicated that this was one of the main demands of trainees that should be included in corrective programs. In the field of OHSE, measurement and evaluation of occupational harmful factors is a main pillar. Thus, trainees in this field need to work with instruments and equipment in the workplace, which must be considered both quantitatively and qualitatively. Seemingly, lack of laboratory facilities at the universities of the country is a basic public problem. In the study carried out by Jahangiri et al. (20), the lowest score was related to "sufficient laboratory facilities".

Continued presence of experienced instructors alongside trainees, their efforts and follow-up, and providing responses to questions can be effective in improvement of the graduates' academic status and skills as well as quick identification and resolution of deficiencies (25, 26). In the present study, the efforts and continuous presence of instructors were reported to be among the successful elements and trainees' demands in evaluation of the training period. Also, instructors accessibility and accountability were desirable from the perspective of the trainees, such a way that no 'weak' and 'very weak' scores were obtained for this element. However, some studies have reported that lack of access to instructors and their unaccountability led to dissatisfaction of the trainees (27).

In the current study, the lowest score was related to the fourth dimension of the questionnaire; i.e., "improving individual, managerial, and internship skills by passing the course". Training entrepreneurial human resources and occupational qualifications instead of merely knowledgeable and aware human resources is among the most important approaches of the modern educational system in the world (28). In fact, the modern educational systems in the field of higher education emphasize that graduates must understand the needs of the family as well as the community and learn how to link classroom learning to real-world experiences (27). In the evaluation instrument developed in this study, the field of development of occupational qualifications and internship was taken into consideration, because the main task of the educational system should be directing learners from memorizing the materials to creative problem solving and the main responsibility of the educational system in medical sciences must be training capable, critical, efficient, entrepreneur, and creative graduates in solving community health problems (29). Traineeship plays a crucial role in achieving occupational

abilities and personal and managerial skills (30).

The results of other studies performed in various fields indicated that training occupational, managerial, and entrepreneurial skills in universities were underestimated (24, 31). This dimension, which can be used as an element for linking the trainees from the academic environment to the occupational environment, focuses on their growth, managerial characteristics, and occupational training for employment, self-employment, and internship (32). In addition, OHSE trainees face some problems in learning, practicing individual and managerial skills, and familiarity with the required internship principles. Thus, appropriate interventions should be carried out not only in training programs but also in educational programs (pre-training). Various studies have also disclosed that special attention should be paid to training and practice of these skills because the educational quality can be promoted by investigating the proportionality of the educational programs with the managerial needs and occupational qualifications of the study field (33, 34).

In the current study, the trainees who had selected their training place purposefully and with prior consultation as well as those who had prepared a planned program at the beginning of the training program gained significantly higher mean scores in comparison to others. Therefore, it can be concluded that passing the training course and taking advantage of this important period were more effective for the students who had purposefully and consciously started this course and continued with a specific program in comparison to other trainees. Similar results were also obtained in other training studies conducted in other academic disciplines (32).

The trainees who were continually in touch with the instructors in their training field in order to solve academic-practical questions and ambiguities gave significantly higher scores to the traineeship period. This implies that consultation and continuous communication with a reliable source confirmed by academic institutions (instructors) increases confidence and strengthens the problem solving spirit in the trainees, eliminates the ambiguities with a proper process and does not postpone it to the end of the course, and minimizes the probability of individuals' reference to sources with an unknown scientific status (35, 36). In order to ensure the continuity of the trainees' visits, instructors are suggested to record the general status of visits and follow-ups for purposeful elimination of ambiguities and consider it as an important factor in the final evaluation of the trainees. They are also recommended to develop the Gantt's table by performing needs assessment and investigating the weaknesses of the training program.

In the present study, the mean score of evaluation of the training period was significantly higher by top trainees (GPA of 17 and above) compared to other trainees. This could be due to their higher interest in the field of study,

higher motivation for success, and continuous effort to complete the academic course (37, 38).

Regarding the fact that the trainees were mostly active at the beginning of the briefing period, there was no significant difference between this group of trainees and those who did not participate in the briefing session with respect to the mean score of the course. Nonetheless, scheduled holding of these meetings could familiarize trainees with the objectives of the course, how to conduct different sections, and how to evaluate them to use the course more efficiently. It could also provide mental readiness, increase trainees' satisfaction, and enhance course quality (39, 40).

This is a preliminary study, and the authors have faced various limitations. One of the most important limitations of the study was the low number of students (even with a three-year evaluation, 2016-2018).

CONCLUSION

The present study indicated that the designed and validated instrument including 20 questions in five dimensions could evaluate the perspective of OHSE trainees about the training period and use the results to correct the weaknesses and reinforce the strengths of the training program.

Regarding the significance of active participation in the field of OHSE, training programs should be promoted and managed such a way to update the laboratory equipment qualitatively and quantitatively, enhance individuals' motivation, maintain attractiveness, and create a learning position that can empower trainees to carry out managerial roles and entrepreneurial principles. In fact, this course provides the ground for the trainees to become familiar with the actual conditions of the workplace and to take steps in order to exploit their forgotten capacities to create employment.

Considering the entrepreneurial approach, educating graduates with business qualifications and familiarizing students with job creation processes are considered to be the country's economic-scientific requirements in the 2021 perspective. There is also a need for similar studies in other countries and interventions to improve the internship situation.

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