



The effect of apprenticeship on the knowledge and function of students of environmental health engineering

Mousavi SAR (PhD)^{1,2}, Mohammadi P (PhD)¹, Almasi A (PhD)¹, Pirsaeheb M (PhD)¹, Hoseini H (PhD)¹, Asadi F (MSc)¹, Khashij M (PhD)^{3,4}*

- 1. Department of environmental health engineering, Faculty of Public health, Kermanshah University of medical sciences.*
- 2. Research Center for Environmental Determinants of Health (RCEDH), Kermanshah University of Medical Sciences, Kermanshah, Iran.*
- 3. Environmental Health Engineering, Shahid Beheshti University of Medical Sciences, Tehran, Iran.*
- 4. Environmental Science and Technology Research Center, Department of Environmental Health Engineering, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.*

Received: 11 Nov 2017

Accepted: 11 Apr 2018

Abstract

Introduction: Creating optimized opportunities for experiential learning and practical training is an important factor that improves the quality of education. This study aims to identify and analyze the mechanism of improving apprenticeship course for the students of Environmental Health Engineering at School of public Health in Kermanshah.

Methods: This study is based on comparing the quality of education in apprenticeship courses by before – after study. The participants were the students who passed the apprenticeship course in the first semester of 2014 -2015 (32 students). The SPSS v.16 and the statistical T-test were used for statistical analysis.

Results: The average scores for men before apprenticeship was 2.02 ± 0.41 and after the apprenticeship was 2.82 ± 0.44 , and the average scores for women before and after the apprenticeship were respectively 1.9 ± 0.34 and 2.84 ± 0.37 , respectively. The level of training during the apprenticeship course influence on increasing knowledge in the students of environmental health engineering.

Conclusion: Analyzing the effective factors on improving the apprenticeship course influenced by the following factors: implementation method of effective roles of the educating units, playing an effective role in apprenticeship course, supplementary training activities during the serving time and playing an effective role be apprentices.

Keywords: Theoretical knowledge; Apprenticeship; Environmental Health Engineering

Introduction

One of the shortcomings of the educational systems is disregarding to the practical courses and lessons and also focusing too much on the theoretical courses and class instructions, which makes the trained graduates as the specialists and experts who don't have enough academic qualifications to enter the job due to lack of innovation and real life experience and they can't do innovative and creative works like an (1). Some issues like the lack of necessary facilities and conveniences for passing practical courses, not understanding the real nature of those courses by teachers, managers and students, the lack of proportionality among theoretic and practical courses, theoretical tendencies and excelling the class trainings to practical trainings and this kind of issues have led to experiential courses that provide opportunities for experiential learning not be considered properly (2-4). In such situations, it is necessary to focus on practical courses in the environmental health trainings. The apprenticeship course is an important practical course for the students of environmental health engineering and improving and organizing it play an important role in promoting the quality of education, teaching and learning. According to the studies of Pollard (2003), the apprenticeship course should last at least for 1 academic year. Apprentices must have a complete experience in teamwork with all of

the employees. Also liaison person is needed between the place of apprenticeship and the training centers to coordinate the apprenticeship. In order to increase the effectiveness of apprenticeship, it is necessary to combine the teamwork and individual activities (8). The surveys indicate that the apprenticeship courses are faced with a series of insufficiencies and difficulties. One of these difficulties is the poor communication of apprenticeship course with the curriculum. In fact this course is not taken seriously (9). It is necessary to pay more attention to it in terms of the number of courses, the duration of the course, standard monitoring and evaluating the course for apprenticeship, and also holding it must be in accordance with other components of curriculum, especially the specialized courses to have the necessary synergies with other courses and to improve the comprehension of the curriculum. If the apprentices cooperate actively in the planning and designing the course, so the apprenticeship course will achieve to the excellent educational objectives (10). According to the researches, the students who cooperate in their apprenticeship courses learn better and more than other students (11). The study of Lu et al (2002) examines the apprenticeship program of the food science students at the universities of Delaware and Maryland. They emphasized on some characteristics such as problem based

learning, teacher – students, student centered, considering the learning styles of the students, providing career counseling, and direct interaction with the experts and technicians in the industry. In this type of weekly reports, a final report and being in a final interview were used to evaluate the students using 6 aspects namely the ability to understand, implement, evaluate, and rethink and new understanding (12). But according to the evidence (5-7), some insufficiencies and shortcomings in this course have caused to decrease its original function and sometimes it will be a problematic course that the students don't have enough tendencies to pass it and subsequently the expected outcomes can't be achieved. The purpose of this study was to identify and analyze the mechanism of improving the apprenticeship course among the students of environmental wealth engineering in the Hygiene School of public Health at Medical Science University of Kermanshah.

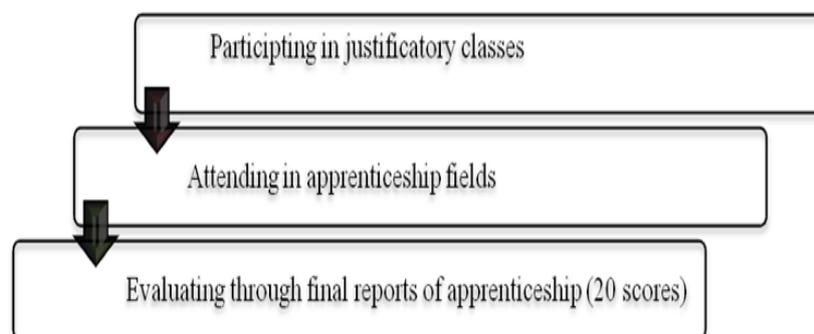
Methods

This study is before- after study. Two apprenticeship methods in the past and also in the present were compared. Now in order to pass the apprenticeship course, the pre-test and post-test plans are used. 50 multiple choice questions were used and they were about the environmental health knowledge in urban and rural areas health centers. The test includes 5 scores. In this study, the independent variable was content designing, and the dependent variable was increasing the ability of students. In academic year 2014- 2015 who participated in the study. The independent T-test and SPSS v.16 were used for statistical analysis.

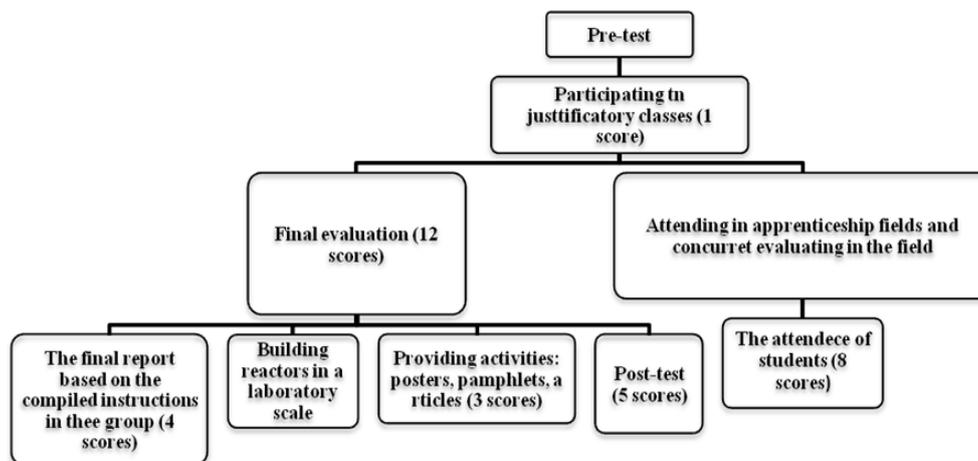
Results

The processes of apprenticeship in the past and in the present are respectively shown in flowchart 1 and 2.

Flowchart 1: The process of apprenticeship in the past



Flowchart 2: The process of apprenticeship in the present



2014 – 2015 introductions year in the study 84.4% participated 5 males and 27 females (gram 1). The average score for men before and after the apprenticeship were 2.02 and 2.82 and the average score for women before and after the apprenticeship were 1.9 and 2.84 respectively (gram 2). Assuming to the normality of the data, the Pearson correlation coefficient was used to measure the relationship between the scores before and after the apprenticeship. The value of coefficient was X^2

= 0.172. According to the Pearson correlation coefficient (P=0.365), it was accepted that the scores before and after the apprenticeship were independent. Thus the independent T-test was used to compare the scores before and after the apprenticeship. The level of knowledge during the apprenticeship course influenced on increasing the knowledge of Environmental Health Engineering students (P<0.001) (table 1).

Figure 1: The increment of knowledge on the basis of gender

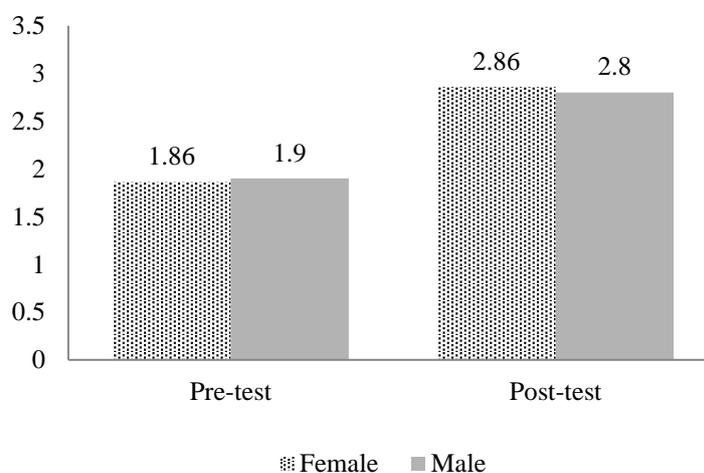


Table 1: Descriptive statistics for apprenticeship test

T-test	gender	average	standard deviation	Minimum	Maximum	Sig
Before passing apprenticeship course	Women	1.90	0.34	1.0	2.5	0.01
	Men	2.02	0.41	1.7	2.7	0.05
After passing apprenticeship course	Women	2.84	0.37	2.1	3.7	0003
	Men	2.82	0.44	2.2	3.2	0.001

Discussion

Access to results and expected outcomes of the apprenticeship course needs to hold appropriate apprenticeship course and also to provide the related requirements. In this study, the pre-test and post-test were used to improve the apprenticeship course and also to achieve the expected learning objectives. Also the students were encouraged to do practical activities, such as making posters, pamphlets and writing papers and articles according to the scientific knowledge that they learned in apprenticeship course. The significant difference between pre-test and post-test according to their impact and importance shows that students pay attention to the apprenticeship courses. We extracted five factors by analyzing the effective factors on improving the apprenticeship course. In fact these factors are the constitutive elements for the apprenticeship course and also for playing effective roles and expected tasks by the different parties that are involved in holding this course. Achieving logically to the expected outcomes and results of the apprenticeship course depend on the quality of each element and also their synergies.

These five factors include: a) how to hold an apprenticeship course: the discipline in planning, implementing and evaluating, providing opportunities for the students to pass the apprenticeship courses in groups, practical orientation of apprenticeship course instead of focusing on the routine office works, the relation and coordination of apprenticeship course activities with other practical and theoretical courses and learned theories, the possibility of job rotation for apprentice's activities in order to gain practical experiences in various area, delegate responsibilities with complete latitude, and granting creativity to the apprentices during the apprenticeship course for more innovation. b) Playing an effective role by educational unit: holding justificatory meetings for the students by the Department (educational group) about the importance, the process, the objectives of apprenticeship, justifying the headman and officials of the apprenticeship unit about the educational objectives and the conditions of learning apprenticeship course, direct and regular monitoring and visiting the place of apprenticeship for the students by the professor

between the performed activities during the course with the academic knowledge, increasing the scope of the major of study and improving the communicational-social skills and also linking the theoretical and practical skills. These factors have been discussed in this study (13). These findings are partly consistent with the findings of the Pollard's (2003) studies (8). Some researchers like Mac Kerio (1998), Feldman (1990), Baagh (2003) have mentioned some effective factors on apprenticeship course, like the spent time by the apprentice during the course, the level of guidance and supervision during the apprenticeship course, the type of activities, corresponding the activities with the apprentices needs (15-17).

Conclusion

Some effective factors on apprenticeship courses are important such as the appropriateness of the apprenticeship place with the major of study and the relation between the performed activities during the course and the academic knowledge. Increasing the scope of the major of study and improving the communication and social skills, linking the theoretical and practical skills and helpful strategies to improve the quality of education.

CONFLICT OF INTEREST

No conflict of interest

AUTHORS' CONTRIBUTIONS

All authors were participated in all stages of the research.

References

1. Guilbert JJ. *Educational handbook for health personnel*. WHO Offset Publication? 1987; 35:348
2. Newble DI, Jaeger K. *The effect of assessment and examinations on the learning of medical students*. Medical Education. 1983; 17(3):165-171.
3. Grauer GF, Forrester SD, Shuman C, Sanderson MW. *Comparison of student performance after lecture-based and problem-based teaching in a case-based/large group*. Journal of Veterinary Medical Education. 2011; 35 (2):310-317.
4. Smith-Strøm H, Nortvedt MW. *Evaluation of evidence-based methods used to teach nursing students to critically appraise evidence*. Journal of Nursing Education. 2008; 47 (8): 372-375.
5. Yoshida M, Tanaka M, Mizuno K, Ishii A, Nozaki K, Urakawa A, et al. *Factors influencing the academic motivation of individual college students*. International Journal of Neuroscience. 2008; 118 (10): 1400-1411.

6. Franko DL, Cousineau TM, Trant M, Green TC, Rancourt D, Thompson D, et al. *Motivation, self-efficacy, physical activity and nutrition in college students: Randomized controlled trial of an education program*. Prevention Medicine internet-based. 2008; 47 (4): 369-377.
7. Sepasi H. *A comparison between and True-False test item in measuring multiple-choice ShahidChamran University undergraduate students' academic achievement in measurement and evaluation course with the control of students' absences*. Journal of Education and Psychology. 1998; 5(1&2): 31-56. [Persian].
8. Pollard RR, Pollard CJ. *Principal's perception of extended teacher internship*. Education. 2003; 124(1): 151-156.
9. Lal S. *Innovation approaches in the pursuits of teaching-training and research in community medicine*. Indian Journal of Community Medicine 1999, 24(1), 8-18.
10. Bansal RK. *Need for Strengthening of Internship (Rotatory houseman ship) Training in India*. Education for Health 2004; 17(3): 332-338.
11. Sorensen, E. W, Haugbolle LS, Herborg H, Tomsen DV. *Improving situated learning in pharmacy internship*. Pharmacy Education. . 2005; 5 (3-4): 223-233.
12. Lo Y.M, Gdovin S.L, Stankiewicz, J.B, Appezzato L, Garvey E.M. *A Dynamic Food Science Internship Program: Integration of Problem-Based Learning and Student-Centered Men-toring*. Journal of Food Science Education 2002; 1(3):.45-51.
13. Sadeghi F, sharifzade a, movahed mohamadi h. *Study strengths and weaknesses of the Faculty of Agriculture, Tehran University students*. Journal of Agricultural Extension and Education 2008; 4(2): 99-108. [Persian]
14. McKerrow K. *Administrative internship: quality or quantity?*. Journal of School Leadership, 1998; 8:171-186.
15. Feldman Daniel C, Barton A. *Weitz Summer Interns: Factors Contributing to Positive Development Experiences*. Journal of Vocational Behavior. 1990; 37: 267-284.
16. Baugh DF. *The school-based administrative internship: Requirements and student expectations, connections*. Journal of Principal Preparation and Development. 2003; 4: 7-12.

od apprenticeship course, interaction and corporation between the Department and the professor of apprenticeship course, assigning a specific experts by the Department in order to coordinate the apprenticeship works, informing about the appropriate and possible places for passing the apprenticeship course to the students (finding a place for passing apprenticeship course) by the Department, the feedback of student's reports about the apprenticeship course to apprenticeship units for using them, the necessary coordination among the related organizations and formations and the educational unit for passing apprenticeship courses, practical evaluation according to the subject of the apprenticeship in corporation with the officials of the place of apprenticeship, selecting the eminent apprenticeship units and encouraging these units by the faculty. c) Playing an effective role by the apprenticeship units: The practical experiences and the technical competences of the responsible individual(s) of the apprenticeship in the concerned units, holding justificatory meetings by the apprenticeship units for the apprentices in order to introduce the relevant units, access and use of equipment, required laboratory, desert, workshop and administrative facilities during the apprenticeship course, the level of development in the courses and theoretical knowledge of the students, cooperating the managers and the staff

of the apprenticeship unit with the apprentices, using the viewpoints, approaches and innovations of the apprentices in the apprenticeship unit, determining a certain person by the apprenticeship unit for guiding the students. d) The training activities during the course: Such as holding complementary educational meetings and inviting qualified persons for the apprentices by the department, holding the academic workshops about the subject of apprenticeship for the apprentices during the apprenticeship course, visiting the educational, manufacturing, administrative and research centers which are related to the other subjects of the apprenticeship during the apprenticeship course, preparing and introducing the practical guidebooks that are related to the subject of the apprenticeship to the students. e) Playing role by the apprentices: The interests and motivations of the students for practical learning and experiences during the apprenticeship course, regular and active attendance of the apprentices in the apprenticeship places during the apprenticeship course, documenting and publicizing the successful experiences of the students.

Some of the findings of this study have already been proposed by other researchers. Sadeghi et al (2008) have indicated some effective factors on apprenticeship courses such as the appropriateness of the apprenticeship place with the major of study and the relation

اثر نهادینه شدن دانش تئوریک با اجرای فرایند صحیح کارآموزی در دانشجویان مهندسی بهداشت

محیط

سید علیرضا موسوی^{۱،۲}، پرویز محمدی^۱، علی الماسی^۱، مقداد پیرصاحب^۱، هیوا حسینی^۱، فاطمه اسدی^۱، مریم خشیج^{۳،۴*}

- ۱- گروه مهندسی بهداشت محیط، دانشکده بهداشت، دانشگاه علوم پزشکی کرمانشاه، کرمانشاه، ایران
 - ۲- مرکز تحقیقات عوامل محیطی موثر بر سلامت، دانشگاه علوم پزشکی کرمانشاه، کرمانشاه، ایران
 - ۳- گروه مهندسی بهداشت محیط، دانشکده بهداشت، دانشگاه علوم پزشکی شهید بهشتی، تهران، ایران
 - ۴- مرکز تحقیقات علوم زیست محیطی، گروه مهندسی بهداشت محیط، دانشگاه علوم پزشکی شهید صدوقی یزد، یزد، ایران
- * (نویسنده مسئول): تلفن: ۰۹۳۶۴۸۲۰۴۲۳، پست الکترونیکی: m.khashij@yahoo.com

تاریخ پذیرش: ۱۳۹۷/۱/۲۲

تاریخ دریافت: ۱۳۹۶/۰۸/۲۰

چکیده

سابقه و هدف: ایجاد فرصت های بهینه برای یادگیری تجربی و آموزش عملی، عامل مهمی است که کیفیت آموزش را بهبود می بخشد. هدف از این مطالعه شناسایی و تجزیه و تحلیل مکانیسم بهبود دوره کارآموزی برای دانشجویان مهندسی بهداشت محیط در دانشکده بهداشت کرمانشاه بود.

روش کار: این مطالعه بر اساس مقایسه کیفیت آموزش در دوره های کارآموزی به صورت قبل و بعد صورت گرفت. افراد شرکت کننده دانشجویانی بودند که دوره کارآموزی را در نیمه اول سال ۱۳۹۴-۱۳۹۵ (۳۲ نفر) گذراندند. تجزیه و تحلیل داده ها با استفاده از SPSS ۷.16 انجام شد.

یافته ها: میانگین نمرات دانشجویان پسر قبل از کارآموزی به ترتیب 2.02 ± 0.41 و پس از آن 2.82 ± 0.44 و میانگین نمرات دانشجویان دختر قبل و بعد از کارآموزی به ترتیب 1.9 ± 0.34 و 2.84 ± 0.37 بدست آمد. سطح آموزش در طول دوره کارآموزی بر افزایش دانش در دانشجویان مهندسی بهداشت محیط تاثیر می گذارد.

نتیجه گیری: براساس نتایج عوامل مؤثر در بهبود فرایند کارآموزی تحت تاثیر عوامل زیر روش تحقیق، نقش موثر واحدهای آموزشی، نقش موثر در دوره کارآموزی، فعالیت های آموزشی اضافی در زمان خدمت و نقش موثر در انجام کارآفرینی است.

واژگان کلیدی: دانش نظری؛ کارآموزی؛ مهندسی بهداشت محیط

This paper should be cited as:

Mousavi SAR, Mohammadi P, Almasi A, Pirsahab M, Hosaini H, Asadi F, Khashij M. *The effect apprenticeship on the knowledge and function of environmental health engineering*. J Med Edu Dev; 13(1): 68-76.

* Corresponding Author: Tel: + 09364820423, Email: m.khashij@yahoo.com