Explaining the Status of Soft Skills Training in Dentistry Profession in Basic Sciences Courses and Identifying the Capabilities of These Courses for the Process-Oriented Integration of Soft Skills

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Abstract

Background: The dentistry profession requires a high level of soft skills whose training seems necessary to respond to the community and increase the quality of specialized practice.

Objectives: The present study was conducted to examine the status of soft skills training in dentistry basic sciences courses and identify the capabilities of each basic sciences course for the process-oriented integration of soft skills in the dentistry profession.

Methods: The present qualitative study was conducted in 2018-2019.Semi-structured interviews were used to collect the data. The study's statistical population included the faculty members of the basic sciences of Isfahan and Mazandaran universities of medical sciences Iran, using purposive sampling. Moreover, the content analysis method was used to analyze the data.

Results: Soft skills training in the dentistry profession was not one of the educational objectives of basic sciences courses in this field, and teaching and evaluation methods used by professors had less capability to develop these skills. Additionally, the results showed that most of the identified soft skills in five domains had the integration capability in most basic sciences courses. Only some differences were observed in the integration of soft skills in the cognitive-intellectual domain.

Conclusion: It is suggested to include soft skills training in the objectives of dentistry basic sciences courses and consider the capabilities of each course and curricula to correct teaching and evaluation methods in this regard. Furthermore, it is recommended to strengthen the capabilities of basic sciences professors to integrate soft skills.

Keywords: Soft skills, Dentistry, Integration

Background

Education can deliver high-quality human capital to society for wise and skillful actions when it provides comprehensive development of personality, abilities, special skills, and intellectual, physical, and spiritual growth (1, 2). A responsive university is a university that pays attention to personal development and professional preparation together. Today, employers expect university graduates to have soft skills and specialized skills (3), and most organizations have introduced soft skills development as an international priority (4).

Soft skills are known as intrapersonal and interpersonal skills essential for personal development, social participation, and success in the workplace (5). In general, soft skills are a dynamic combination of cognitive and metacognitive, interpersonal, intellectual, and practical skills and moral values (6). Researchers have identified communication skills, analytical skills, interpersonal skills, positive attitude, work ethics, cultural competence, time management, partnership and teamwork, modesty and politeness, flexibility, professionalism, responsibility, critical thinking, problem-solving and decision-making, good judgment, trust, confidence, criticism management, initiation and creativity, and leadership as

soft skills (7-9). The aforementioned skills significantly increase self-confidence, professionalism, coordination, friendship, and optimism and provide positive energy for professional and personal success (10); therefore, the ability of graduates, including graduates of medical sciences, in soft skills is one of the key indicators of success and accountability to the community.

The dentistry profession, similar to other professions of medical sciences, requires a high level of soft skills and specialized skills to respond to the community and provide high-quality services. However, research results (11, 12) indicated that dentistry students have low abilities in some soft skills. Two strategies have been proposed for teaching soft skills in the university curriculum, namely the embedded or integration model and the stand-alone model (13). The stand-alone model has mainly been used for soft skills development (e.g., work ethics and communication skills) in the dentistry curriculum, which seems less effective due to students' low soft skills. The lack of attention to teaching soft skills in dentistry basic sciences courses is highly noticeable. However, the dentistry basic sciences course is an appropriate background and platform for soft skills development in clinical courses, and students can perform better in clinical courses using the soft skills they acquire in this course. Therefore, it will be apparently more effective if soft skills training starts as a longitudinal theme of basic sciences and is included and evaluated in all theoretical and practical courses.

Most researchers state that the most appropriate model for soft skills development is the embedded or integration model (14-17). Integration takes place in two forms Background, namely content-oriented integration and process-oriented integration. Content-oriented integration emphasizes the subject matter and breaks down the content boundaries of science; however, the process-oriented integration represents an integrated organization to strengthen process skills, such as critical thinking, communicating, and problem-solving. The integrated model of soft skills development has been somewhat neglected in the dentistry curriculum, and few studies have been conducted on the process-oriented integration of soft skills in the curriculum of basic sciences courses.

Objectives

The present study aimed to expand the idea of integrating soft skills into dentistry basic sciences courses based on the process-oriented integration by examining the status of soft skills training in dentistry basic sciences courses and identifying the capabilities of each basic sciences course for the process-oriented integration of soft skills in the dentistry profession.

Methods

The present qualitative content-analysis study was conducted in 2018-2019. The study's statistical population included the faculty members of the basic sciences of Isfahan and Mazandaran universities of medical sciences, Iran, using purposive sampling. During meeting with the directors of the Education Development Office of Medical School and explaining the research topic, faculty members interested in education with valuable expertise, experience, and information in this field were selected as a sample. Additionally, the chain sampling method was used to identify other faculty members of basic medical sciences interested in education with appropriate information on this subject. In this study, the actual sample size was determined by the quality and completeness of the collected data; if the collected data was a repetition of the previous data and no new data were obtained, the data saturation was performed and sampling was stopped.

Semi-structured interviews were used to collect the data. During meeting with the directors of the Education Development Office of Medical School and explaining the research topic, he was asked to introduce faculty members with a valuable educational experience and interest in the research topic for an interview. After the initial identification of the faculty members and obtaining informed consent from the participants, interviews were conducted in person at the appointed times in faculty members' offices. The interviewer first explained the research objectives to the participants. Then, the list of soft skills of the dentistry profession identified in Valiapour Khajeghyasi et al.'s (18) study was provided to the faculty members, and then the interviews were conducted (Table 1). Each interview lasted for 25-60 minutes. The chain sampling method was used during the interviews to identify other participants. The interviews were recorded by obtaining the permission of the participants to comply with ethical principles, and the interviewees were assured that all the information would remain confidential.

Qualitative data analysis was performed by content analysis method based on Krippendorff's opinion (19). For the achievement of this aim, the full text of each interview was recorded, transcribed, and typed to be encoded. Each interview text was considered a unit of analysis, and data analysis began with repeated reading of all textual data. After gaining an overview of each interview, the texts of the interviews were reviewed line by line, and meaningful sentences related to each research question were extracted as codes. In this study, for the accuracy and robustness, Goba and Lincoln's(20) approach, the study of strategies (e.g., continuous engagement with data content and continuous data review), sufficient time allocation and long-term participation in the research process, good communication with participants and emphasis on the confidentiality of information, benefiting from reviews by supervisor professors and peer reviews, information verification by participants, and provision of a complete description of the research report for readers were used.

Table 1. Most Important Soft Skills of Dentistry Profession

Main components	Subcomponents
Work ethics	Work conscience, responsibility, respect to the patient and his/her privacy, honesty, and truth
Cognitive skill	Reasoning and decision-making, visual thinking, and high precision
Personality traits	Stress management, self-confidence, and psychological intuition
Management skill	Time management
Artistic skill	Handicrafts
Communicational and interpersonal skills	Communication (i.e., verbal, nonverbal, and listening)
	Patience

Source: Valipour Khajeghyasi et al.' study (2021)

Results

In this study, the status of soft skills training in dentistry basic sciences courses was evaluated in three elements, including 1) curriculum, 2) the objectives of basic sciences courses, and 3) teaching and evaluation methods and identification of the capabilities of basic sciences courses for the process-oriented integration of soft skills, using semi-structured interviews from the perspectives of faculty members of dentistry basic sciences courses. A total of 34 faculty members participated in this study, 10 and 24 of whom were female and male, respectively. The academic ranks of 11, 17, and 6 participants were professor, associate professor, and assistant professor, respectively. Moreover, 20 and 14 participants were from Isfahan and Mazandaran universities of medical sciences, respectively. Four individuals participated in the study from each specialized field, and only three individuals participated in the study from medical physics and genetics. The results of the present study are presented in the following sections:

1. Status of Soft Skills Training in Dentistry Basic Sciences Courses

1.1. Is soft skills training among the objectives of dentistry basic sciences courses?

A review of the dentistry general doctoral curriculum shows that most soft skills have been mentioned in this field's general mission, values, beliefs, and objectives. However, the review of each basic sciences course shows that the training and development of these skills are not among educational objectives. The professors of this course also proceed with educational designing based on these headings. Most participants believed that soft skills were mentioned in the general mission and objectives of the dentistry curriculum; nevertheless, soft skills development was not among these objectives. "*Soft skills are not mentioned at all. We only teach parasites and fungi to students, and we have no headings on soft skills training*", said participant 29. Furthermore, participant 30 stated in this regard: "*These skills are not among the curriculum objectives, and the objectives are very general; the course headings are also very specialized. We do not have any heading in this regard.*" Of course, a small number of participants stated that soft skills have not explicitly been mentioned in the educational objectives of basic sciences courses; however, if professors are willing, they develop soft skills in students. Participant 24

stated: "*Soft skills are not mentioned in the headings ... If professors are willing to teach soft skills, they will do it. These skills have not been mentioned clearly.*" One of the participants believed that soft skills should have been clearly stated in the curriculum objectives: "*Soft skills are not clearly presented in the curriculum objectives. They need to be expressed in curriculum objectives.*" (Participant 25)

In addition, the participants believed that soft skills were among general educational objectives; nonetheless, since there were no executive privileges and guarantees for soft skills development in the education system, professors did not teach them seriously and in an organized manner.

1.2. What teaching methods do professors use most in teaching basic sciences courses? Can the used methods develop soft skills in students? Most participants stated that professors mainly used professor-oriented teaching methods in teaching basic sciences courses, and often the teaching method was giving a lecture. Some quotations are as follows:

"*Giving a lecture does not develop soft skills at all.*" (Participant 23)

"*We generally give lectures, and lectures are not usually reciprocal. In fact, we are just teaching.*" (Participant 6) Participant 30 commented: "*Most professors use lectures and PowerPoint in an old-fashioned way. These methods do not develop these skills at all. Professors may be interested in discussing soft skills, but this is not among the objectives.*" However, a point made by one of the participants was that if the lecture method was appropriately implemented, it would have the ability to develop most soft skills; nevertheless, the problem was that the professors did not implement the lecture method properly.

1.3. What methods do professors use most in dentistry basic sciences courses to evaluate students?

Most participants stated that faculty members mostly used four-choice tests to evaluate students in basic sciences courses. Participant 25, emphasizing the large number of students in this field, said: "*We use the written and four-choice methods because the number of students is large ... These evaluation methods can only develop cognitive skills.*" In this regard, participant 20, also emphasizing the large number of students and the workload of faculty members regarding the evaluation methods in basic sciences courses, stated: "*Unfortunately, we use more than four options because the*

conditions are not standard; if the conditions are standard and the workload of the professors is low, the professors can use other methods as well." Participant 21, similar to other participants, pointed to the large number of students and believed that if the four-choice questions were well designed, in addition to superficial knowledge, they could assess some cognitive skills. This participant believed that professors could use other evaluation methods to develop soft skills if facilities, such as collaborating with graduate students, were provided for evaluation.

Summarizing the participants' opinions shows that soft skills development has not been included in the curriculum objectives of basic sciences courses. Moreover, the teaching methods used by faculty members in this course are mainly passive and one-way teaching methods that are less capable of developing soft skills. In addition, in this course, four-choice questions are often used to evaluate students, which in ideal conditions and in the case of standard design, they will have the ability to develop only some soft cognitive skills.

2. Identification of the Capabilities of Basic Sciences Courses for the Process-Oriented Integration of Soft Skills

For the identification of the capabilities of each basic sciences course for the process-oriented integration of soft skills of the dentistry profession, after transcribing and exploring the interview texts, the capabilities of each course were identified from the interviewees' viewpoints (Table 2).

Some viewpoints of the participants are as follows: Most participants believed that in all basic sciences courses, soft skills in five domains, including ethical-work values, aesthetic-artistic values, communication and interpersonal skills, personality traits, and management skills, have the capability of process-oriented integration. Professors can develop these skills in students through educational methods, assignment definition and design, and role models. For example, regarding the time management skill, participant 17 said: "*A professor can teach time management by attending and finishing the class on time.*" Participant 16 said regarding stress management training by role model: "*When the professor is calm and does not have stress, students also learn from him/her to be calm and pass this calmness to patients.*" Participant 23 said regarding changing teaching methods to improve students' communication and interpersonal skills: "*We need to change the teaching methods of our classrooms. Now, we often use the lecture method. If the colleagues of the basic sciences course can manage some of their meetings in the form of small groups and include communication and interpersonal skills in the education, students will learn to interact. In my opinion, these skills can be improved by changing the teaching methods.*" This participant also mentioned the role of designing the assignments and learning tasks to develop soft skills. Participant 25 commented on self-confidence and stress management: "*I think professors can develop*

self-confidence and stress management by exemplifying similar individuals and successful individuals, talking about the fact that everyone may be stressed and have problems, but they have now reached a very successful point.*" This participant also commented on the role model of professors regarding work ethics: "*In terms of work ethics, a professor can be very effective. The professor's way of dressing or respecting, etc., is under the student's magnifying glass. That is why I feel that a professor's personality is at the top of education.*"

However, the participants in this study discriminated in the capability of basic sciences courses to integrate soft skills in the cognitive-intellectual domain. In the following section, participants' views on the capabilities of each dentistry basic sciences course to integrate soft skills in the cognitive-intellectual domain are discussed:

Anatomical Sciences: Among the soft skills of the cognitive-intellectual domain, visual thinking can be further developed in anatomical sciences courses. Participant 23 stated in this regard: "*In the list of cognitive skills, only visual thinking can be taught in the anatomy science ... In anatomy, you see many two-dimensional images. Students try to establish a three-dimensional image of a two-dimensional image in their minds.*" In this regard, participant 14 stated: "*Teaching embryology requires three-dimensional visualization; it has to visualize the stages of evolution.*" Participant 32 also pointed out the existence of software that helps teach visual thinking: "*We have software at present that is three-dimensional and shows all layers of the body.*"

Mycology and Parasitology: Among the soft skills of the cognitive-intellectual domain, reasoning and decision-making ability and precision skill can be further developed in parasitology and mycology. Participant 17 said in this regard: "*In parasitology, we can teach mostly precision and reasoning and decision-making ability.*"

Pathology: Among the soft skills of the cognitive domain, the pathology course has the capability of developing three skills, including visual thinking, reasoning and decision-making ability, and precision. Participant 13 commented on visual thinking: "*When professors talk about cells, for example, we tell students that cells move like this and stick to the vessel wall and pass through in this way; germs are killed by the cells in this way; these cells secrete these substances. They must have visual thinking to understand these descriptions.*" The participants believed that the precision skill when working with a microscope could also be developed.

Immunology: Among the soft skills of the cognitive-intellectual domain, the immunology course can develop skills, such as reasoning and decision-making ability and visual thinking. Participant 16 stated regarding the ability to develop visual thinking in this course: "*In our field (i.e., immunology), the mechanisms can be explained so that the individual is forced to construct them in his/her mind, like animation.*" Concerning the capability of the immunology course in the reasoning skill, this participant stated: "*Immunology can help with cognitive skills in*

Table 2. Capabilities of Dentistry Basic Sciences Courses for the Process-oriented Integration of Soft Skills from Participants' Viewpoints

Medical physics	Virology	Bacteriology	Genetics	Biochemistry	Mycology and Parasitology	Pathology	Immunology	Physiology	Anatomical sciences
Visual thinking	Reasoning and decision-making	Reasoning and decision-making	Reasoning and decision-making	Reasoning and decision-making	Reasoning and decision-making	Visual thinking	Visual thinking	Visual thinking	Visual thinking
Handicrafts	High precision	High precision	Handicrafts	Handicrafts	High precision	Reasoning and decision-making	Reasoning and decision-making	Reasoning and decision-making	Handicrafts
Responsibility	Handicrafts	Handicrafts	Responsibility	Responsibility	Handicrafts	High precision	Handicrafts	Handicrafts	Responsibility
Work conscience	Responsibility	Responsibility	Work conscience	Work conscience	Responsibility	Handicrafts	Responsibility	Responsibility	Work conscience
Respect and privacy	Work conscience	Work conscience	Respect and privacy	Respect and privacy	Work conscience	Responsibility	Work conscience	Work conscience	Respect and privacy
Honesty and truth	Respect and privacy	Respect and privacy	Honesty and truth	Honesty and truth	Respect and privacy	Work conscience	Respect and privacy	Respect and privacy	Honesty and truth
Verbal/Nonverbal communication and listening	Honesty and truth	Honesty and truth	Verbal/Nonverbal communication and listening	Verbal/Nonverbal communication and listening	Honesty and truth	Respect and privacy	Honesty and truth	Honesty and truth	Verbal/Nonverbal communication and listening
Patience	Verbal/Nonverbal communication and listening	Verbal/Nonverbal communication and listening	Patience	Patience	Verbal/Nonverbal communication and listening	Honesty and truth	Verbal/Nonverbal communication and listening	Verbal/Nonverbal communication and listening	Patience
Self-confidence	Patience	Patience	Self-confidence	Self-confidence	Patience	Verbal/Nonverbal communication and listening	Patience	Patience	Self-confidence
Stress management	Self-confidence	Self-confidence	Stress management	Stress management	Self-confidence	Patience	Self-confidence	Self-confidence	Stress management
Time management	Stress management	Stress management	Time management	Time management	Stress management	Self-confidence	Stress management	Stress management	Time management
	Time management	Time management			Time management	Stress management	Time management	Time management	
						Time management			

clinical reasoning. Given that the immune system oversees all physical activities, immunology can greatly strengthen clinical reasoning."

Biochemistry: Among the soft skills of the cognitive-intellectual domain, the biochemistry course can develop reasoning and decision-making ability. Participant 2 stated: "*In some topics, the student has to reason. The biochemistry course can help with clinical reasoning. Any discipline that deals with living organisms must know biochemistry because biochemistry examines the chemical basis of living organisms, what a cell is made of, cells constitute every part of the body, and what compounds*

constitute a membrane; it must be reasoned why this is in this way."

Physiology: Among the soft skills of the cognitive-intellectual domain, the physiology course can develop reasoning, decision-making, and visual thinking. Participant 8 stated on the reasoning skill: "*The field of physiology can help in clinical reasoning. The physiology of functions of bodily systems teaches students clinical reasoning.*" Participant 28 stated: "*Many reactions in physiology can be taught through animation and modeling, which help develop visual thinking.*"

Bacteriology and Virology: Among the soft skills of the cognitive-intellectual domain, bacteriology and virology can develop the skills of reasoning and decision-making, visual thinking, and precision. Concerning visual thinking, participant 5 stated: "*Because we do practical work with students, such as putting the slide and seeing and doing culture, these activities can help teach visual thinking.*" Interviewee 37 stated: "*Precision can be developed in laboratory work.*"

Genetics: Among the soft skills of the cognitive domain, genetics can develop reasoning and decision-making ability. Participant 31 stated in this regard: "*We need to teach students to have an approach to clinical reasoning and decision-making ability. For example, if a patient refers with dental problems, the student should have a diagnostic approach to what the disease is in genetics and how it can be decided.*" Participant 15 stated in this regard: "*Sometimes it may be a simple disease, and it can be diagnosed with a single symptom, but often it is not. It means that most of these diseases have common phenotypes; then, the student should be able to evaluate and take the diagnosis toward one direction.*"

Medical Physics: Among the soft skills of the cognitive domain, medical physics can develop visual thinking. Participant 39 said in this regard: "*Since in the medical physics course students should be familiar with various phenomena and these phenomena are at the level of particles, they should have a visualization of particles and be able to visualize them in their minds in the form of animation. It means that the professor should teach in such a way that visual thinking is created in students, that is, illustration should be performed.*"

Discussion

The present study was designed to investigate the current status of soft skills training in basic sciences courses and identify the capabilities of basic sciences courses for the process-oriented integration of soft skills in the dentistry profession. The findings showed that soft skills development was not among the curriculum objectives of basic sciences courses. In this regard, Jones (2009) has suggested one of the key strategies for soft skills development as explicit inclusion in evaluation and feedback structures, which requires a clear definition of soft skills in curriculum objectives (21). The Malaysian Ministry of Higher Education has clearly defined seven soft skills as "what they should have and what is good to

have" and has included them in the educational objectives. Accordingly, it is suggested to include the soft skills objectives of the dentistry profession in the educational objectives of the basic sciences curriculum similar to their specialized objectives based on the degree of learning necessity and importance as what should be learned and what is better to be learned.

Another finding of the present study showed that the faculty members used the lecture teaching method in basic sciences classrooms that is a passive and one-way teaching method. The evidence indicates that learning soft skills is less common in learning environments where teaching is performed traditionally. In this regard, Virtanen and Tynjälä (2018) reported in their study that traditional teaching forms, such as reading, lecturing, and only working, were negatively associated with learning soft skills. Most studies on soft skills teaching methods showed that active teaching methods are more capable of soft skills development (22). Esa et al. (2015) and Colak (2015) reported in their study that participatory learning was one of the most appropriate approaches for soft skills development in students. The participatory approach positively affects students' abilities for group work and communication skills (23, 24). Professors can develop soft skills in students by applying participatory strategy in the classroom. Virtanen and Tynjälä (2018) study also showed that participatory and interactive teaching methods, a constructivist learning environment, and an integrated learning pedagogy predict soft skills (e.g., decision-making skills), different forms of creativity, and problem-solving skills. In this regard, Redoli et al. (2013) introduced the use of the Delphi learning package in the higher education environment as one of the approaches to soft skills development. From their point of view, Delphi learning develops soft skills, such as critical thinking, the ability to combine, and the ability to judge (25).

In addition, Esa et al. (2015) showed that the lecture method could only be effective in developing communication skills (23). According to the research results, universities can take an effective step toward developing students' soft skills by changing teaching and learning approaches to learner-oriented learning. Another finding of the present study showed that the faculty members in the classrooms of basic sciences courses often used four-choice tests to evaluate dentistry students. Naturally, the evaluation methods used by professors to evaluate students are appropriate to their teaching methods; therefore, given the professors' teaching method, the lack of soft skills educational objectives and four-choice evaluation have taken basic sciences courses away from soft skills training.

Another finding of the present study regarding identifying the capabilities of each dentistry basic sciences course for soft skills integration of dentistry showed that the most important soft skills in all five domains of soft skills, work-ethical values, aesthetic-artistic skills, communication-interpersonal skills, personality traits, and management skills could be integrated into all basic

sciences courses. The study results on soft skills in the cognitive-intellectual domain showed that the courses of anatomy, immunology, pathology, and physiology had higher potential for the development of visual thinking. In this regard, Vorstenbosch et al. (2014) showed in their study that the students' visual thinking ability increased with the study of anatomy (26). Moreover, Guimarães et al. (2018) also reported that using a computer-based learning method in anatomy courses positively affected the students' visual ability. The reasoning and decision-making skills are more capable of being developed in courses, such as immunology, pathology, physiology, mycology and parasitology, virology, biochemistry, and bacteriology (27). In this regard, the results of Ma et al.'s (2018) study showed that the implementation of an application-based reverse classroom teaching model could improve students' problem-solving skills in the medical immunology course (28). Another finding of the current study showed that the precision skill in the courses of pathology, mycology and parasitology, virology, and bacteriology had the additional capability to be developed.

The findings showed that dentistry basic sciences courses could develop students' soft skills by three methods. The first method is the content capability of basic sciences courses. Each basic sciences course can develop particular skills in students according to its content (e.g., the same cognitive skills described by medical professionals of basic sciences for each basic sciences course). The second method is to use active and appropriate teaching methods in classrooms. For the achievement of the aforementioned goal, professors should change their teaching process from a teaching-oriented to a learning-oriented approach and, by playing the facilitator role, design learning assignments and activities appropriate to the development of each soft skill in students. Of course, the prerequisite for this issue is the inclusion of soft skills in the educational objectives of each course and the development of knowledge and skills of faculty members of basic medical sciences in this regard. The third method is the role model of basic medical sciences faculty members. Professors can develop numerous soft skills with a role model in students, the prerequisite of which is the existence of inspiring professors in dentistry basic sciences courses. Therefore, it is suggested to carry out interventional studies on appropriate methods of teaching soft skills in the dentistry profession in each basic sciences course and studies on the methods of development and improvement of inspiring professors in medical universities. One of the limitations of the present study was the wide range of soft skills; therefore, it was not possible for the authors to examine each soft skill in depth.

Acknowledgments

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