Original Article

Ranking the soft skills of the dental profession based on the importance in job performance: A mixed method study in Isfahan and Mazandaran Universities of Medical Sciences

Roghayeh Valipour Khajeghyasi¹, Mohammad Javad Liaghatdar¹, Mohammad Reza Nili², Mandana Shirazi²

¹Department of Education, Faculty of Education and Psychology, University of Isfahan, Isfahan, ²Department of Medical Education, Medical School, Tehran University of Medical Sciences, Tehran, Iran

ABSTRACT

Background: Soft skills are the key indicators of success and quality of performance in various professions, including the dental profession. The skills are the main tools for enhancing the quality of technical work in Dentistry. Hence, the aim of this study was to identify and prioritize the soft skills in dental profession.

Materials and Methods: The study employed a mixed methods research. In the qualitative phase, the dental skills were identified using a semi-structured interview with faculty members and dental students. In the quantitative phase, the soft skills were prioritized with Analytical Hierarchical Process (AHP). The data analysis was using Expert Choice software.

Results: The results showed that the dental profession to improve the quality of performance needs to 29 soft skills in six categories. In professional ethics, work ethics (with weight of 0.212) and responsibility (0.188); in artistic skills, handicrafts (0.616); in cognitive skills, decision-making ability (0.290) and spatial thinking (0.249); in communication skills, verbal/nonverbal communication and listening (0.266), and patience (0.240); in individual characteristics, stress management (0.381) and self-esteem (0.260); and finally, in management skills, time management (0.481) are among the most important soft skills in dental profession.

Conclusion: Identify and prioritize the soft skills can help to improve the quality of performance the dental profession. Therefore, it is recommended to integrate these skills into the dentistry curriculum. Moreover, by increasing the number of studies the essential backgrounds for developing soft skills in dentistry education will be provided.

Key Words: Dentistry, education, quality of performance, soft skills

INTRODUCTION

Soft skills are among the key indicators of the success and quality of job performance in the workplace. That is, in addition to hard skills, university graduates are expected to have a high level of soft skills when entering the workplace.¹,² Hard skills are specialized skills to help individuals succeed in job performance.³ These skills are taught and evaluated at universities. Soft skills denote a wide range of skills, competencies, behaviors, attitudes and personal characteristics...
that enable individuals to effectively manage their environment and work well with others.[4] These skills are functional and complementary to technical and scientific skills[5] and they are essential for the growth of human capital.[3] There are two classifications for soft skills: intra-personal skills and interpersonal skills. Intra-personal skills refer to the ability of individuals to manage themselves to succeed in work. Some of these skills are time management, stress management, creative thinking, etc. Interpersonal skills interact with people’s skills in managing their relationship with others in order to improve the quality of performance, such as the ability to provoke, lead, and talk.[6]

In addition to the effectiveness of hard skills, soft skills greatly enhance confidence, social competence, social participation, professionalism, coordination, friendship and optimism in people and provide them with positive energy for personal and professional success.[3] Therefore, considering the importance of soft skills in the quality of job performance, most organizations have developed these skills as an international priority.[8‑10] In this regard, researchers have also identified soft skills in different research.[11‑13] Table 1 shows the results of several studies in this area.

As research results show, soft skills are a dynamic combination of cognitive and metacognitive skills, communication skills, inter-personal skills and ethical values.[16] However, some soft skills are common in most professions, but each profession needs specific soft skills for the quality of its performance. Therefore, it is essential to identify the soft skills of experts in each profession. Like other professions, dentistry profession requires some special soft skills for success in the work environment and the quality of specialized work. In studies, a review of soft skills is addressed in this profession.[7,15] However, there has been no specific study conducted to identify the soft skills of this profession from the perspective of faculty members and dental students and based on prioritizing the importance of the success and quality of the specialized performance. Therefore, this study aimed to identify and prioritize the soft skills of the dental profession in Isfahan and Mazandaran universities of medical sciences.

### MATERIALS AND METHODS

This study was approved by the School of Education at the University of Isfahan (approval number 97/4264). We used a mixed-method design for our study. In the qualitative phase of the study, soft skills of dental profession were explored through individual interview with faculty members and dental students. Also, the identified soft skills of dental profession were prioritized based on the Analytical Hierarchy Process (AHP) technique in the quantitative phase of the study. AHP is a mathematical method used to rank and determine the significance of factors. This technique prioritizes each criterion by the options pairwise comparisons. The purpose of this technique is to weigh the criteria and select the best options. In this technique, the data matrix is normalized so that the significance of the factors becomes comparable. The normal weight means that the sum of weights is 1.

#### Qualitative approach

In the qualitative phase, a semi-structured interview was used to identify the soft skills of the dental profession. Participants were faculty members and dental students from Isfahan University and Mazandaran University. The faculty members were selected through purposive sampling method, and during the interview, the chain sampling technique

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**Table 1: Soft skills identified for success in job performance**

| Researchers       | Year | Identified soft skills                                                                 |
|-------------------|------|----------------------------------------------------------------------------------------|
| Schulz            | 2008 | Communication skills, critical thinking, problem solving skills, teamwork ability, negotiation skills, management, time management, conflict management, cultural awareness, common knowledge, responsibility, humbleness, self-esteem, sociology, honesty and integrity, empathy, work ethic, project management, and business management |
| Robles            | 2012 | Communications, humbleness, flexibility, integrity, interpersonal skills, positive attitude, professionalism, responsibility, teamwork, and ethical work |
| Zhang and Blakey  | 2012 | Honesty and integrity, communication skills, analytical skills, teamwork ability, interpersonal skills, and motivation |
| Flaherty          | 2014 | Inter-personal skills, positive attitude, work ethics, cultural competence, time management, teamwork, written and audio communication, critical thinking, problem solving, decision-making, negotiation, conflict resolution, confidence, computational skills, ability to work in high-pressure environment, good judgment, crisis management, flexibility, and leadership |
| Lau and Wang      | 2014 | Reliable behaviors such as strong communication, negotiation, conflict resolution |
was also used to identify other people who had good information about the subject.\[16\] The entry criterion for students was to have enough experience in this field. For this purpose, the senior dental students of Isfahan University and Mazandaran University and dental residents of Isfahan University were selected through purposeful random sampling. This sampling method involves the selection of a random sample using quantitative research methods. However, unlike quantitative research, this random sampling not only represents the society but also ensures that a nonbiased sampling is used.\[16\] In qualitative studies, very large or very small samples are not recommended; but, obtaining criteria, such as data saturation and repeatability of the data, show sample size adequacy.\[16\] The present study was saturated with 23 faculty members and 21 students.

After obtaining consent, interviews with the participants were made in person at the dates set by the researcher (first author). The researcher first described the purpose of the research to the participants, and after obtaining consent, interviews were conducted. All interviews but one were recorded with the participants’ permission, and they were assured that all information would be confidential. All interviews were conducted by the researcher starting with the main question: “What skills do dental professionals need in addition to their specialized skills?” The questions were continued, according to the participants’ responses.

Data analysis was conducted through content analysis of the interviews. The process of analyzing the content of the interviews was based on Krippendorff’s theory that includes data collection (including recording of the content), data reduction, inference, and analysis.\[17\] For this purpose, interviews were fully recorded, implemented, and transcribed. Each text of the interview was considered as a unit of analysis and the data analysis was started by repeated reading of all text data. After obtaining a general view, the text of the interviews was reviewed line by line and the meaningful sentences related to the main question of the research were extracted as codes and were categorized.

For evaluating the accuracy and strength of the study, four proposed criteria of Guba and Lincoln, including Credibility Criterion, Dependability, Conformability, and Transferability, were used.\[18\] The researchers fully met these criteria by allocating sufficient time, making good communication with the participants, conducting data collection from the two groups (student and faculty members), confirmation of information by the participants, reviewing and reconsidering the data, getting help from the supervisors and peers, and providing a rich description of the research report for the readers.

### Quantitative approach

Levels of purpose, criteria and subcriteria [Figure 1]; at the highest level of the purpose, priority was given to the soft skills of the dental profession, in the second category, the components of soft skills (criteria), cognitive skills, artistic skills, ethical–professional values and communicative and interpersonal skills, management skills and individual characteristics; and in the third category, the subcomponents of soft skills (subcriteria) were included. In the second step, based on the hierarchy tree, a pairwise comparison questionnaire was designed based on the degrees of importance, from a little important to extremely important. On this scale, number 1 represents a little important, 2 represents little importance to slightly more important, 3 is slightly more important, 4 slightly more important to almost important, 5 is important, 6 is important to very important, 7 is very important, 8 is very important to highly important, and 9 is extremely important. The questionnaire was confirmed by experts in the field of hierarchical process technique. Fifteen experts (faculty members of dentistry) were selected by purposeful method and the questionnaire was completed by them. Saaty (1994), the designer of this technique believes that ten experts would be sufficient for studies based on pairwise comparison.\[19\] For analyzing questionnaires and prioritizing soft skills, Expert Choice 11 was used. One of the important issues in this method is the inconsistency rate. The inconsistency rate is the tool that specifies the consistency of the matrix of pairwise comparisons and shows how much confidence can be gained from the comparative priorities. According to Saaty, if the judgments are stable, the matrix compatibility rate is <0.1. In the present study, the inconsistency rate in the main criteria and the sub-criteria was <0.1, so there is an acceptable consistency in pairwise comparisons and the validity of the response of the participants is confirmed.

### RESULTS

#### Qualitative findings

In this section, 23 faculty members and 21 dental students participated. Nine faculty members were
female and 14 were male. Among the students, 12 of them were women and 9 were men. Five were dental resident students and 16 were senior dental students. Analysis of the data from the interviews with the participants resulted in the extraction of 29 soft skills in six areas. In the field of ethical–professional values, 8 soft skills, in the field of artistic skills, 2 soft skills, communication and inter-personal skills, 6 soft skills, in the area of cognitive skills, 5 soft skills, in the field of individual characteristics, 5 soft skills, and for managerial skills, 3 soft skills were identified in the dental profession. The components and subcomponents of the content analysis of the interviews are presented in Table 2.

Quantitative findings
This part of the study was designed to weigh and measure the importance of each soft skill identified in the qualitative phase. In this section, 15 faculty members of the dentistry department participated. The average of their years of service in the dental profession was 14 years.

The results of prioritizing the areas of soft skills in the dental profession based on AHP [Table 3] showed that ethical–professional values (relative weight of 0.253), artistic skills (relative weight of 0.227), and cognitive skills (relative weight of 0.178) are, from the point of view of the experts, the most important ones, respectively, in the success and quality of the dental profession. Communicative and interpersonal skills (relative weight of 0.151), individual characteristics (relative weight of 0.097), and management skill (relative weight of 0.094) were in the fourth, fifth, and sixth priorities, respectively.

In determining the relative values of each area of soft skills, results [Table 4] showed that in the area of ethical–professional values, work ethics (relative weight of 0.212), responsibility (relative weight of 0.188), respecting the patient’s privacy (relative weight of 0.187) and truth and honesty (relative weight of 0.160) were, respectively, the most important soft skills in dental profession. In terms of management skills, time management (relative weight of 0.481), and among artistic skills, handicrafts (relative weight of 0.616) were more important in terms of quality of dental profession.

Among the individual characteristics, stress management (relative weight of 0.381) and self-confidence (relative weight of 0.260) and in the cognitive domain of reasoning and decision-making ability (relative weight of 0.290), spatial thinking (relative weight of 0.249) and high precision (relative weight of 0.223) were among the most important soft skills in dental profession. Furthermore, in the area of communication skills, verbal and nonverbal communication and listening (relative weight of 0.266) and patience (relative weight of 0.240) were considered more important in the success and quality of the dental profession.

DISCUSSION
The present study aimed to identify and prioritize the soft skills in dental profession based on the importance of the success and quality of the profession. The results of the study showed that, from the viewpoint of faculty members and students, the dental profession in addition to technical skills, also need soft skills in 6 areas of ethical–professional values, artistic skills, communicative and interpersonal skills, cognitive skills, individual characteristics and managerial skills. From the expert’s viewpoint, professional ethics was
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Table 2: Soft skills identified in qualitative phase study

| Components                              | Soft skills                                           | An example of quotations |
|-----------------------------------------|------------------------------------------------------|--------------------------|
| Cognitive skills                        | 1. Spatial thinking, 2. Creativity, 3. Reasoning and decision making ability, 4. Critical thinking and assessment, 5. High precision |
| Communication and interpersonal skills  | 1. Communication (verbal, non-verbal and listening), 2. Patience, 3. Openness/ good morals, 4. Kindness, 5. Compassion, 6. Empathy |
| Artistic skills                         | 1. Aesthetic vision, 2. Handicrafts (sculpture, painting and design, calligraphy, miniatures, etc.) |
| Ethical-professional values             | 1. Responsibility, 2. Conscience at work, 3. Cultural competence, 4. Respect for patients and their privacy, 5. Appearance, 6. Life-long learning, 7. Integrity and trust, 8. Teamwork |
| Personal characteristics                | 1. Confidence, 2. Stress management, 3. Psychological sense, 4. Self-possession, 5. Being open to criticism |
| Management skills                       | 1. Time management, 2. Leadership and management of others, 3. Challenges management |

In the present study, communication (verbal, nonverbal, and listening) and patience in the field of interpersonal and communicative skills were two critical skills for success in dentistry. In this regard, the American Dental Education Association has identified intrapersonal and interpersonal skills among the main dentist’s skills. This is also consistent with the study of Virtue et al. In communication skills, they point to good communication skills and handicrafts such as painting, sculpture, and other fine arts were more important in the quality of the dental profession. According to the results of this study, it is suggested that attention should be paid to this skill when admitting dental students. Also, formal and informal training of artistic skills in students must be attended. In the area of cognitive skill, which was ranked third in the valuation of dental skills, arithmetic and decision-making skills, spatial thinking was respectively the most important in the quality of this profession. In this regard, in their study, Langlois et al. (2015) stated that spatial thinking is a very important factor in the selection and training of specialized occupational health skills. Professors can develop the student’s spatial thinking by applying appropriate teaching methods in different disciplines, including anatomy lessons.

Table 3: The relative importance of soft skills areas of dental profession

| Components                              | Relative weight (sum of weights=1) | Priority |
|-----------------------------------------|------------------------------------|----------|
| Ethical-professional values             | 0.253                              | 1        |
| Artistic skills                         | 0.227                              | 2        |
| Cognitive skills                        | 0.178                              | 3        |
| Communication and interpersonal skills  | 0.151                              | 4        |
| Personal characteristics                | 0.097                              | 5        |
| Management skills                       | 0.094                              | 6        |

the highest in importance in the dental profession. In this area, responsibility, work ethics, respect for the patient’s privacy and honesty and truth had more weight and were more important. This finding is consistent with the results of Virtue et al.[20] In their study, professionalism was the highest in the view of the faculty members. In professionalism, they pointed to skills such as responsibility, honesty and truth. In their study of individual characteristics, Van der Berg-Cloete et al. pointed to the honesty in the work, which is consistent with the result of the present study.[21]

In valuing the skills based on AHP, from the expert’s point of view, artistic skill was second to the success and quality of the dental profession. In this area,
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Evidence suggests that educating and improving these skills improve interactions clinically. Also, the nature of the dental profession requires attention and delicacy. A dentist must be so patient to provide quality treatment to the patients. Therefore, it is suggested that special attention should be paid to patience skills when admitting students and faculty members.

The result of this study in assessing the importance of individual characteristics showed that stress management and self-esteem are more important in the performance of the dental profession. Dentists have experienced a lot of work-related stress since training. Pozos et al., stated that the stress of dentists is more than three times that of ordinary people in the community, hence empowering students in the field stress management will help in the quality of their specialized work. It is also important to have the competence and confidence to bridge the gap between education and practice, while the main part of the curriculum of dental schools focuses more on assessing student’s technical skills and less attention is always paid to confidence and competence in acquiring skills, acquisition of competence and trust. Self-esteem should be placed on the list of goals of the dental curriculum.

In the present study, prioritizing soft skills from the viewpoint of experts showed that time management skills are one of the most important skills needed in the dental profession. Therefore, it is recommended that through independent curriculum or in integration with other curriculums, the skill of time management be strengthened among dental students.

**CONCLUSION**

In our study, the most important soft skills in dentistry were identified and prioritized from the viewpoint of students and faculty members of dental profession. Future research should focus on how to integrate these skills into the curriculum and on how to train and develop them to identify the best practices for

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Table 4: Relative importance of the components of the soft skills in the dental profession

| Domain                          | Soft skill                                      | Relative weight (sum of weights=1) | Priority |
|---------------------------------|------------------------------------------------|------------------------------------|----------|
| Ethical - professional values   | Conscience at work                              | 0.212                              | 1        |
|                                 | Responsibility                                  | 0.188                              | 2        |
|                                 | Respect for patients and their privacy          | 0.187                              | 3        |
|                                 | Honesty and integrity                           | 0.160                              | 4        |
|                                 | Lifelong learning                               | 0.84                               | 5        |
|                                 | Cultural competence                             | 0.077                              | 6        |
|                                 | Teamwork                                        | 0.052                              | 7        |
|                                 | Appearance                                      | 0.041                              | 8        |
| Artistic skills                 | Handicrafts                                     | 0.616                              | 1        |
|                                 | Esthetic vision                                 | 0.384                              | 2        |
| Cognitive skills                | Reasoning and decision making                   | 0.290                              | 1        |
|                                 | Spatial thinking                                | 0.249                              | 2        |
|                                 | High precision                                  | 0.223                              | 3        |
|                                 | Creativity                                      | 0.157                              | 4        |
|                                 | Critical evaluation and thinking                | 0.080                              | 5        |
| Communication and interpersonal skills | Communication (verbal, nonverbal and listening) | 0.266                              | 1        |
|                                 | Patience                                        | 0.240                              | 2        |
|                                 | Kindness                                        | 0.159                              | 3        |
|                                 | Compassion                                      | 0.130                              | 4        |
|                                 | Openness/good moral                             | 0.127                              | 5        |
|                                 | Empathy                                         | 0.082                              | 6        |
| Management skills               | Time management                                 | 0.481                              | 1        |
|                                 | Challenge management                            | 0.294                              | 2        |
|                                 | Management and leadership                       | 0.224                              | 3        |
| Personal characteristics        | Stress management                               | 0.381                              | 1        |
|                                 | Self-confidence                                 | 0.260                              | 2        |
|                                 | Psychological sense                             | 0.184                              | 3        |
|                                 | Self-possession                                 | 0.097                              | 4        |
|                                 | Open to criticism                               | 0.078                              | 5        |
training each of the skills. Some skills seem to need an independent curriculum, and others may need to be in an integrated curriculum. It is also suggested that this research be done at various dental schools.

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The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

REFERENCES

1. Osman WA, Girardi A, Paull M. Educator perceptions of soft skill development: An examination within the Malaysian public higher education sector. Int J Learn 2012;18:49-62.

2. Schulz B. The importance of soft skills: Education beyond academic knowledge. J Lang Communication 2012;49:146-54.

3. Robles MM. Executive perceptions of the top 10 soft skills needed in today’s workplace. Bus Communication Q 2012;75:453-65.

4. Oxford English Dictionary. Definition: Soft skills. Oxford English Dictionary; 2016. Available from: https://en.oxforddictionaries.com/definition/soft_skills. [Last accessed on 2018 Jun 23].

5. Lippman LH, Ryberg R, Carney R, Moore KA. Workforce Connections: Key “Soft Skills” that Foster Youth Workforce Success: Toward a Consensus across Fields. Washington, DC: Child Trends; 2015.

6. Kechagias K. Teaching and Assessing Soft Skills, MASS Project Report. Neapoli, Greece: School of Thessaloniki; 2011. p. 189.

7. Dalaya M, Ishaquddin S, Ghadage M, Hatte G. An interesting review on soft skills and dental practice. J Clin Diagn Res 2015;9:ZE19-21.

8. Chan CK, Fong ET, Luk LY, Ho R. A review of literature on challenges in the development and implementation of generic competencies in higher education curriculum. Int J Educ Dev 2017;57:1-0.

9. World Health Organization. Skills for Health. Skills-Based Health Education Including Life Skills: An Important Component of a Child- Friendly Health- Promoting School. Information Series on School Health. Geneva: World Health Organization; 2003.

10. Ministry of Higher Education, Malaysia. Soft Skills Development Module for Higher Learning Institutions. Kuala Lumpur: University Putra Malaysia Press; 2006.

11. Zhang A, Blakey P. Peer assessment of soft skills and hard skills. J Inf Technol Educ 2012;11:155-68.

12. Flaherty K. Soft skills: The critical accompaniment to technical skills. Am Med Writers Assoc J 2014;29:70-2.

13. Lau Y, Wang W. Development and evaluation of a learner-centered educational summer camp program on soft skills for baccalaureate nursing students. Nurse Educ 2014;39:246-51.

14. Ashbaugh JL. The hard case for soft skills and retention. Staffing woes may be related to poorly developed soft skills in your leaders. Healthc Exec 2003;18:59-60.

15. Gonzalez MA, Abu Kasim NH, Naimie Z. Soft skills and dental education. Eur J Dent Educ 2013;17:73-82.

16. Gall MD, Borg WR, Gall JP. Educational Research: An Introduction. New York: Longman Publishing; 1996.

17. Krippendorff KH. Content Analysis: An Introduction to its Methodology. London: Sage Publication; 2003.

18. Strubert Speziale HY, Alen J, Carpenter DR. Qualitative Research in Nursing. 3rd ed. Philadelphia: Williams & Wilkins; 2003.

19. Saaty TL. Fundamentals of Decision Making. Pittsburgh: RWS Publications; 1994.

20. Virtue SM, Pendergast L, Tellez M, Waldron E, Ismael A. Identifying noncognitive skills that contribute to dental students’ success: Dental faculty perspectives. J Dent Educ 2017;81:300-9.

21. Van der Berg-Cloete SE, Snyman L, Postma TC, White JG. South African dental students’ perceptions of most important nonclinical skills according to medical leadership competency framework. J Dent Educ 2016;80:1357-67.

22. Langlois J, Bellemare C, Toulouse J, Wells GA. Spatial abilities and technical skills performance in health care: A systematic review. Med Educ 2015;49:1065-85.

23. ADEA competencies for the new general dentist: (As approved by the 2008 ADEA house of delegates). J Dent Educ 2017;81:844-7.

24. Broder HL, Janal M, Mitnick DM, Rodriguez JY, Sischo L. Communication skills in dental students: New data regarding retention and generalization of training effects. J Dent Educ 2015;79:940-8.

25. Montero-Marín J, Piva Demarzo MM, Pereira JP, Olea M, García-Campayo J. Reassessment of the psychometric characteristics and factor structure of the ‘Perceived Stress Questionnaire’ (PSQ): Analysis in a sample of dental students. PLoS One 2014;9:e87071.

26. Pozos Radillo BE, Tórrez López TM, Aguilera Velasco Mde L, Acosta Fernández M, González Perez GJ. Stress-associated factors in Mexican dentists. Braz Oral Res 2008;22:223-8.

27. Baidas LF. Comparison of the confidence level of final year dental students in general practice between two Saudi dental colleges in Riyadh. EC Dent Sci 2017;8:38-47.