

The Examination of the Reasons for the Need to Change and Integrate in the Dental Curriculum in Iran and the World

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Objectives The aim of this research was to examine the reasons for the need to change and bring about integration in the dental curriculum in Iran and worldwide.

Methods The qualitative method was used in this research. The real experiences of some reliable universities over the world and in Iran were studied on the necessity to change the dental curriculum and the integrated curriculum through library studies. In addition, the information obtained from this study was analyzed and interpreted based on the theoretical reasoning and empirical achievements of the authoritative and reliable universities.

Results The result of the examination of these experiences of the various universities on the modification and integration of the dental curriculum showed that the high cost of education in this discipline and dissatisfaction of the students with the teaching methods in this field were among the most important reasons for the change in the dental curriculum in Iran and globally. The integrated pattern of the curriculum of the universities was associated with the positive consequences on the review and applied changes in the dental curriculum.

Conclusion In total, the axis of the activities of changing and modifying the curriculum in these universities was established by the focus on the integrated approaches, including "educating research", "the evidence-based dental", and "entering new knowledge in the dental curriculum".

Keywords Curriculum, Education, Dentistry

Introduction

The depth and expanse of public expectations from the field of dental medicine are enhanced and this led to a considerable increase in the demand for dental services during the last quarter of the twentieth century. Some of these demands are intensified by the available social trends, especially the growth of democracy in many parts of the world and today, both states as well as the public demand for accountability as well as a qualitative change in the healthcare services with a greater emphasis on health promotion and disease prevention.

The growth in technology and life sciences has had a fundamental contribution toward meeting this demand. The demand to apply the changes emerges in various forms, such as the Global Meeting of Medical Education. The fields for changing the dental curriculum in the given meeting, which was held in 1993, were introduced as follows: 1) demographic changes including population aging; 2) strong need for emphasis on prevention; 3) continuously increasing costs of health care; 4) Diverting the path of health care under influencing market pressures and commercialization; 5) Information explosions in various fields of medical sciences, including dental. In addition, it has been stated in this declaration: "The duties of dentists in the new world are to promote oral health and prevent the diseases that are associated with them as well as provide primary care." They should relieve the patients compassionately and based on the morality.

In addition, there should be effective managers in health care groups who can take responsibility for the care and support of the patients and community, communicate effectively, be critical thinkers, have the skill to use information, and apply social sciences and behavioral sciences in their work with good results as well as be intrinsically motivated toward lifelong learning.¹ Hence, there is a global need for a change in the educational curriculum of general dental science as well as in Iran.² The idea of "integration" is used in the education system, in general, and in the dental education system, in particular, to meet this aim.³ Integrating the curriculum means connecting and combining the content of the curriculum to provide solidarity to the student's learning experiences.⁴ The pattern of the integrated curriculum is from an expert and the guidance provided by her/him (medical education and curriculum planning) to optimally organize and successfully integrate the curriculum.^{5,6}

The distinction between educating "basic sciences" and "clinical sciences" had been made by the curriculum, which is based on the tradition that is most dominant in the field of dental education. According to this tradition, the "theoretical" curriculum is preceded by the "practical" curriculum during the time of education to observe the principle of the sequence. At the same time, this tradition of education has an extensive emphasis on "disciplines" and "social issues" that are often neglected. While the realities dominate, the new scientific and social world indicates that they should be coordinated and associated with the

operational disciplines, such as dental, practical, and theoretical education.⁷ The curriculum of the General Dental Ph.D. Course, which is being implemented in Iranian dental faculties, has been categorized into subject/thematic units and each educational subject has been planned separately.^{8,9} The two fundamental features of this curriculum include the separation between theoretical and practical educations and to plan one of them (practical) based on the other one (theoretical) as well as the separation between the theoretical and practical courses is done according to the disciplines and branches of science. These two features have emerged based on the decisions of the dental curriculum planners about applying the two types of "communication" that exist between the components of the curriculum content, which have been included based on the order of two features, namely, "vertical communication" and "horizontal communication".¹⁰

It can be stated that the principles of the integrated curriculum have not been practically chosen and followed in this plan by examining the current pattern of dental curriculum, which is implemented in Iran and the other features that govern it, such as the separation of basic sciences from each other as well as from the clinical and subject-oriented sciences while disregarding the creation of the discussions between the horizontal and vertical communications. Therefore, it is must use the adequately integrated approaches in the dental curriculum proportional to the Iranian ecosystem to update it by paying attention to the past effects and consequences experienced while applying the integration process into the dental curriculum.¹¹ This has been attempted in this research to examine the necessity for change and offers integration in the dental curriculum by examining the integrated approaches in the curriculum of the world's reliable universities. This research aimed to identify the reasons for the need to change and integrate the dental curriculum globally as well as in Iran, according to the mentioned literature. It is hoped that if the integrated cases are correctly used in the design of a particular pattern of the dental curriculum, ground-breaking and essential services will be provided to the population of dentists as well as the public.

Materials and Methods

This is a historical research which is considered a qualitative research. In its implementation, it has been tried to study the integration of the dental curriculum with an analytical perspective using available resources and documents. Historical research examines certain issues at a specified time, and the researcher evaluates the integrity of the material to interpret and analyze the information. Given the theoretical nature of the research, the data gathering tool was taking notes through the study of documents. The notes were taken by researchers who were faculty members at School of Dentistry of Shahid Beheshti University of Medical Sciences and Member of Academic Board of Education Department Ministry of Health, Treatment and

Training and Ph.D. curriculum. For this purpose, the literature on the integrated curriculum was studied and the documents were used to collect information about the general dental curriculum in Iran and other reputable universities in the world. This review has been limited to a specific time frame: it was limited to examining the status of Iran during the period covering the current program and foreign universities from 2000, which are among the newest examples. In order to access resources, in addition to referring to prestigious universities in Iran (Faculty of Dentistry of Shahid Beheshti University of Medical Sciences, Faculty of Dentistry of Tehran University of Medical Sciences, Faculty of Dentistry of Islamic Azad University, Shahed University, Kerman, Isfahan, and Tabriz Universities of Medical Sciences), the study of scientific and research documents was also carried out using the "Spider's Web" method. In this method, each source can provide clues from other sources and lead the research to new information. This method was especially used to obtain information about sources outside of Iran. To collect information, a targeted, organized search was used. To access a wide range of scientific texts, Google Scholar and Alta Vista search engines were used. Also, medical databases such as PubMed and MEDLINE were used, and to access bibliographies, databases such as ERIC and RDRB were used. In these databases, keywords such as integration, integrative curriculum, dental school, dental curriculum, higher education, the basics and elements of dentistry syllabus, types of integration, and other related terms were used to search for theoretical literature and research backgrounds since 2000. It was also visited on the website of dental schools to reach the dental curriculum of the reputable universities of the world. Therefore, methods such as document analysis, comparative study, and review of documentation were used during the study. In general, in this method, the initial plan of information is compiled based on the main questions and is being sought in the resources. To analyze the data, the method of theoretical analysis focused on the questionnaire was used. In this method, the data are combined to form a comprehensive and logical answer, and their defensible organization is the basis for determining the validity of the method.

Results

Considering the changes in the field of knowledge and socio-economic changes of societies, the need for revision and changing the curriculum of universities and higher education institutions is even more evident.^{12,13} Such factors are more evident in certain disciplines such as dentistry with greater speed and strength, as in the field of dentistry, the level of services is introduced globally, and because these services have "general" and "quantitative" aspects, the general public is applying for it.¹⁴ Accordingly, the discussion of "global necessities" and "indigenous

necessities" of curriculum change was put on the agenda to provide a "need assessment" for curriculum change and provide the necessary infrastructure for "drawing a favorable situation".¹⁵ Indigenous necessities are derived from the current realities of the current Iranian society and the status of its universities and the "global necessities" of the international experiences of the world's major universities on the revision of dentistry curricula, which are discussed below.

A) Indigenous necessities of dental curriculum modification
In the study of indigenous needs, the need for a change in Iran's dental curriculum was found by studying the existing sources and documentation (Table 1).

Table 1- Indigenous Needs of Oral Health in Iran

1	Prevention of dental caries in children and proper treatment of teeth in children
2	Prevention and treatment of common oral and dental diseases (tooth decay, soft tissue diseases of the mouth and fluorosis)
3	Prevention and treatment of oral cancer
4	Improving the level of oral health throughout the country
5	Prevention and treatment of native oral and dental diseases in any geographical region of Iran
6	Use of the latest global technologies for the prevention and treatment of oral and dental diseases

B) Global experiences in dental curriculum reform

Global experiences in dental curriculum reform showed that integration in dental education is undoubtedly needed, and most dental schools have switched to academic dentistry in their curriculum. Therefore, integration has

been accepted as an essential educational strategy in dental education. The integration is generally divided into horizontal and vertical categories:

A) Horizontal integration: The integration between parallel disciplines is called horizontal integration; however, it has been defined mainly with dental education to define the integration of the basic sciences with each other or the integration of clinical sciences with each other.¹⁴ This kind of integration has already been implemented in about ten percent of the universities in North America (such as Pennsylvania, Maryland, and Ohio) and is considered as one of the fundamental measures in the new reforms plan of most universities around the world.

B) Vertical integration: Integrating the disciplines that are taught in the usual state in different courses. Usually, this kind of integration is defined regarding dental education as the integration of the basic sciences, pre-clinical, and clinical sciences (pre-clinical and clinical sciences into basic sciences, and basic sciences in pre-clinical and clinical sciences).¹⁴

There may be both horizontal and vertical integration in an educational program. Integrating both, in addition to creating a more understandable meaning on the different concepts, usually increases the effectiveness of the system and this is known to be a critical factor in providing an effective educational program. The experiences of the world's dental universities, summarized in Table 2.

Table 2- Global experiences in the integration of different dentistry curriculum

No.	Universities which have completed Integration	Integration issue	Reasons	Type	Compliance with the current status of Iran's current program
1	Toronto UK Texas Marquette	Basic sciences together (basic science education packages)	- Raise the student's motivation - Integration of practical courses with theoretical courses	Horizontal	Available in the current program
2	Harvard Japan	Basic science in clinical sciences	- Enabling students to do the best and most of the tasks	Vertical	Available in the current program
3	Baylor Louisiana Wales	Oral hygiene with public health; creating a unit called dental care	- Integration of basic sciences and clinical skills and treatment of the first patient	Horizontal	Available in the current program
4	Ankara Sheffield	Pediatric dentistry emergency department in pediatric dentistry unit	- More durable information and more useful	Horizontal	Available in the current program
5	Connecticut	Dental preventive and pediatric dentistry unit	- Familiarity with systemic diseases and their association with oral and dental diseases	Horizontal	Available in the current program
6	Germany Netherlands	Microbiology course with periodontitis	- Rising patient satisfaction level in the community	Vertical	Available in the current program
7	Pennsylvania Toronto	System organs based on basic medical sciences and clinical communication of topics	- Raise the quality of work life & commitment to the program	Vertical	Available in the current program
8	Virginia Harvard Boston	Oral disease unit, oral pathology and oral & Maxillofacial Surgery	- Strengthening the disciplined approach and encouraging students to communicate between oral diseases and comprehensive therapy	Horizontal	Available in the current program
9	Sweden Switzerland Indonesia	Pre-clinic in the department of pediatric dentistry with pre-Clinic of the restoration & endodontics department	- Rising efficiency of students in the clinic	Vertical	Available in the current program
10	Sydney Pennsylvania	Research design, advanced & applied critical statistics into dentistry	- Rising efficiency of students in the clinic	Vertical	Available but require an overview

11	England Baylor Wales Germany	curriculum A medical approach in clinical dental services (dental diseases with general diseases) (medical & dental education)	-Emphasis on the relationship between theoretical knowledge with clinical & practical knowledge	Vertical	Available but require an overview
12	Connecticut Canada (Toronto) Virginia Marquette	Education of dental caries & oral health into the children & children's family	-Understanding the health & oral & dental diseases	Vertical	Available but require an overview
13	New Jersey Indiana	Professional ethics and behavior in dentistry	-Creation of a unique integration between basic science & clinical research findings through the Biodontics education	Vertical	Available but require an overview
14	England Baylor Wales Germany	Disease-based dentistry course in the curriculum	- Students' ability to diagnose problems in the treatment of patients and the ability to respond based on evidence	Vertical	Required lessons to complete the current program
15	Netherlands Belgium Sweden Switzerland Dundee	Medical emergencies in the dentistry curriculum	- Comprehensive care of the patient	Vertical	Required lessons to complete the current program
16	Austria Taiwan Colombia	evidence-based dentistry in the curriculum	- Early encountering students with clinical discipline(private and individual performance by students)	Vertical	Required lessons to complete the current program
17	Swiss Hindi	New sciences in dentistry	-Using a quality assessment method Improves learning; Increases the interaction between teachers; Works with less stress in the clinic; More suggestions from professors presented to the students regarding the correction of practical tasks	Vertical	Required lessons to complete the current program
18	Colorado Columbia Illinois	Designing a treatment plan in the dentistry curriculum		Vertical	Required lessons to complete the current program

Discussion

The trends of the changes in the dental curriculum were noted at Iran and colleges from the countries of North America, Europe, Asia, and Australia, especially in the universities of Marquette, Texas, and Connecticut (North America) and then, the reasons for the changes and reforms introduced into the dental curriculum as well as the introduction of the integrated dental curriculum were specified.¹¹⁻²² Many healthcare crises and dissatisfactions of the dental students were the main reasons for introducing changes to the dental curriculum. The findings of this study showed that the following cases are some of the most important reasons for the need to change and integrate the dental curriculum in Iran and the world:

- 1. Convoluted:** Extremely busy, unmanageable, inflexible, out-of-the-subject, discrete dental curriculum, and basic science materials are not related to the behavioral and clinical sciences. Meanwhile, the educational system is based on the principle of knowledge preservation rather than providing emphasis on reason, logic, critical thinking, and evidence.²¹
- 2. Costs:** The cost of dental education is high and students usually have financial debt and this issue negatively affects their learning. This problem results in a decrease in the occupational ability of the new graduated people and, in spite of the demand and the need of people, engage in primary dental/dental care.^{15, 16}

- 3. Dissatisfying to consumers (dental students):** Inactive learning and learning based on memorization leads students to stray far away from being a critical thinker and a permanent learner.¹⁸
- 4. Acquiring the abilities that are approved by the American Dental Education Association (ADEA).** These abilities include critical thinking, professionalism, communication and interpersonal skills, health promotion, performance and information management, patient care, and creation and maintenance of oral health care.^{23, 24}
- 5. Scientific discoveries and the integration of knowledge with each other:** The entry of modern and up-to-date sciences including educational and psychological sciences in the dental curriculum seems necessary since behavioral and social sciences help to establish a scientific, spiritual, and humanistic climate in dental education.²⁵
- 6. The need for evidence-based oral health education:** Professors should present medical strategies based on the evidence and criticize them academically (in practice to students); patient care should be done based on a critique and the evaluation of the best scientific evidence, and should be the focus of patient care in dental education.^{25, 26}
- 7. The entry of new knowledge in dental education:** The entry of new sciences into the field of dental medicine is a fundamental requirement. These new sciences are from the fields of molecular biology,

genetics, tissue engineering, nanotechnology and informatics currently^{20, 21}, they have had a slow entry in the dental field; therefore, issue should be resolved quickly.

Other findings from this study are the reasons for the need to integrate the dental curriculum. In this regard, it should be said that dental education usually begins with the education of basic biomedical sciences and ends with patient care learning in pre-clinical and clinical courses.² The traditional dental education programs consisted of distinct specialist blocks (separate courses), such that it is assumed that at the end of the course, the student will be able to effectively manage the diseases by placing a number of blocks together and placing other blocks on these blocks. A general dentist should have the ability to access the necessary knowledge, skill, and attitude in order to provide effective care at the time of confronting the problems of his/her patients.^{1,6} Each component of this knowledge, skill, and attitude is formed in specialized, separated blocks that have been formed over a period of five to six years, and it is assumed that each graduated person, at the end of his/her education, will be able to combine these components together.⁷ This final and ultimate objective of the curriculum has been delegated to chance in the traditional educational program, since it is only an assumption that each student will be able to integrate his/her knowledge and achieve this ability. This process of integrating and solving the ultimate problem existing in these programs has been delegated to the student, and their existence or absence is usually not precisely evaluated. This concern was confirmed by the students who have successfully passed the final comprehensive evaluations that act only to measure the theoretical knowledge, but these students have serious problems in diagnosing and managing their patients.^{22, 25} Hence, although the integration process should be embedded into the minds of the students, the curriculum should also be organized in order to meet this objective. Therefore, integration has been accepted as an important educational strategy in dental education.^{4, 5, 14} In fact, integration and organization of the educational materials is being done in order to establish a distinct relationship between them or the integration of the materials, which are often taught separately in academic courses or departments,

needs to be done.¹⁸

The integration, in addition to creating a more understandable meaning regarding the different concepts, usually increases the effectiveness of the system and this is known to be a key factor in providing an effective educational program.^{10, 11} In the traditional educational system, unnecessary repetitions are common. Besides, considering the different teaching approaches available in the program, sometimes the concepts are not compatible with each other, which creates mental disturbance for the student. Integrating the educational curriculum by avoiding unnecessary repetitions and saving time leads to an increase in the effectiveness of the educational system.¹⁴ In addition, integration provides the possibility of allocating educational resources in a better and more logical method.²⁰ However, integration helps in reducing fragmented knowledge and effectively increases the probability of transferring the conceptual map of the unit which will enhance the efficiency of students.⁵

Conclusion

Hence, the need to adapt to the new social conditions and the need to pay attention to new methods and developments in medical education are among the main factors that necessitate a revision of the traditional dental curriculum. Considering the benefits of an integrated curriculum, such as increased motivation among students toward learning, more effective teaching, enhancement in the level of the educational objectives of remembering the knowledge to the level of application of knowledge, the strengthening of problem solving skills in students, increased communication and cooperation among professors, rationalization of the educational resources, and the creation of unity and relationship between medical disciplines, a general review of the dentistry curriculum, especially the topics required for combining basic sciences in pre-clinical and clinical courses of general dentistry, is recommended.

Conflict of Interests

None Declared ■

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