



Current curricular trends and future directions for dental education – The Indian perspective

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Abstract

Dental curriculum has not seen much modification for a few decades. The Medical Council of India has outlined contemporary educational strategies to incorporate the global and national relevance to the curriculum and also stressed on the training of attitudinal and communication skills in the clinical practice. Although these aspects are mentioned in the Dental Syllabus of India, the importance of these is not stressed. In the global scenario, many contemporary strategies have been proposed and introduced, but the outcomes and feasibility of such strategies have been questioned. There is no single curricular pattern which can satisfy all the requirements of a graduate. The institutions should tailor the curriculum based on the dental council guidelines and syllabus. In the current literature, there is no evidence of the development or assessment of outcomes of a contemporary dental curricular model developed which is culturally relevant to the Indian scenario. This paper is an endeavor to urge and motivate the dental facilitators to break the chains of conventional training and assessment strategies and open the possibilities of scientifically sound contemporary educational strategies. This is also the need of the hour to address the changing generation of trainees who are reluctant, withdrawing and showing resistance to the conventional educational patterns.

Introduction

Many decades back, in the training of health professionals, the students and scholars receive instruction from the practitioners to a large extent. With the advent of educational science among the health professionals, the knowledge to deliver the instruction in a methodical and scientific approach was realized, and efforts have been made by pioneering educationists to spread the philosophy and principles of education through various faculty development programs.^[1] However, in the Indian scenario, dynamic centers which have the wealth of equipped health professional educators are very minimal. There is still a lack of impetus among the upcoming educationists to make the change.^[2]

In Indian Dental Curriculum, the undergraduate education focuses mainly on the procedural skill training. The quota system proposed by the Dental Council of India drives the student to perform the number of cases. In internship, as the students do not take up exams, their training is simplified to the mere presence of the ward in the respective departments. They are used mainly to dispose of cases, to be supportive of postgraduates and the

department managerial jobs.^[2,3] In fact, during the internship, there is no structured curriculum designed for the residents during their period of stay in the institution other than the quota of cases mentioned by the council.^[4] Although words such as competency, communication skills, and professionalism are mentioned in the syllabus, institutions have not taken them in the right sense and the reform it is intended to create.

In the global scenario, many dental schools which have realized such deficiencies are marching towards competency-based curriculum. It is a serious wake-up call to all dental educators to think globally and acts locally in their respective places.^[5]

It is the responsibility of the institution and the dental educators to chart a curriculum which should be tailored and made palatable for the stakeholders. The syllabus is given by the council with a large flexibility for changes and reforms. Desirable changes would be to have directives globally from various councils and unions for convergence for standards for dental education to provide globally competent dentists.

Being one of the highest populous countries, with abundant resources and manpower, there are serious challenges which are faced in spite of abundant opportunities available in the field of dental education. There is no question on the theoretical acumen of dental professionals who are trained in institutions. Most of the educational training for students who are high achievers or low achievers alike are focused on obtaining pass or good marks in the summative assessment. Decision-making skills and critical thinking to solve problems are lacking in the training of undergraduates. Such skills may also form a strong base to motivate the students to research as they grow higher in the field. With the lack of such training future professionals are not motivated to perform research or produce quality research.

The Dental Council of India has outlined guidelines which have tremendous scope for innovations in the curriculum.^[4] The evaluation aspects however may not have the scope for flexibility. It is to be understood that we are training the doctors of tomorrow with the dentists of today with the curriculum of yesteryears.

The dental undergraduate is expected to perform 75–80% of the procedures during their presence in the institution. The procedures are assessed during the examination. The number of times the graduate performs a procedure may also be inadequate to be assessed in a summative examination. Formatives play a very minimal or no serious role in the assessment of the graduate.

Another challenge is the input process which should involve highly motivated students to join dentistry. In the Indian scenario, with the rapid increase in the number of colleges, the students' cohort does not reflect the motivation to join the profession. There is no scope for tests of aptitude during the selection process to take up dentistry as a profession.

Student engagement in conventional training may not be possible. We need to engage them with a training curriculum which could demonstrate relevance. Moreover, the clinical settings and classroom settings may not provide the infrastructure to incorporate a stimulating learning environment.

The aforementioned issues cannot be generalized to all Indian Institutions. There are certainly few institutions which have demonstrated the mission steps to achieve the vision of a progressive curriculum. To address the above problems, there is a strong need for revival in the dental curriculum. The purpose of the article is to provide the readers with an outline of the existing curricular systems in the field of dentistry and provides possible options as guidelines to design a progressive curricular model in their workplace.

Evolution of Curricular Models for Health Professions Education

Educational evolution has driven the curriculum from a structureless mode to Gurukul mode and the most recent elaborate network of activities based on sound scientific principles in education.

The technical/scientific model is based on logical reasoning and adapted from general educational philosophies and

principles, whereas the nontechnical is more centered on the student, individualized, concentrate of the type of learning, subjective, and personal. The Tyler and their kind of curriculum form the technical models.^[6,7]

The remarkable breakthrough in the approach toward education is a shift from teacher centered to student centered. Some other educationists, namely, Ornstein and Hunkins in 2009 came out with yet another design classification as subject centered, learner centered, society centered, and discipline centered.^[8] Many dental schools follow the discipline centered curriculum for the sake of convenience and even have compartmentalized patient care and work in silos according to disciplines.^[9] A few dental schools have broken the norms of in silos discipline-oriented learning and opened up a platform for comprehensive treatment by training with facilitators across discipline. However, majority of other colleges seem satisfied with age old system of training.

Neary in 2003 have mentioned two models in the curriculum. The “process model” which emphasizes activities and effects and the “product model” which emphasizes intentions and plans.^[10] The product model could be seen as an adaptation from an earlier model by Tyler in 1949, which was a major influence on education in America. As early as 1938, Dewey has mentioned that the tailoring of the curriculum is better and it is often a blend of the philosophical and psychological basis of learning a particular discipline.

Blended design concepts such as the SPICES – acronym of Student Centered, Problem Based, Integrated, Community based, Electives, and Systematic developed by Dr. R. M Harden have been accepted as one of the innovative, effective approaches toward health professions education.^[11] Competency and outcome-based curricular design which has been suggested in a candid manner over the years and has emerged as a strong model in the past decade. Many educationists have suggested core competencies from a health professional point of view.

The Accreditation Council of Graduate Medical Education (ACGME) has proposed medical knowledge, practice-based learning and improvement, patient care, systems-based practice, professionalism and interpersonal skills and communication as core competencies.^[12] We are able to appreciate that the interpersonal skills and communication skills forming a separate entity. It is no more linked with professionalism. The assessment of above listed competencies for all skills required of a health care professional should be carried out by a trained facilitator. The American Dental Education Academy (ADEA) has also outlined competencies similar to the ACGME competencies, but more relevant for a dentist. The Indian Dental Fraternity has not framed any uniform format through regulations for competencies. A few individual universities have created their own system of assessment. These disparities have led to the complacency of many institutions as a pressing need was not felt.

Despite advancements in assessment, the majority of institutions stick to a conventional assessment system without the focus on objectives based on competencies. The assessment of the level of competence can be done by the Dreyfus model

of checking competency.^[13] Newer workplace assessment tools such as direct observation of procedural skills and mini-clinical evaluation exercise for assessment of procedures and diagnostic skills should find its place in the modern curricular for the undergraduate or postgraduate dentist.^[14,15]

Requirements for a dental curricular model

No curriculum which is designed today can be considered as permanent. It is prone to amendments, revisions of a major redesign. It should be understood that once designed even the best of the curriculum design cannot be used forever. It should also be understood that the curriculum is not a universal recipe for all institutions. As the curriculum is a part of the education system, it requires the characteristic of a good system which is flexible and open. A rigid curriculum with all details would reduce the ability of the facilitators to explore their creativity and try innovations in teaching learning and evaluation methods. The design of the curriculum in a health-care system should also be appropriate for the culture, race, and disease patterns native to the institution.

There are various models in vogue based on sound educational philosophies. A progressive or a hybrid curriculum would be relevant to the current situation. Problem-based learning curriculum approach had practical problems which prevent them from being incorporated into all learners. The integrated curricular approach which focuses on comprehensive problems with the involvement of various disciplines in health-care demands infrastructure, taskforce, elaborate planning, and designing of each module. SPICES model by Harden in 1984 was proposed to develop the skills required by the health-care professional in a systematic, student-centered manner and also imparted training with problem-based, integrated approach. Electives provided freedom and flexibility to choose the subject of choice for the student. Contemporary assessment tools should find its place in the evaluation of achieved competencies.

Seeding foundation for a new curriculum

A new curriculum could be designed with a thorough evaluation of the background, data from the stakeholders, council regulations, community needs, and global benchmarks. If the curriculum is a revision of the previously existing curriculum, then we should be double sure before implementing any change. Change for the sake of it would not enable enhancing the quality of a desirable outcome. Hence, a situation analysis is mandatory to understand the pitfalls, advantages, and disadvantages. A situation analysis should be carried out with thorough feedback from stakeholders of a particular program for which the curriculum would be designed. If competency-based education needs to be adopted, the need should be felt among the implementers and the stakeholders. Delphi technique or nominal group technique can be used to perform an analysis to identify lacunae and pitfalls in the existing curriculum.

The identity of a model curriculum in dentistry is still to be established. A hybrid model of the curriculum with a prudent blend of advantages in different curricular models would be the

best to suit the needs and demands of a particular institution. Many curricular models were proposed based on the existing knowledge, relevance to the institution of the authors and locale to the community where they live.

The Indian Dental syllabus guidelines in the Dental Council of India regulations have given enormous possibilities and scope to impart innovation and experiment with global trends in teaching learning and evaluation. For example, objectification of practical examinations in objective structured clinical examination format is mentioned, which many of us fail to recognize and conveniently ignore for various reasons.

With the concept of transformative education, the future students in health-care professions are supposed to be “change agents” with their unique and remarkable attributes needed for tomorrow’s doctors. Managerial skills, professionalism, and communication skills are to be embedded in the curriculum of any health-care profession.

Not all changes or revisions are desirable. Bringing about a desirable change is needed, which involves the active involvement of facilitators at all levels. Action research should be encouraged which could provide immediate results and correction and implementation at a small level to evaluate the outcomes. With the assimilation of outcomes of such research, the curriculum can be tailor-made to suit the institution. Many of the budding facilitators feel that curricular designing is beyond their realm and they are not empowered to contribute in the process. The freshness of ideas and wisdom from experiences should work together to create the curriculum which is customized for the requirements of the institution.

The Process with a Viable Example

The first step would be the list of entrustable professional activities (EPA)/skills, which the undergraduate dentist should master. They are to be made from the relevance, commonality, requirement, expectation of an undergraduate or postgraduate [Table 1]. The EPAs should be executable independently, observable by a trained facilitator and the process along with the outcome which must be measurable.^[16] The next step would be defining competencies for each EPA.

The American College of Graduate Medical Education guidelines and ADEA have outlined competencies which are desirable and need to be demonstrated by a health-care professional. For dentistry, the attributes expected of an undergraduate or a postgraduate are explained in Table 2 with the attributes of each competencies. The competencies are also mapped to the domains so that appropriate teaching or training strategy and assessment method can be adopted. Here, it should be noted that skill or activity is different from the competency. Competency refers to the behavior demonstrated by the trainee in a particular skill.

The next step would be assessed using milestones based on Dreyfus original model of achieving clinical competence which ranges from Novice-Advanced Beginner – Competence – Proficiency-Expert in five levels. For an undergraduate or a

Table 1: Entrustable professional activities

Entrustable professional activity/skills
Ability to diagnose and plan treatment for common diseases and conditions of teeth and oral cavity, define the role of the general dentist in handling such conditions and timely referral to specialist.
Ability to effectively motivate the public toward good oral hygiene practices, educate them to follow oral hygiene measures and to abstain from habits that could prove detrimental to the health of the dental and oral tissues.
Ability to diagnose early disease states or conditions that would require early recognition, such as incipient carious lesions, premalignant lesions, developing malocclusions, growth and developmental disorders, and to carry out preventive and interceptive measures by timely referral to the specialist.
Ability to diagnose pain in relation to head and neck arising due to odontogenic or nonodontogenic causes and outline the line of treatment for such conditions.
Ability to effectively use diagnostic adjuncts such as casts, biopsy, cytological examination, radiographs, blood investigations to arrive at a confirmative diagnosis and to correlate the results with clinical findings to arrive at a definitive diagnosis.
Ability to choose an appropriate treatment from the available options for common oral conditions and to assist the patient in decision making by explaining the pros and cons of individual procedures.
Ability to prescribe the appropriate pain killers, antibiotics for common infections, diseases or conditions of the oral cavity.
Ability to correlate the impact of systemic health on the oral cavity and vice versa and to seek medical opinion through appropriate referrals.
Ability to perform behavioral management with applied principles of child psychology in children requiring dental treatment.
Ability to recognize a child with special care needs, identify the limitations during treatment and realize the need for referral.
Ability to perform dental and oral procedures in a pediatric or geriatric patient and to involve the guardians or parents during treatment planning and management.
Ability to perform extractions and minor oral surgical procedures under local anesthesia.
Ability to perform early management of traumatic injuries to head and neck, carry out emergency procedures, to prescribe appropriate investigations, and carry out emergency referrals.
Ability to identify common medical emergencies in dental office such as bleeding, syncope, seizure, hypoglycemic episode, hyperventilation, and anaphylaxis, to manage the same within the scope of a dental surgeon and also realize the need for early medical intervention.
Ability to assess vital signs, perform basic life support, and administration of intramuscular, intravenous, and subcutaneous injections in appropriate situations.
Ability to carry out restorative procedures, endodontic treatment with regular as well as recently available materials and to assess the outcomes.
Ability to carry out replacement procedures for missing teeth with removable and fixed prosthetic options, to the satisfaction of the patient.

(Contd...)

Table 1: (Continued)

Appreciate the principles of esthetics as related to dental restorations and replacements and provide optimal results in restorations and replacements.
Ability to identify diseases of the periodontium and devise management protocols for the same.
Ability to carry out preventive procedures such as oral prophylaxis using ultrasonic and hand instrumentation, pit and fissure sealants, fluoride application, and early replacement of missing teeth.
Ability to realize the importance of laboratory support and be able to guide the technicians involved in the fabrication of restoration and replacements.
Ability to perform comprehensive dental care, with an interdisciplinary case management strategy.
Ability to organize and execute public health programs.
Ability to perform simple epidemiological research for assessment of demographical status, incidence or prevalence of a disease or condition.
Ability to identify the community needs in the prevention of a dental or oral disease and to carry out an action plan for prevention or management of the same.
Ability to carry out community-centered practice at rural health set up and perform primary care services such as scaling, restorations, and simple extractions.
Ability to follow universal precautions, practice sterilization, and asepsis during dental procedures and waste management.

Table 2: Domain and competency link

Domains	Competencies	Attributes
Cognitive	Dental/Medical knowledge	Higher level of thinking, Critical thinking, decision-making skills through integrated, interdisciplinary approach, evidence-based dentistry
Psychomotor domain	Procedural skill	Patient care, Systems-based practice, use of information technology
Attitudinal domain	Interpersonal and communication skills Professionalism	Rapport development, counseling, interdisciplinary communication and referral and teamwork Code of conduct, ethical practice, discipline,

postgraduate, the expected level of competency can be fixed according to the demands.^[13] A simplified milestone assessment may also be carried out with scoring of -1 below par, 1 on par, and +1 beyond par. These milestones are developed for each competency. An individual may score more on procedural skill but less on medical knowledge. Timely feedback can be given to improve that particular competency.

An example of an activity is mentioned in Table 2. Each activity would comprise a theoretical component which is planned to trigger a higher level of thinking a procedural component where the training of the manual activity with precision and accuracy is carried out and an attitudinal or behavioral component which

Table 3: Outline of procedures department wise

Domains	EPA no	Teaching-learning method	Assessment
Impression making in edentulous arch			
Theoretical [Cognitive domain] Classification of impression materials, trays, theories of impression making, water powder ratio, disinfection protocol Advantages and disadvantages, Precautions and management of compromised conditions	17,27	Seminar, discussion	Q & A test, MCQs, Viva
Procedural [Psychomotor domain] Chair position, selection of tray, manipulation, disinfection, and preservation of impression	17,27	Demonstration, videos, learning on models, and apprenticeship	OSCE practical examination
Behavioral [Attitudinal domain] care for neatness, explanation of procedure, gentleness in handling, patient comfort	17,27	Roleplay, demonstrations	OSCE

involves training and feedback of abstract soft skills the trainee is expected to possess and demonstrate. The formative evaluation should be aimed at providing constant feedback for improvement. Without feedback development of competency is not achieved.

The undergraduate should be able to perform independently the basic procedures which are ought to perform in his routine dental practice. This should be the goal of any training program. The postgraduate education could aim at a higher level of clinical competence, where he would be able to teach and train a skill to another peer or a junior trainee. Listing of activities in various disciplines should be aligned with the main skill list from the institution. Procedures should address all the domains of learning. Formulate the objectives, mode of teaching-learning method and assessment methods [Table 3]. Checklists should be developed for each procedure and required level of achievement of each competency should be mentioned. (For an undergraduate an expert level of competency may not be needed). There are different notions on the use of rubrics and checklists with stringent scales of assessment versus global assessment. It was found that although checklists are best to assess competencies individually with respect to internal consistency, the return rates of global ratings were more.

The global benchmarks are used not only to set objectives but also to analyze the results of the evaluation in comparison with them, so as to understand the current state. The visionaries, policymakers who head the institutions, should have the caliber of an educationist to be an academic leader. Such a leader should be abreast with the latest happenings and trends in education and necessary changes can be brought also with the top-down approach. Action research with innovations and latest trends should be encouraged so that timely changes and responses could be observed from time to time.

The current trend of competency-based training approach for a dental graduate is the need of the hour. Here, an attempt is made to develop the EPA for a BDS undergraduate. The expected level of competency needs to be fixed by the trainer and trainee should be trained to satisfy the requirement.

Implementation and evaluation

The Curriculum Planner should observe for untoward consequences and plan for an immediate change in curricular

approach and implementation. Action research should be encouraged to detect errors, deviation, or any undesirable interim outcomes for timely change in the planned action.

Any process which is implemented goes through an evaluation of the curriculum with the responses from various stakeholders. The desirable change, which the new curriculum intended for health-care professions, would be reflected in quality patient care, teaching-learning activity and research which would be the three pillars which contribute to the growth and stability of an institution. The outcomes from these three areas should be compared with the educational objectives from institutional to specific learning objectives. The achievement gap should be identified and realistic objectives should be designed to minimize the achievement gap.

After a thorough evaluation of the outcomes, improvements and suggestions could be imparted in the framing of new educational objectives and the curriculum may be subjected to revision and improvement.

Conclusion

A simple viable approach to develop a competency-based curriculum for dental undergraduation is presented. The model may have many limitations, which would be known only after implementation. The model can be modified to suit the demands of the parent institution, resources available and the local relevance to make it more feasible and acceptable among the stakeholders.

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