

DENTAL EDUCATION- CURRENT SCENARIO AND FUTURE TRENDS

Abstract

Policy making in dental education and upgrading the emerging issues in dentistry is a continues process. An impactful dentistry comes from collecting new data on the topic of interest from the Dean, Program directors, Course directors, Faculty, PhD scholars, Post graduates and Undergraduate students. Thus, the latter will help in updating the discrete subject areas for better understanding in the field of academics and dental literature. Highly experienced academicians in dental education system serve as expert panelist, thereby discussing the major ongoing trends which require an emergency need to incorporate them under dental education. There is a basic need and considerations in dentistry as to how improve the quality of education, simultaneously incorporate the newer technologies into the subject or to project the newer emerging trends under continues dental education programs. Centers for dental research are chosen by many dental colleges across India in order to improve the research prospects of dental education for Undergraduate, Post graduates and PhD scholars. Thus, this article aims to provide an easy access with quality oral health care needs by maintaining a steady updated areas for the future dental needs.

Keywords: dental education, Dentistry, medical science.

Authors

Dr. Syed Ahmed Raheel

Professor and HOD
Department of Oral Medicine & Radiology
KGF College of Dental Sciences.
Kolar, Karnataka, India.

Dr. Saadath Afzaa S.A.

Assistant Professor
Department of Prosthodontics &
Crown & Bridge
Sri Rajiv Gandhi College of Dental
Sciences & Hospital.
Bangalore, Karnataka, India.

I. INTRODUCTION

India is one of the most ancient nations in the world, with a population of around 1.35 billion people spread across 29 states and seven union territories. Caste, creed, and religious differences, as well as contrasting community needs in both urban and rural structures, characterize this ancient nation, as do its social, cultural, and environmental aspects. India's dental education system functions inside a vast, varied, and intricate web of networks. With the addition of new universities and the annual graduation of thousands of graduates, this field has been expanding dramatically. With the aid of various media, many authors have meticulously expressed their opinions on dental education on numerous occasions. However, the verbal incitement provided by these pioneers of field has never advanced the perceptions of aspiring dentists regarding the purported and boasted scope in the profession.

Dentistry is a respectable profession; like physicians, dentists promise to observe certain ethical standards, and earning a graduate degree requires years of dedication to the field of dentistry. The majority of India's 309 dental colleges are located in its southern states, and none are located in its northeastern states, which illustrates the biased distribution and establishment of dental colleges in that region, which has experienced many interethnic conflicts and disturbances since India's independence and has had an impact on socioeconomic life, transportation, and communication.¹

II. DENTISTRY AND ITS MOTIVE

The reasons people choose to pursue a career in dentistry include the recommendation of their family and friends, social status, prestige, pride in being called a doctor, the inability to obtain a medical seat, and only a smaller percentage enrolling out of interest, with few of them coming from a dental background. As a result of these motivations, the caliber of graduating students has declined. Even though the National Oral Health Policy for India was established many years ago, it is still a desolate scene because there is no specific budget set aside for oral health in India. However, it is more crucial that the Indian government implement the oral health policy with greater vigor to improve quality, strengthen dental education, and lower the burden of oral disease.²

The quality and quantity of dental faculty have a significant impact on the dental education system because the success of guidance is always heavily dependent on the teachers. As a result, it is up to dental institutions and faculty to decide whether they should generate graduates who fit the current health systems or try to change those structures to match the principles of social accountability. Any educational system is, in general, an open system where modifications are made as needed based on feedback from all stakeholders. The society, students, teachers, administrators of the institutions, and the governing council constitute key contributors in the dentistry education system. The dentistry education system is significantly influenced by two factors: societal needs and governing council directives. Their requirements are transformed into institutional goals. These quality goals are what quality assurance is meant to achieve. The article discusses the goals for future dentistry education based on the evidence from the literature.³

III. REFORMS IN DENTAL EDUCATION

The Carnegie foundation identified four difficult areas and provided the corresponding recommendations in 2010, continuing Flexner's study from 1910 that called for significant reforms in medical education. Despite the fact that the reforms focused on medical education, they apply to other health professions education. The reforms include (i) Individualizing the learning process and standardizing learning outcomes, (ii) Encouraging the integration of formal knowledge and experiential learning, (iii) Encouraging the development of inquiry habits by exposing students to difficult problems and enhancing the quality of care that includes population health, and (iv) Emphasizing the development of professional identity through formal instruction in ethics, providing feedback and reflective opportunities, and assessing students' performance.⁴

- 1. Inter professional Education:** According to Spielman et al, there is a 25% overlap between the medical curriculum and the dentistry core competencies, and a 38% overlap with the nursing curriculum. The best way to use this overlap in basic abilities is via inter professional education. Faculty must put in effort to develop the shared clinical training experiences effectively. Connecting health professions education is multifaceted. It aids in creating the clinically collaborative practice that characterizes the upcoming, more effective and efficient health care delivery system.⁵
- 2. Integrated Curriculum:** The division between basic and clinical sciences is laid down in the curriculum, allowing for improved knowledge understanding and application. The merging of basic or clinical sciences is referred to as horizontal integration. It also gives up plenty of time for other active teaching and learning approaches, which helps to reduce curriculum redundancy. Integrating the fundamental and applied sciences is known as vertical integration. This facilitates the ideal blending of information and application at the right time and improves graduates' retention of that knowledge in the long run. Spiral curriculum, which is currently in demand, represents using both horizontal and vertical integration in a curriculum. Along with the standard college classes, online learning for students shall be implemented. For the purpose of teaching oral histology, Cynthia et al reported successful outcomes with the curriculum delivery using a hybrid of face-to-face and online courses. In a different study by Elizabeth, the students thought that using online fixed prosthodontics resources was a beneficial addition. Dental students should be exposed to research as part of their education to help them adapt to an uncertain future and to help them stay updated. Scholarly experiences at the undergraduate level itself should be added to their expertise.⁶
- 3. Professionalism and Communication Abilities:** Adherence to high standards of practice necessitates developing moral and ethical behavior. Altruism, obligation, quality, service, accountability, honor, honesty, and respect for others are the goals of professionalism. Professionalism is primarily taught through apprenticeship training through observation. Instead, in order to improve teaching professionalism, the faculty should start evaluating students based on it. Instead of practicing scenarios in which they are inept, students should have a thorough understanding of dental ethics, how to handle dento-legal difficulties, and how to make the appropriate referrals when necessary.⁷

- 4. Technology in Dental Education:** Information and communication technology (ICT) use will be essential for dentistry institutions to succeed in the future. ICT encompasses more than just using PowerPoint for lectures or going paperless. The more general use is on how it might be applied to research, health care, and education, with an emphasis on informatics rather than information technology. Beyond just replacing paper in clinical care, electronic dental records can be used to connect data on oral and systemic health, enable tele-dentistry, and apply evidence-based dentistry and preventive management techniques. High-tech simulations that offer virtual reality, trainers, 3D atlases, electronic textbooks, learning management systems, and student response systems can be used successfully in education. Utilizing ICT for research enables the reuse of clinical data, application of general research tools, and advanced computational methodologies. To be more successful, the divide between IT experts and dentists needs to be closed.⁸
- 5. Practice Management:** Today's graduating students have the chance to practice for the next 40 years. Thanks to scientific advancements, there is a lot of room for evidence-based practice to advance over the next forty years. The dentistry curriculum must therefore put an emphasis on preparing graduates to be lifelong learners, critical thinkers, and problem solvers who can engage in reflective practice. The current dental curriculum does a decent job of teaching the "how and what of dentistry" through preclinical and clinical exercises, but it needs to teach the "why and when of dentistry" in order to prepare future dentists to be lifelong learners and to assure the integration of information, skills, and values. The graduates should receive training in making treatment decisions in consultation with patients and their attendees. Based on the patient's clinical characteristics, they should be able to provide them a variety of treatment options. However, if it is not the best treatment option, they should be able to adhere to Least Expensive Alternative Treatment (LEAT) approach treatment plans.⁹
- 6. Research:** The dental colleges ought to immerse their graduates in research so they can keep up with new developments in healthcare. They should have the resources necessary to assess the literature and scientific advancements. It is important to think of research as an aspect of experiential learning. By establishing regional research consortiums, creating team-based training and mentorship programs for faculty, and transforming the clinical setting into practice-based networks, it can be incorporated into curriculum.¹⁰
- 7. Choice Based Credit System (CBCS):** With the exception of health professions education, the University Grants Commission has already made the choice-based credit system mandatory for all professions. The Indian dental education system is now in line with the rest of the world thanks to the adjustment of the dental curriculum to include CBCS, as stated by Shivasakthy et al. The curriculum becomes more learner-centered thanks to the availability of electives, self-paced learning, and credit transfer. It kind of increases the kids' motivation, which leads to higher results. In contrast to a yearly curriculum, the majority of the objectives, such as professionalism, communication skills, ICT expertise, research, and practice management training, can be easily accommodated in a choice-based credit system.¹¹
- 8. Assessment Methods:** It is important to promote the adoption of innovative assessment techniques in dentistry education, such as Workplace Based Assessment (WPBA), Objective Structured Clinical Examination (OSCE), Objective Structured Practical

Examination (OSPE), Triple Jump Examinations (TJE), and Portfolios. The students will develop their critical thinking, problem-solving, and reflective abilities through such evaluation techniques that support them in adhering to best professional practices and overcoming problems in the future.

- 9. Quality Improvement:** It is a way of approaching change in healthcare that focuses on self-reflection, assessing needs and gaps, and considering how to improve in a multifaceted manner. It aims to provide practitioners and managers with the skills and knowledge needed to assess the performance of healthcare, individual and population needs. It also aims to understand the gaps between current activities and best practice and to have the tools and confidence to develop activities to reduce these gaps. Quality improvement can be approached in two stages. Undergraduate dental education can be improved in the short term by utilizing ICT-based teaching methods, sharing resources among colleges, giving students constructive feedback in a timely manner, and properly integrating basic science and clinical science subject classes. Long-term improvements can be made by giving students more clinical experience, expanding faculty development initiatives, and giving postgraduate students the option to pursue a clinical academic stream of their choosing.^{9,12}

- 10. Faculty Development:** Total Quality Improvement (TQI) is a phrase used in training and monitoring for the development of human resources. Felder and Brent used TQM principles to raise teaching standards. They claim that writing instructional objectives, applying active learning principles, using cooperative learning techniques, evaluating the quality of instruction, and conducting long-term studies of teaching strategies all seem to enhance the quality of instruction. The contemporary educational system necessitates the development of faculty members already in place because they will be training the next generation of dentists. For them to use evidence-based methodologies in their teaching approaches, faculty members must commit to lifelong learning and display an open mind. Core competencies must be taught to students in an integrated manner, and certification exams at the end of the program should focus on those competencies.^{9,12}

- 11. Teaching Learning Experiences:** The way that technology is used in education has changed over time. The millennial generation of students would rather use a variety of resources than only textbooks to learn. The use of case studies, problem-based learning, flipped classrooms, interactive quizzes, simulations, small group discussions, web-based learning, mobile learning, etc. in routine instruction encourages students to think critically and participate actively in their learning. Through conversation and problem-solving activities, flipped classes help students grasp a subject in greater detail and improve retention.¹³

The teaching-learning processes should also emphasize the students' growth in professionalism, ethics, and communication abilities. The ability to deliver patient-centered care in an interdisciplinary team while adopting evidence-based practice and quality improvement techniques using information and communication technology is favored by these skills in future dentists. The list of competencies for all areas of dentistry has been provided by the Indian Dental Council. The clinical students' competency-based training and internship testing will enable the graduates succeed in their careers with confidence. The training should concentrate on creating and achieving Entrustable

Professional activities (EPA) because the competency needed by postgraduates is at a higher level. The curriculum duration should be cut by the faculty members by identifying the obsolete and superfluous portions of the program.¹⁴

One of the WPBA's tools, the Mini-CEX (Clinical Evaluation Exercise), is used to evaluate students' attitudes as well as their clinical skills. Behere evaluated the mini-CEX for dental undergraduate students and determined that it was a useful instrument. He also highlighted the ideas for the scale's improvement. The Multi-Source Feedback (MSF) tool is yet another helpful WPBA tool that has just undergone extensive testing. This tool records comments on the student from a variety of persons who fall inside their sphere of influence. The 360 degree assessment is another name for it. It evaluates student's professionalism and communication abilities.¹⁵

12. Globalization of Dental Education: The most current technological advancement has a lot of promise and applications in dental education worldwide. The focus on technical aspects of laboratory processes and the highly technical character of clinical dentistry make the acquisition of skills necessary in order to deliver treatment with solid foundations. Dental techniques that were crucial fifty years ago cannot continue to be emphasized in modern teaching. The learning process must be dynamic in order for the students to keep up with the most recent developments in the world, and this needs to be taken into account in the teaching curricula.

13. Student Exchange Programs with Foreign Countries: Workplace cultures and methods of health education should be strengthened. These chances for collaboration offer students, and eventually the communities where they will serve, benefits that have never before been possible. One way to encourage these encounters is through the DCI's student exchange program. The provision of regular professional updates and scientific dialogue must be part of our curriculum. This has improved understanding and application of standardized clinical techniques used all around the world. The Universities of Adelaide and Sharjah starting a new dentistry college in Sharjah by exchanging curricula, intellectual property, and related skills is an example of this flattening. The University of Adelaide has demonstrated how obstacles can be overcome by utilizing technology to present an online education and numerous multimedia tools.¹⁶

14. Application of Teledentistry: The full potential of information technology can be used to discuss rare instances and create treatment plans using the most recent developments. Teledentistry offers affordable care to underprivileged patient populations, including those in rural areas. Teledentistry offers a chance to enhance conventional teaching techniques in dental education and will open up new career prospects for dentists and dental students. Self-instruction and interactive videoconferencing are the two primary divisions of teledentistry in education. These two techniques have both been applied in numerous studies and nations.¹⁷

15. Collaboration with Foreign Universities: Videoconferencing may be used to access seminars and CDE programs. Patients and providers in remote areas can connect with experts in distant locales through the use of videoconferencing technology. Frontline oral health professionals can interact with dentists and specialists to deliver the best possible care thanks to digital imaging and intraoral cameras, which enable the transmission of

clinical data via the internet. These examples show how the practice of dentistry may make use of technology to increase patient care quality while also improving access to oral health care services.¹⁶

16. Artificial Intelligence: Artificial intelligence was applied in practical approaches to the clinical and educational facets of dentistry. The clinical fields of dentistry will inevitably require updating as improved deep-learning algorithms transform diagnosis, treatment planning, management, and telemedicine screening. The foundations of dentistry education, such as writing essays, theses, or research papers, may need to adapt to Artificial intelligence as a result of recent advancements in AI language models. Over the past two decades, artificial intelligence (AI) in dentistry has undergone phenomenal progress and expansion in terms of clinical trends and research. The disruption of current dentistry workflows by three-dimensional (3D) printing technology took more than ten years, which was thought to be an extraordinarily swift advance.

In dentistry, 3D scans using smartphones and software to help AI diagnosis and patient care are already typical, although research and development are still underway. The dental industry, for instance, has expressed interest in adopting the metaverse. The metaverse is a virtual setting that mimics the real world and could be utilized for telemedicine consultations and dental education. Both of the primary dental education fields are being profoundly changed by it. It is better suitable for curriculum upgrades because theoretical dental education is significantly further advanced in AI implementation than practical/clinical education. Clinical AI-powered software will change the way oral health care is provided, but it may take some time for it to fully develop or some use cases may not even exist yet. At the moment, we tend to exaggerate the short-term effects of generative AI in dentistry while severely underestimating its long-term effects on all facets of dental education.¹⁸

IV. CONCLUSION

Students in each Institute may perform a SWOT (Strength, Weakness, Opportunities, and Threats) study of the curriculum to determine what adjustments are necessary. According to Sheeba et al., the globalization of dental education offers opportunities for advancement of dental education in India through partnerships with foreign universities, student exchange programs, teledentistry, use of multimedia, and simulation. To advance professional advancement, we must think globally and act locally. The need of the day is for ongoing professional development and license renewal for clinical practice. The dental education system has a duty to instill values in students in order to improve their continual learning experiences and stay current with new technologies so that they may use evidence-based practice in patient care and thrive throughout their careers. The direction in which dental education develops will determine the future of the dental profession. Future dentists should be taught to be sensitive to societal requirements and to adapt accordingly in order to provide preeminent oral health services.

REFERENCES

- [1] Sandhu K, Kruger E. Dental schools in Republic India. A geographic and population analysis of their distribution. *Int J Oral health sciences* (2014);4:13-17.
- [2] Kothia NR, Bommireddy VS. Assessment of the status of national oral health policy in India. *Int J Health Policy management* (2015);4:575-581.
- [3] Ramesh MV, Kumar P. Indian dental students perspectives on dental education and their future professional career: A cross sectional questionnaire based survey. *Br J EducSocbehavSci* (2015);7:211-219.
- [4] David M. Calls for reforms in medical Education. *Academic Medicine* (2010);85(2);220-227.
- [5] Spielman AI. Dentistry, nursing and medicine: a comparison of core competencies. *J Dent Educ* (2005);69(11): 1257-1271.
- [6] David G. The integrated curriculum in medical education. *Med Teach* (2015); 37:312-322.
- [7] Cohen MM. Major long term factors influencing Dental education in 21st Century. *J Dent Educ* (2002);66(3):360-373.
- [8] ADEA Competencies for the New General Dentist. *J Dent Educ* (2011);75(7)932-935.
- [9] Mandeep S. Virdhi. Quality considerations in Dental education in India. *J Dental Educ* (2012);76(3):372-376.
- [10] Peter J. Polverini. Why integrated Research and scholarship into Dental Education matters. *J Dent Educ* (2014);78(3)332-333.
- [11] ShivasakthyManivasakan. The Proposal of a BDS Syllabus frame work to suit Choice Based Credit System (CBCS). *J ClinDiagn Res* (2016);10(8):JC01-JC05.
- [12] Charles F. Dental School: Balancing Education and Training. *J Dent Educ* (2014);78(5);655-666.
- [13] Shankar S. Perception of dental education in India among Dental students and staff's- A pilot survey. *J Indian Assoc Public Health dent* (2010);15:148-151.
- [14] Haden NK. Meeting the demands for future dental school faculty: Trends, challenges and Response. *J Dent Educ* (2002);66(9)1102-1113.
- [15] ShilpaChawlaJamenis. Use of Mini Clinical Evaluation Exercise as a Tool to assess the orthodontic postgraduate students. *Journal of Indian orthodontic society* (2020);1-5.
- [16] Redefining collaboration- DCI initiates global learning. (Hony) Brig Dr Anil Kohli. *Dentistry India* May/June (2008);2(3).
- [17] Estai M. A systematic review of the research evidence for the benefits of teledentistry . *J. Telemed. Telecare* (2018);24:147-156.
- [18] Afrashtehfar K I. Metaverse, Crypto and NFTs In Dentistry. *Educ. Sci* (2022); 12:538.