

Critical Analysis of Draft of Bachelor of Dental Surgery Program Regulations 2022 of India as against Dental Curriculum of English Speaking Developed Countries-USA and UK

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Abstract

Background: Competency Based' and 'Outcome Based' dental curricula were suggested by the most international accrediting organizations like American Dental Education Association (ADEA) and European Dental Education Association (EDEA). The Dental Council of India (DCI) keen to make this change in order to bring dental education in India up to and eventually surpass international standards. The new curriculum was created to achieve the best possible balance between traditional hands-on training, the 'Choice-Based Credit System (CBCS), National Education Policy (NEP) and education 4.0' in an era of hybrid learning, flexible progression, and student autonomy in their education. The aim of the study was to critically analyse Bachelor of Dental Surgery Program Regulations 2022 draft notified by Dental Council of India as against English Speaking Developed Countries- United States of America (USA) and United Kingdom (UK). **Materials and methods:** The study's documents were collected and evaluated from their respective official websites of USA, UK and Indian revised dental draft. The comparison of structural gaps done in terms of Eligibility, Course structure, Syllabic inclusions of course topics, Number of Competencies, Teaching-Learning methods, Modes of Assessments, Electives, Alternative Degrees and Exit test. **Results:** The comparative and critical analysis of all the three countries dental curriculum shows similarities and variations, inclusions and exclusion of topics and modifications required in New Indian dental draft. **Conclusion:** The structural updated model of Competency Based Dental Education Curriculum for use and utilization will be evolved and proposed which would be utilized by the planning and policy making authorities in India as a basal/referral document results in enhancement of global competencies in Indian Dental Graduates.

Keywords: Choice-Based Credit System, Competency, Credentials, Curriculum, Outcome, Dental Education, Dental Graduates, Education Policy, Global standard, Structural Updated Model

Introduction

A competency-based education program is 'a collection of skills and abilities intended to meet the needs of a population or individual'[1]. In order to support an individual's holistic development, this not only provides possibilities and pathways for learning key courses but also explores alternative learning paths beyond them. 'Competency Based' and 'Outcome Based' dental curricula were suggested by the most international accrediting organizations like American Dental Education Association (ADEA) and European Dental Education Association (EDEA) [2-3]. The Indian dental education system must adopt the same international curriculum. The Dental Council of India (DCI) is keen to make this change in order to bring dental education in India up to and eventually surpass international standards. The new curriculum was created to achieve the best possible balance between traditional hands-on training, the 'Choice-Based Credit System (CBCS)', National Education Policy (NEP) and education 4.0 in an era of hybrid learning, flexible progression, and student autonomy in their education. Building on competency-based education, the new University Grants Commission (UGC) and NEP guidelines for CBCS incorporate the draft of the Bachelor of Dental Surgery (BDS) Program Regulations 2022 [4-8].

Clark J. et al explored how learning outcomes can be implemented in dental education in the areas of student selection, curriculum preparation, teaching, learning, and evaluation. The author stated that the three-circle model is a valuable and user-friendly way for teachers and students to focus on learning outcomes. It will help curriculum planners and teachers create a program that meets the desired learning outcomes [9]. Viridi MS investigates the potential benefits and implications of implementing a credits and semester system within dental schools. According to this study, the credit system increases flexibility, improves student learning experiences, and better prepares graduates for professional practice [10]. Rao LN et al compares dental curriculum of India versus developed countries compares the curriculum structure, content, and instructional methodologies used in the United States with the United Kingdom. However, the curriculum content, including Teaching-Learning methods, examinations, and grading system, not thoroughly explained [11].

Manivasakan S et al proposed a new framework for the Bachelor of Dental Surgery (BDS) syllabus that corresponds with the Choice Based Credit System (CBCS) and focuses on how to revamp the BDS curriculum to make it more flexible and adaptive to students' requirements and the changing demands of the dental profession using a structured BDS syllabus and further assess the acceptability and feasibility of Choice based credit system in BDS Syllabus [12,13].

Field JC et al explored about the new method that Association for Dental Education in Europe (ADEE) offers for undergraduate dental education in Europe with 'The Graduating European Dentist' incorporates top academic practices. Across the industry, schools, organizations, society, and regulators are expected to find this new format much more useful and accessible [14]. Biswas S. intended to emphasize that a

Choice Based Credit System is necessary for Higher Education. Given the diversity of all universities, the implementation of a Choice Based Credit System appears to be a good system for assessing a student's overall performance in a universal manner using a single grading scale, reducing rote learning and remembering, introducing critical thinking and analysis, which leads to creativity and innovation in the educational system [15].

Ozdemir-Ozenen in a 6-Year Study of competencies of performance appraisal in a dentistry school suggested to expose dental students to as many case variations as feasible through the use of case scenarios and OSCEs (Objective Structured Clinical Examinations) in the curriculum [16]. Tonni I et al. analysing workplace-based assessment (WBA) and the possibilities of Entrustable Professional Activities (EPAs) in the context of competency-based education in the twenty-first century, concentrated on developments in the evaluation of students at the top level of Miller's assessment pyramid ("does") [17]. Noha Rashwan et al. aims to address the suitability of competency-based education in dentistry with respect to its stages, various evaluation techniques, and benefits over traditional education and is a reliable way to teach dentistry [18]. Kakodkar P. V. et al. outlines a plan for the university to comply with National Education Policy (NEP) 2020's requirements for dentistry education in India and looks into the framework for creating Multidisciplinary Education and Research Universities (MERUs) that support the goals of NEP 2020 [19]. Kabra L. et al. assess the awareness and perception of the CBCS among dental undergraduate students in Belagavi City, India shows varied level of awareness and differing perceptions among dental students about the newly proposed CBCS [20].

Credential review is a prerequisite for pursuing further education and practicing in any nation, commonly practiced in United States of America (USA) and United Kingdom (UK) [21]. Hence, in order to boost productivity in a competitive global economy, aligning dental curricula is essential to meet global standards. There are no such proposals implemented in dentistry until to start the CBCS. Hence, DCI designed the Draft of Bachelor of Dental Surgery Program Regulations 2022 to set a standard in order to restrict the variance in education and training practices for undergraduate dental courses offered by institutions across the Country. Hence, it is important to analyse the standard Indian curriculum and compare it with English speaking developed countries for higher education on the basis of standard parameters and make a structural updated model of curriculum with the necessary inclusions, exclusions and restructuring that helps to strengthen the curriculum and meets the current and future needs of the Dental profession in not only national but international context.

Therefore, this study, critically analyse the draft of Bachelor of Dental Surgery Program Regulations 2022 notified by Dental Council of India and compare against English Speaking Developed Countries in USA and UK. This critical analysis intended for further modifications of this draft and generate new updated structural

model for maintaining universal norms of dental education in India.

Aim: The aim of the study was to critically analyse Bachelor of Dental Surgery Program Regulations 2022 draft notified by Dental Council of India as against English Speaking Developed Countries viz. USA and UK.

Material and Methods

Methodology for Curriculum Analysis:

The Institutional Ethics Committee of DMIHER, Sawangi, Meghe, Wardha approval for Doctoral Research obtained (Ref. No. DMIHER (DU)/IEC/2024/383).

The Draft of Bachelor of Dental Surgery Program Regulations 2022 was thus critically analysed and compared with the English Speaking Developed Countries, USA and UK. Since, the universities are among the top universities in the world and authorized by the relevant national regulatory framework, they are indicative of the curriculum including University of Michigan School of Dentistry, Ann Arbor, USA and Queen's University Belfast, UK [22,23].

The Dental Undergraduate Curricula selected from India, the United States of America, and the United Kingdom served as the foundation for curriculum comparison in each country. The study's documents were collected and evaluated from their respective official websites.

Parametric Structural Analysis:

Comparison of Indian Draft with USA and UK Curriculum on the basis of parameters:

The comparison for identification of structural gaps in terms of Eligibility, Course structure, Syllabic Inclusions of Course Topics, Number of Competencies, Teaching-Learning methods (Innovative Teaching-Early Clinical Exposure), Modes of Assessment-Formative and Summative including OSPE/OSCE, AETCOM, Entrustable Professional Activities (EPA), Electives, Alternative Degrees and Exit test.

Results

On comparison of Indian draft with USA and UK following observations are shown in the tables mentioned below.

Table 1. shows comparison of eligibility parameter for admission in Indian Universities as per Indian Draft with USA and UK Universities. Admission to dental undergraduate program the common entrance test for BDS Program in India is NEET, DAT in USA for DDS and UCAT in UK for BDS. In India a common counselling for admission on the basis of merit list of NEET whereas in USA and UK Students required to attend an online interview.

Table 1: Comparison of Eligibility parameter for admission in Indian Universities as per Indian Draft with USA and UK Universities

Sr. No.	Parameter	Indian Draft	United States of America	United Kingdom
1	Eligibility-cum-Entrance Test	For BDS Program- • NEET- 'National Eligibility-cum-Entrance Test' • NTA National Testing Agency-MHFW, GoI.	For DDS program- • DAT- Dental Admissions Test • AADSAS- The ADEA Associated American Dental Schools Application Service	For BDS Program- • UCAT- University Clinical Aptitude Test • UCAS-Universities and Colleges Admissions Service through- www.ucat.ac.uk
2	Prerequisites	10+2 Higher Secondary Examination-with Physics, Chemistry, Biology/Biotechnology, Mathematics and English	C or better grade with Prerequisites Coursework- Biochemistry, Microbiology, Psychology, Sociology, English Composition, Biology, General Chemistry, Organic Chemistry and Physics with labs	• AAA (Chemistry and Biology) at A-level • GCSE Mathematics minimum grade C required if not offered at AS level or A-level. • GCSE English Language Grade C/4 • English - An IELTS score 7.5, minimum 7.0 (Speaking)& 6.0 (Listening)

Table 2 shows comparison of course structure parameter of Indian Draft with USA and UK Universities. Credits not mentioned in USA but present in Indian draft and UK Curriculum. Internship is not mentioned in USA and UK whereas, One-year compulsory rotatory Internship is required in Indian draft. Comprehensive care and early clinical work started in 1st year in USA and UK but not shown in new Indian draft.

Table 2: Comparison of Course Structure parameter of Indian Draft with USA and UK Universities

Sr. No	Parameter	Indian Draft	United States of America	United Kingdom
1	Course structure with credits	<p>5 & ½ years program</p> <ul style="list-style-type: none"> 9 semesters 1year CRI 24 Subjects (subjects not integrated) Year wise subjects and credits not divided Subject wise credits allotted An outgoing graduate credits- 173 core credits, 6 Comprehensive clinical credits, 18 elective credits, 12 CDE credits, 61 CRRI credits Total 270 credits 197 credits - CGPA 	<p>4-years Program</p> <ul style="list-style-type: none"> Summer/Winter/Fall terms Subjects integrated Year 1- ½ day per week in clinic, Assisting upper classes in clinical care, Direct patient care in winter term Year 2- 1-2 days per week Begin managing patient families Year 3- Average 2 days/week seeing own patients, 2 weeks of hospital dentistry outside school, specialty-based rotations Year 4- 3 days/week seeing own patients plus, 12 weeks of outreach-community based practice Characteristics of the patient care program- <ul style="list-style-type: none"> Comprehensive Competency-based Vertically integrated (teams of students from all 4 years) Early clinical experiences in 1st year 	<p>5-years Program</p> <ul style="list-style-type: none"> Yearly term Subjects integrated Year 1 and 2- Foundations of clinical practice Year 3- Clinical skills in Restorative Dentistry & Impact of systemic disease in dentistry Year 4 and 5- Advanced Dental Clinical Skills within the range of clinical specialties in dentistry. Clinical teaching-within the Dental School and in Outreach dental clinics Year wise credits- <ul style="list-style-type: none"> Year 1 (120 credits) Year 2 (120 credits) Year 3 (120 credits) Year 4 (130 credits) Year 5 (120 credits)

Table 3 discussed about content inclusions in Indian Draft from Michigan University, USA and Queens University, Belfast, UK Curriculum. Few variations were observed in USA and UK curriculum which are proposed to be added in New Indian draft.

Table 3: Content inclusions in Indian Draft from Michigan University, USA & Queens University, Belfast, UK Curriculum

Content inclusions from Michigan University, USA			
Sr. No.	Subject in Michigan University USA	Topic name	Subject to be added in Structured updated model of Indian curriculum
1	Basic Histology for the Dentist	Interpretation of histological images in a scientific way	Addition in Human Anatomy, Embryology, Histology & Medical Genetics
2	Cell and Molecular Biology	Case Study-modern biomedicine	Addition in Biochemistry
3	Clinical Rotation - Orthodontics	3-D virtual simulation of tooth movements	Addition in Orthodontics & Dentofacial Orthopaedics
4	Scientific Foundation for Evidence-Based Dentistry	Modules with exercises and online assessments	New Subject to be introduced as Foundation Course
5	Introduction to Clinical Skills	<ul style="list-style-type: none"> • Patient privacy and security practices • Practicing infection control • Assisting a colleague treating a patient • Identifying normal oral anatomy and head and neck structures • Performing head and neck examinations • BLS • CPR 	New Subject to be introduced as Foundation Course
6	Dental Profession and Practice	Practice Management course- <ul style="list-style-type: none"> • Identifying elements 	Deleted from PHD and New Subject to be introduced as Foundation Course

		critical to effective management of any successful practice • Applying select elements toward enhanced management of your Comprehensive Care Clinic Practice • Assessing the impact of those applications	
7	Pathways Program	Mentoring for future avenues • To align with NAAC-Alumni Committee	New Subject to be introduced as Foundation Course
8	Oral Health Promotion, HC System & Policy	• Overview of the Oral Healthcare Delivery System • Health Policy related to oral health at the State and National levels	New Subject to be introduced as Foundation Course in First Semester
9	Comprehensive Care Clinic	Digital Impression	Addition in Oral & Maxillofacial Prosthodontics - clinical activities-Skill
10	Occlusion Fundamentals	• Obstructive Sleep Apnea- Teledentistry	Addition in Orthodontics- Clinical hands-on activity-Skill
11	Dental Implants Treatment Planning	• Implant surgical guide fabrication and hands-on training on implant supported posterior crown	Addition in Oral & Maxillofacial Prosthodontics- Clinical hands-on activity-Skill
Content inclusions from Queens University, Belfast, UK			
Sr. No.	Subject in Queens University, Belfast, UK	Topic name	Subject to be added in Structured updated model of Indian curriculum
1	Anatomy for Dentistry	Dissection skills	Addition in Human Anatomy, Embryology, Histology & Medical Genetics
2	Special Care Dentistry	Define disability and explain the difference	Addition in Paediatric and Preventive Dentistry

		between medical and social models of disability	
3	Orthodontics	Explain and be able to carry out first aid and emergency management for orthodontic appliances	Addition in Orthodontics and Dentofacial Orthopaedics
4	Dental Public Health and Behavioural Science	<ul style="list-style-type: none"> Healthcare System's Dental Professionals work within Local and National Health Policy and Organisations Delivery of healthcare and equity Protection and promotion of the health of individual patients 	New Subject to be introduced as Foundation Course in First Semester

Table 4 shows comparison of Competency, Learning and Teaching Methods and Assessment parameters of Indian Draft with USA and UK Curriculum. Indian draft shows Competency based education system aims at evolvement and expansion of competencies with maintenance of oral health as a whole. The University of Michigan School of Dentistry, USA is a prominent example of a school that increasingly adopting and emphasizes competency-based education to prepare students for clinical practice. Competency-based education in the Queen's University, Belfast, UK emphasizes the practical application of knowledge and skills in clinical settings with holistic approach. In undergraduate dental education, the number of assessed competencies varies in all three curriculums.

Indian draft, USA and UK Curriculum shows almost similar Innovative Teaching-Learning Methods and similar modes of Assessments.

Table 4: Comparison of Competency, Learning and Teaching Methods and Assessment parameters of Indian Draft with USA and UK Curriculum

Sr. No	Parameter	Indian Draft Curriculum	United States of America	United Kingdom
Comparison of Competency parameter of Indian Draft with USA and UK Curriculum				
1	CBDE	Evolverment and expansion of critical thinking and reasoning Instil professionalism Develop communication and interpersonal skills Betterment of oral/general health promotion of the individual and society Inclusion of practice management and informatics and Maintenance of oral health as a whole.	Prepare students for clinical practice Develop strong communication and critical assessment skills, enabling them to handle complex clinical situations	Clinical practice-practical application of knowledge and skills in clinical setting Holistic approach- To adopt diverse clinical situations
2	Number of Competencies	27	47	66
Comparison of Learning and Teaching Methods (Innovative Teaching) parameter of Indian Draft with USA and UK Curriculum				
1	Learning and Teaching (Innovative Teaching)	<ul style="list-style-type: none"> • Demonstration using videos, role plays and other audio-visual aids • Early clinical exposure • Flipped Classroom 	<ul style="list-style-type: none"> • Traditional lecture-based • Technology-Based • Group Learning, • Innovative approaches like blended 	<ul style="list-style-type: none"> • Innovative technologies (World class library) • Self-directed study-development as

		<ul style="list-style-type: none"> • Simulation • DOAP • Problem-Based Learning • Case-Based Learning • Microteaching 	<ul style="list-style-type: none"> learning and virtual clinics • Critical thinking • Problem solving • Early clinical experiences • Case analysis and case studies • Simulation exercises • Critically appraised topics • Clinical huddles and discussion including comprehensive treatment planning • Grand rounds presentations • SWOT analysis of overall competency development • Reflective self-assessment and essays • Ethical dilemma resolution and other exercises • Interprofessional team-based learning • Pathways project-based inquiry 	<ul style="list-style-type: none"> independent, lifelong learners • Clinical teaching-Simulated and a clinical environment • E-Learning technologies - Virtual Learning Environment-Canvas • Lectures-Case-based learning clinical scenarios • Microteaching
Comparison of Modes of Assessment parameter of Indian Draft with USA and UK Curriculum				
1	Written (Theory) examination	<ul style="list-style-type: none"> • MCQ's, Short answer, Essays and Concept Maps • Co-curricular components • Self-assessment 	<ul style="list-style-type: none"> MCQs, case studies and group projects • Short answer • Written project • Self-assessment/ reflection 	<ul style="list-style-type: none"> • MCQ's, Case Studies and Group Projects

2	Practical / Clinical examination	<ul style="list-style-type: none"> • Viva voce, OSCE, Log book • EPA's • Clinical case presentation & clinical evaluation • AETCOM • In formative assessment-passing marks-30% Summative -50% 	<ul style="list-style-type: none"> • EPAs, • Standardized patient exams • Assessments of clinical skills • Practical Examinations • Clinical Case-Based Assessments • OSCEs • Clinical SWOT Analysis • Longitudinal Assessment • Dental Competency Assessments 	<ul style="list-style-type: none"> • Clinical Procedures with patients • OSCE-Objective Structured Clinical Examination
3	Self-assessment	<ul style="list-style-type: none"> • Self-assessment during Formative assessment 	<ul style="list-style-type: none"> • Daily Self-assessment in Clinical activities 	<ul style="list-style-type: none"> • Not mentioned

Table 5 discussed about comparison of electives parameter of Indian Draft with USA and UK Curriculum. In Indian draft, electives are designed to improve employability of graduates in trans disciplinary positions as healthcare workers. In Michigan University, USA Curriculum the overarching goal of the Pathways Program is to provide a space within the curriculum to ignite passion, foster purpose and sustain individual professional identity formation. Flexibility is the foundation of Pathways. In Queen's University Dental School, electives may focus on advanced clinical skills and techniques and Students can participate in research projects with faculty.

Table 5: Comparison of Electives parameter of Indian Draft with USA and UK Curriculum

Sr. No	Parameter	Subject in Indian Draft Curriculum	United States of America	United Kingdom
1	Electives	complete at least 9 electives across all 6 listed categories to graduate. Each Elective -2 credits Six Categories of electives- Integrated Dentistry, Advanced Clinical Training, Research, Ethics and Professionalism Biomedical Science Clinic Administration	Pathways Program - encourages student autonomy and allows them to direct their own learning through a multi-year program that begins in their D-1 year and culminates in a celebratory Pathways Day in their D-4 year. Continuing Dental Education Advanced Clinical Skills Research Opportunities Specialized Areas: implantology , public health, or other advanced specialties.	Advanced Clinical Practice Research projects

Table 6 shows comparison of alternative/dual degrees-further study opportunities and exit test parameters of Indian Draft with USA and UK Curriculum. The DDS/MBA and DDS/PhD dual degree offered in USA and additional intercalated M.Sc. or B.Sc. or MPH offered in UK. All three Curriculums shows requirement of EXIT examination clearance to start dental practice.

Table 6: Comparison of Alternative/Dual Degrees-Further study opportunities and Exit Test parameters of Indian Draft with USA and UK Curriculum

Sr. No	Parameter	Indian Draft curriculum	United States of America	United Kingdom
1	Alternative / Dual Degrees-Further study opportunities	<ul style="list-style-type: none"> No scope for dual degree Honors awarded for electives BSc- degree if not completing BDS Program 	<ul style="list-style-type: none"> DDS/MBA dual degree DDS/PHD-The doctor of philosophy degree in Oral Health Sciences 	<ul style="list-style-type: none"> Intercalated MSc or BSc Master of Public Health (MPH)
2	EXIT Examination	<ul style="list-style-type: none"> NEXT- National Exit Exam 	<ul style="list-style-type: none"> INBDE- Integrated National Board Dental Examination 	<ul style="list-style-type: none"> LDS-The Licence in Dental Surgery

Discussion

Critical analysis of Indian Draft with USA and UK Dental Curriculum:

The Draft of Bachelor of Dental Surgery Program Regulations 2022 was critically analysed and compared with the English Speaking Developed Countries USA and UK. The Universities included for comparison are representative of the curriculum as the ones included are accredited by the respective Country regulatory framework and amongst the best gradations Worldwide.

On comparison of eligibility parameter of Indian draft with USA and UK Universities, it is observed that English Language with higher grade is prerequisite for admission in both countries. Hence, it needs to be incorporated as higher grade English language in Indian Dental Universities to match with the international standard.

Michigan University, USA Curriculum emphasised on 'Comprehensive patient care program' started early from first year provide a broad array of clinical experience, based on patient need. Similarly, in UK Curriculum Foundations of clinical and professional skills practice started from first and second years. Indian draft not shown clinical skills at the early stage (1st semester), therefore, clinical skills practiced during compulsory rotatory Internship which required One-year to acquire these skills. So, 'Comprehensive patient care program' should include in Indian curriculum at early stage, as it facilitates better healthcare services for patients and BDS Program can be of 4 and half years (9 semesters) plus 6 months'

Rotatory internship merely to revise the clinical skills and evaluating the student's competencies.

All the subjects in USA and UK Dental Universities are integrated with other subjects while in Indian curriculum subjects have separate existence which are suggested to teach the topics with vertical and horizontal integrations in Indian draft. Integrated subjects help to teach the topics of relevant subjects with all aspects in comprehensive manner along with clinical applicability. Hence, Subjects integrations need to be added.

'Interpretation of histological images in a scientific way' topic from 'Basic Histology for the Dentist' of Michigan University, USA to be added in Human Anatomy, Embryology, Histology & Medical Genetics and topic- 'Case Study-modern biomedicine' from 'Cell and Molecular Biology' to be added in Biochemistry. In Michigan University, USA 'Clinical Rotation-Orthodontics' includes '3-D virtual simulation of tooth movements'. This helps students to understand treatment planning options in simple way. Hence, it to be added in Orthodontics & Dentofacial Orthopaedics.

'Introduction to Clinical Skills' course in Michigan University, USA provides fundamental skills that a first year student must have to begin treating patients. These include patient privacy and security practices, practicing infection control, properly assisting a colleague treating a patient, identifying normal oral anatomy and head and neck structures, and performing head and neck examinations. Students will also receive basic life support (BLS - CPR) training and obtain other credentials in order to begin patient care. So, this subject to be introduced as 'Foundation Course' in First Semester in Indian Draft.

'Scientific Foundation for Evidence- Based Dentistry' (EBD) in Michigan University, USA is a major theme for all the courses in the curriculum and for a contemporary dental practice. This course provides a foundation for students along with an introductory working knowledge of all of the tools for EBD. This includes modules with exercises and online assessments. Therefore, this Subject to be introduced as 'Foundation Course' in Indian Draft.

'Dental Profession and Practice' in Michigan University, USA, and 'Dental Public Health and Behavioural Science' in Queen's University Belfast, UK, these courses are to make students aware of the real life issues facing the practicing dental professional and to provide with the skills necessary to excel as a dental professional and run a successful dental practice. In today's competent world, dental students need to be patient-centric with good communication skill and leadership qualities. The ethical and social issues that are intrinsic to the practice environment are addressed. 'Practice management' in Indian Draft is shown as core course. This subject to be restructured as a separate 'Foundation Course' in Fourth Semester before starting regular clinical postings in Indian Draft.

In Michigan University, USA, 'Pathways Program' course gives students a perspective of dental education from a diverse group of recent graduating students. During this course, students learn basic skills to help ensure academic and professional success and get to know their vertical mentors. Students assigned to groups midway through the semester after their Pathway Selection to interact with different classmates to build community and share reflections. This course helps in Mentoring for future avenues and to be align with National Assessment and Accreditation Council' (NAAC) criteria. Therefore, Subject to be introduced as 'Value-added Course' under Alumni association in First Semester in Indian Draft.

'Oral Health Promotion, Health Care System and Policy' from Michigan University, USA to be added in First Semester as 'Foundation Course' to conduct outreach activity under 'Public Health Dentistry' to make the students aware about overview of the 'Oral Healthcare Delivery System and Health Policy' related to oral health at the State and National levels.

In Michigan University, USA 'Comprehensive Care Clinic' course includes Digital Impression' to learn the advanced technology with precision in treatment outcome. So, to be added in Oral & Maxillofacial Prosthodontics as a clinical activity to improve clinical skill of student.

'Occlusion Fundamentals' in Michigan University, USA includes 'Obstructive Sleep Apnoea' via 'Tele dentistry' which needs a specialist to teach. Such specialists are not available in each institution. So, to make it possible to be added in Orthodontics as clinical hands-on activity to improve clinical skills of student.

'Dental Implants Treatment Planning' from Michigan University, USA included 'Implant surgical guide fabrication and hands-on training on implant supported posterior crown'. Hence, to be added in Oral & Maxillofacial Prosthodontics as a Clinical hands-on activity to improve clinical skills of student and make them competent.

'Dissection skills' topic from Anatomy for Dentistry to be added in Human Anatomy, Embryology, Histology & Medical Genetics from Queen's University Belfast, UK. From Queen's University Belfast, UK 'Special Care Dentistry' course includes 'Define disability and explain the difference between medical and social models of disability' topics to be added in Paediatric and Preventive Dentistry.

'First aid and emergency management' for orthodontic appliances topic from Orthodontics course in Queen's University Belfast, UK to be added in Orthodontics and Dentofacial Orthopaedics.

Michigan University, USA, Queen's University, UK and Indian draft shows Competency based education system aims at evolvement and expansion of 'critical thinking and reasoning, instil professionalism, develop communication and interpersonal skills, betterment of oral/ general health promotion of the individual and society, inclusion of practice management and informatics for patient care- 'diagnosis, planning, treatment and maintenance of oral health as a whole'.

Michigan University, USA, Queen's University, UK and Indian draft shows Non-didactic modes of teaching-learning like flipped classroom, problem based learning, case based/modified case based learning, and problem solving strategies are adapted for teaching theoretical aspects. Demonstration of concepts or techniques using videos, role plays and other audio-visual aids has carried out. But, USA and UK Universities education is more technology driven as compared to Indian Draft.

USA Curriculum shows daily Self-assessment in Clinical activities by students to improve their competencies. In Indian draft, Formative assessment shows 30% passing which should be updated to 50% to maintain the Intellectual standard of Healthcare profession.

Elective Subjects in University of Michigan School of Dentistry are continuing dental education, advanced clinical skills, research opportunities, specialized areas like implantology, public health, or other advanced specialties. Elective Subjects in Queen's University Dental School are Advanced Clinical Practice and Research Opportunities. In Indian Draft, students should complete at least 9 electives across all 6 listed categories to graduate- Integrated Dentistry, Advanced Clinical Training, Research, Ethics and Professionalism, Biomedical Science and Clinic Administration. In USA, Michigan University offered DDS/MBA dual degree to dental students who would like to explore complementary interests and career goals that combine dentistry and business beyond what is offered in the DDS curriculum. DDS/PHD dual Degree, the doctor of philosophy degree in Oral Health Sciences is a program that trains exceptional students into becoming leaders in academic research in oral health science.

UK Queen's University offered further study opportunities like intercalated MSc or BSc., Master of Public Health (MPH), MPH in Global Health, MSc (Res) in Cancer Medicine, MSc in Experimental Medicine, MSc in Bioinformatics and Computational Genomics, MSc in Clinical Anatomy, MSc in Applied Developmental Psychology and MSc in Clinical Health Psychology.

Indian draft awarded a Honours Degree to a student who completed more than 14 electives and if a candidate completes more than 6 electives in a single elective category, then they shall receive an Honours in that category. If a student unable to complete BDS Course then he will pursue B.Sc. Oral biology, B.Sc. CAD CAM dentistry, B.Sc. Dental Technology, B.Sc. Psychology and other non-clinical arts programs within the powers of the university recognised by UGC.

Hence, upon review of the USA and UK curriculum with Indian draft, the conclusion drawn for the structural updated model curriculum will be framed with the above inclusions, substitutions and deletions of topics / subjects as discussed.

Conclusion

This study attempts to collect information regarding the Competency Based Dental Education Depicted in Draft of Bachelor of Dental Surgery Program Regulations 2022

notified by Dental Council of India and tries to compare and critically analysed with Dental Curriculum of English Speaking Developed Countries-USA and UK and will Propose a Structural Updated Model of Dental Curriculum in India. This would result in enhancement of global competencies in Indian Dental Graduates.

The present study in tune with its aims and objectives has brought out the required inclusions that have been duly aligned with criterion that are embodied in the UGC, NEP 2020, DCI and education 4.0.

In its result the structural updated model of Competency Based Dental Education Curriculum for use and utilization will be evolved and proposed which would be utilized by the planning and policy making authorities in India as a basal/ referral document.

Limitations of the study

1. Outcome analysis of the use and utility of the curriculum in vogue has not been availed in the present study.

Recommendations:

1. 'Amalgam' is outdated material which is still present in the Indian draft in Conservative Dentistry and Endodontics should be deleted and emphasis should be given on recent advanced materials like tooth coloured restorative materials.
2. Hybrid Learning should be practiced including Online Assessment on LMS as per student's pace/Offline.
3. Interdisciplinary/inter professional teaching should be introduced.
4. E-Portfolio module should be added for self-assessment of students and should be evaluated after every semester.
5. Student exchange program should be conducted at National and International Universities to share their knowledge and improve the interpersonal skills.
6. State of art Infrastructure should be planned in each Institute to upgrade the teaching.
7. Faculty Development Program (FDP) like Curriculum Workshop, Capacity Building, Teachers Training program should be carried out.
8. Regular feedbacks from all Stakeholders-Students, Faculties, Parents and Patients should be taken.

Declaration of conflict of interest

No conflict of Interest.

References

1. Manoharan PS. Competency-based Education in Dentistry—The Indian Scenario—Are We Late? *J Basic Clin Appl Health Sci* 2019;2(2):76–78.
2. ADEA Competencies for the New General Dentist. *J Dent Educ.* 2017 Jul;81(7):844–847. PMID: 31989605. ADEA Competencies for the New General Dentist, 2008, ADEA, USA.
3. XI Action plan for academic and administrative reforms. Retrieved from: www.ugc.ac.in, Higher education in India: Strategies and schemes.
4. National Education Policy, Government of India, Ministry of Education. www.education.gov.in.
5. Proposed CBCS comprising CBDE Curriculum of BDS placed in public domain accessed through www.scribd.com.
6. Clark JD, Robertson LJ, Harden RM. Applying learning outcomes to dental education. *Br Dent J.* 2004 Mar 27;196(6):357–9. PMID: 15044993.
7. Viridi MS. Reforming undergraduate dental education in India: introducing a credits and semester system. *J Dent Educ.* 2011 Dec;75(12):1596–602. PMID: 22184599.
8. Rao, Lakshmi & Hegde, Mithra & Hegde, Priyadarshini & Shetty, Chitharanjan. (2014). Comparison of Dental curriculum in India versus Developed countries. *Nitte University Journal of Health Sciences.* 4. 121–124. 10.1055/s-0040-1703779.
9. Manivasakan S, Sethuraman KR, Narayan KA. The Proposal of a BDS Syllabus Framework to Suit Choice Based Credit System (CBCS). *J Clin Diagn Res.* 2016 Aug;10(8):JC01–5. Epub 2016 Aug 1. PMID: 27656467; PMCID: PMC5028490.
10. Manivasakan, S., Sethuraman, K., & Adkoli, B. Acceptability and feasibility of Choice based credit system in BDS Syllabus. *International Journal For Innovation Education And Research*, (2016) 4, 73–80.
11. Field JC, Cowpe JG, Walmsley AD. The Graduating European Dentist: A New Undergraduate Curriculum Framework. *Eur J Dent Educ.* 2017 Dec;21 Suppl 1:2–10. PMID: 29205782.
12. Biswas, S. (2018). Choices Based Credit System(CBCS)— An analytical study *IJRAR- International Journal of Research and Analytical Reviews* VOLUME 5 I ISSUE 3 I JULY– SEPT 2018 E ISSN 2348 –1269, PRINT ISSN 2349–5138.
13. Didem Ozdemir-Ozenen & Ceyda Ozcakil-Tomruk & Gurkan Ozenen & Meltem Ozdemir-Karatas & Ozlem Tanriover & Elif Sungurtekin-Ekci & Jale Tanalp, 2020. "Competencies of Performance Appraisal in a Dentistry School: A 6-Year Study," *SAGE Open*, , vol. 10(3), pages 21582440209, August.
14. Tonni I, Gadbury-Amyot CC, Govaerts M, et al. ADEA-ADEE Shaping the Future of Dental Education III: Assessment in competency-based dental education: Ways forward. *J Dent Educ.* 2020; 84:97–104. PMID: 31977092.
15. Noha Rashwan, and Mohamed R Mahmoud, "Application of Competency Based Education in Dentistry (Review Article)." *International Journal of Dental Sciences and Research*, vol. 9, no. 2 (2021): 23–26.

16. Kakodkar PV, Manivasakan S. National education policy 2020 compliant multidisciplinary education and research universities for dental education in India - A road map. *J Med Evid* 2022; 3:60-3.
17. Kabra L, Santhosh VN, Sequeira RN, Ankola AV, Coutinho D. Dental curriculum reform in India: Undergraduate students' awareness and perception on the newly proposed choice based credit system. *J Oral Biol Craniofac Res*. 2023 Sep-Oct;13(5):630-635. Epub 2023 Aug 11. PMID: 37637854; PMCID: PMC10448454.