

## **CURRICULUM STRUCTURE, CONTENT, LEARNING AND ASSESSMENT IN EUROPEAN UNDERGRADUATE DENTAL EDUCATION - Update 2010**

This document was approved by the ADEE General Assembly on 27th August 2010

Manogue, Michael<sup>1</sup> (Chair)  
McLoughlin, Jacinta<sup>2</sup> (Rapporteur)  
Christersson, Cecilia<sup>3</sup>  
Delap, Ellis<sup>2</sup>  
Lindh, Christina<sup>3</sup>  
Schoonheim-Klein, Meta<sup>4</sup>  
Plasschaert, Alphons<sup>5</sup>

<sup>1</sup> Leeds Dental Institute, LEEDS, UK

<sup>2</sup> Dental School & Hospital, Trinity College Dublin, Ireland

<sup>3</sup> Faculty of Odontology, Malmö University, Sweden

<sup>4</sup> ACTA, Amsterdam, The Netherlands

<sup>5</sup> St. Radboud University Medical Centre, Nijmegen, The Netherlands

### **Correspondence**

Professor Michael Manogue  
Leeds Dental Institute  
Learning and Teaching Office  
Clarendon Way  
LEEDS LS2 9LU, UK  
Email: [M.Manogue@leeds.ac.uk](mailto:M.Manogue@leeds.ac.uk)

## CURRICULUM STRUCTURE, CONTENT, LEARNING AND ASSESSMENT IN EUROPEAN UNDERGRADUATE DENTAL EDUCATION

### Introduction

Mutual recognition of qualifications and free movement of dentists (and other specified health care professionals) across the EU are guaranteed by the relevant sections of EU Directive 2005/36/EC (1). Against this background, a key aim of the DentEd III project was to encourage convergence in undergraduate dental education and as part of its commitment to DentEd III ADEE has undertaken to continue this process. Such convergence allows for mutual recognition of undergraduate studies and ECTS from EU dental schools for purposes of exchange of dental students between dental schools and most importantly ensures that patients receive appropriate standards of oral healthcare across the EU.

The issues relating to the competence of the new graduate have been addressed in the *Profile and Competences for the Graduating European Dentist* (in press) which has been revised following wide consultation and is available on the Taskforce page of the Association for Dental Education in Europe (ADEE) website [www.adee.org](http://www.adee.org) (2)

The content of the current revised document takes into account feedback received from a questionnaire circulated widely (in late 2009 and early 2010) within the European dental education community; it replaces two previous papers entitled *Curriculum Structure and European Credit Transfer System for European Dental Schools, Part I*(3) and *Curriculum Content, Structure and ECTS for European Dental Schools Part II* (4). Further information on certain aspects discussed in this paper can be found in those original documents

The recommendations set out here under the headings of Primary and Secondary are designed to aid curriculum revisions in European dental schools in order to facilitate further convergence in European dental education in the years ahead. The suggested framework for a model of an undergraduate educational programme in dentistry will serve as a template for use in various national systems.

### ***The Framework for a Dental Programme Suggested by ADEE***

A dental undergraduate curriculum should be evidence-based, reflecting the oral health needs of the local population, while acknowledging diversity across Europe. Graduating dentists should have acquired the necessary profile and competences to enable them to contribute to improving oral health in their communities.

ADEE is keen to preserve diversity in undergraduate dental education in order to give Universities and learners real choice. However, choice should be achieved within a common framework and with a high level of transparency, in order to promote cohesion. This framework should stimulate the discussion necessary to provide our dental students with tertiary educational structures that have a genuine European, rather than a purely national, background.

Although the Bologna recommendation introduced the '3-5-8' model (Bachelor-Master-Doctor) for tertiary education, there are specific professions, mainly those in the health sector, that are regulated by Sectoral Directives defining not only how titles and degrees are recognised across borders, but also minimum educational requirements for obtaining

such degrees. The European Parliament approved the common directive on recognition for professional qualifications in 2005 (1). The Directive included the educational requirements concerning the mutual recognition of diplomas, certificates and other evidence of the formal qualifications for practitioners of dentistry.

Under the 2005 general directive, freedom of movement and mutual recognition of the evidence of formal training of doctors, nurses responsible for general care, dental practitioners, veterinary surgeons, midwives, pharmacists and architects must be based on the fundamental principle of automatic recognition of the evidence of formal qualifications on the basis of co-ordinated minimum conditions for education. Under this provision, the professional activity of the dental practitioner must be carried out only by those qualified as dental practitioners, as defined in the Directive.

This Directive established that dental education shall comprise a total of at least five years of full-time theoretical and clinical study, given in a University or an Institute of Higher Education that is recognised as being of an equivalent level or is under the direct supervision of a University. The Directive is due to be revised in 2011.

Currently, most dental schools have an undivided 5-year dental programme but there is the option within academia to follow the Bologna system of 3+2 to the Masters level. Such a programme would consist of 5 years of full time education, with appropriate ECTS credits, leading to a dental Master's degree. Countries that have not yet adopted the practice of awarding a dental Master's degree are encouraged to consider the implications of implementing this approach.

A 3+2 model implies the awarding of a Bachelor's degree after three years. Such a Bachelor's degree would be an academic award only and it would not qualify the graduate to engage in the practice of dentistry in any form. This would facilitate students who realise that they did not wish to become a dentist to leave having successfully completed three years of university education with a bachelor's degree, which could be followed with study at the Master's level in another subject area. It will also facilitate Erasmus-style student exchange.

**In dentistry, such a Bachelor's degree would be an academic award only and it would not qualify the graduate to engage in the practice of dentistry in any form as the European directive requires a minimum of five years of full-time theoretical and clinical study for the practice of dentistry.**

The importance of vocational training as a bridge between dental school and general practice has been recognised in a number of countries in Europe. These countries require that on successful completion of the prescribed dental educational programme the new dental graduate must undertake a vocational training programme (5) for one or two years, before being permitted to practice within the state-funded system. As all countries have not introduced such a system of vocational training, there may be an inconsistent situation where new graduates who travel to work in a different EU country cannot be required to undertake vocational training in that country even though graduates from dental schools in that second country must undertake vocational training. ADEE would wish to progress harmonization of vocational training together with representatives of the national authorities such as: ministries and professional associations. The role of CED and CECDO has to be acknowledged in this endeavour.

### Curriculum Structure

The dental school should have authority in the development of an independent dental curriculum within the context and parameters of the university and faculty. Following the Bologna recommendations, the dental curriculum should be organised in a modular form.

A module is defined as a learning unit, independent from discipline or departmental structure. It is based on well-defined learning outcomes, essential to the curriculum as a whole and drawn from the curricular competences, with clear articulation of study paths, learning materials, contact hours (e.g. lectures, seminars, working groups) and assessment procedures. It should be clear to the student how, on completion of the module, the experience should be used in further areas of the curriculum. Each module's description should include: a title, ECTS value (6) and learning outcomes; a brief description of the syllabus; methods of teaching and learning; methods of assessment. For more information see *Appendix 1 - European Credit Transfer System (ECTS)* on the Taskforce page of the ADEE website [www.adee.org](http://www.adee.org)

**The dental school should have authority in the development of an independent dental curriculum within the context and parameters of the university and faculty. Following the Bologna recommendations, the dental curriculum should be organised in a modular form.**

### ***Learning Outcomes***

Learning outcomes are statements of what a student should be able to know, understand and/or be able to demonstrate on completion of a module of learning (as opposed to a description of what is provided or 'delivered' to them). Learning outcomes should encompass requirements in the cognitive, affective and psychomotor domains.

Guidance for writing learning outcomes:

- Specify the essential learning for a module and the criteria that will enable a student to pass
- A smaller number of important learning outcomes is preferred to a large number of superficial ones
- Learning outcomes are not a "wish list". They must be simply and clearly described and be capable of being assessed
- Bloom's taxonomy (7) provides a ready-made list of verbs suitable for writing learning outcomes. The emphasis should be on unambiguous, measurable verbs which demonstrate the application of knowledge

### ***Horizontal and Vertical Integration***

The benefits of contextual learning in dental undergraduate curricula (and in all health sciences education) are well established. The move to modularisation should not be a barrier to horizontal or vertical integration, nor to ensuring early clinical contact with patients. Such curricula may have a spiral structure, in which subject areas are not simply covered in only one module, but learning from earlier modules is revisited later, with a requirement of deeper learning through the articulation of more demanding learning outcomes.

### ***Primary Recommendations – Curriculum Structure***

#### Primary Recommendations – Curriculum Structure

1. A dental school should have a strong link with or be part of a university and a medical faculty, or a more broadly based healthcare studies faculty, to be an effective higher education teaching institution
2. Dental schools should have authority in the development of a dental curriculum within the context and parameters of the university or faculty. A dental school should have a Dean or Director carrying equal status to the Deans or Directors of the other health care study programmes
3. For effective management of the dental school there should be a clearly defined organisational structure with appropriate devolved authority and responsibilities
4. Given the intensive nature of the dental curriculum adequate numbers of clinical/academic educators and administrative staff should be in place
5. The educational principles of learning and teaching in a dental curriculum should be student- and patient-centred, which should influence the curriculum structure.
6. Departmental structure should not hamper but contribute to a horizontally and vertically integrated clinical learning environment in the curriculum
7. Structures should be established to facilitate the teaching of whole patient oral care
8. A dental school should have an up-to-date curriculum handbook available for all students and staff, comprising the educational philosophy, the curriculum structure, content and assessment regulations
9. Each module handbook should include: a title, ECTS value and learning outcomes; a brief description of the syllabus; methods of teaching and learning; methods of assessment. A module should comprise a minimum of 5 and ideally should not exceed a maximum of 30 ECTS
10. Organisational structures of the school should support the internationalisation (and European convergence) of dental education by lively exchange programmes for faculty and students and acceptance of appropriate credit systems (ECTS)

### **Secondary Recommendations – Curriculum Structure**

#### Secondary Recommendations – Curriculum Structure

1. National health policies, regional and national dental care needs should be major drivers for the development of courses and content
2. A dental school should have access to information on how it is resourced and be given authority to determine, or at least contribute to its annual business plan linked to the educational objectives for that year. There should be transparency of the devolved dental budget
3. The committee structure should be inclusive and supportive. It should have representatives from different grades of staff and students
4. Arrangements should exist to recognise the successful completion of three years of the five year programme as a general bachelors' degree, although this emphatically does not lead to the opportunity for registration as a dentist or any oral healthcare professional
5. Taught postgraduate programmes in a dental school are recommended but should not weaken the dental undergraduate programme (staff and patient resources)

### **Curriculum Content**

#### ***Overview***

The evolution of biotechnology and biomedical sciences in general, together with new developments in the knowledge and technology of dental sciences has generated such a volume of new knowledge that it is practically impossible to maintain the currency of traditional curricula (i.e. where education is based on teaching independent subjects). It has become evident that traditional curricula and traditional methodologies of teaching, e.g. those based upon lectures and acquisition of knowledge by rote, are not effective in the fostering of learning habits that instil a culture of self-directed learning, which is so necessary in the current knowledge society and especially for health care providers.

The solution lies in the introduction of flexibility in curricular models and in the need to integrate basic, medical and dental sciences both vertically and horizontally. This should inspire students to become life-long learners and to continue the process of knowledge acquisition for evidence-based practice throughout their professional lives.

**It has become evident that traditional curricula and traditional methodologies of teaching, e.g. those based upon lectures and acquisition of knowledge by rote, are not efficient in the fostering of learning habits that instil a culture of self-directed learning, which is so necessary in the current knowledge society and especially for health care providers.**

### ***Core and Elective Curricula***

To attempt to solve the problem of curricular overload, a core curriculum is proposed where content and competences that are fundamental to the accomplishment of the agreed professional profile and learning outcomes are defined. At the same time, a catalogue of elective courses is developed. According to their individual interest students have the option to choose from clinical, non-clinical and other projects. These could be research, clinical, non-clinical, humanities or even other projects of different faculties of the University.

By providing a core curriculum plus a catalogue of dental electives all dental graduates should achieve a wide-ranging core of clinical education in order to allow them to meet the requirements for competence as established in the profile. At the same time, there should be some freedom to study diverse topics that will allow them to explore areas of particular interest in greater depth. Health professionals should engage in a broad academic education embracing topics beyond the field of dentistry to better understand their role in society.

### ***The Dental Team***

There is increasing emphasis on team work in the provision of oral health care, with the dental team being lead by a dentist who may be a general practitioner or specialist working with other dental care personnel such as dental therapists, dental hygienists, dental nurses, clinical dental technicians or dental technicians all of whom may have differing functions depending on legislation within individual countries. In order to ensure effective functioning of the dental team, students in the relevant undergraduate programmes need to engage in interdisciplinary training at undergraduate level. Dental undergraduates also need to become familiar with roles of the various dental specialists in their own countries.

### ***Primary Recommendations - Curriculum Content***

<i>Primary Recommendations - Curriculum Content</i>
<ol style="list-style-type: none"><li>1. The content of the dental curriculum should directly be related and contribute to the Profile and Competences for the European Dentist</li><li>2. Schools should ensure that the content of the curriculum is evidence based and reflects current best practice throughout the entire programme.</li><li>3. Early contact between patients and dental students should take place. In particular, it is necessary in first or second-year dental students to have some contact with patients</li><li>4. Effective infection control should be integral to all clinical activity</li><li>5. Integrated patient care should be an fundamental part of the clinical education</li><li>6. A research project should be an integral part of the dental curriculum</li><li>7. Basic and biomedical subjects should be learned in an integrated manner</li><li>8. Education including hands-on training in basic life support skills should be compulsory, repeated and assessed.</li></ol>

### ***Secondary Recommendations - Curriculum Content***

<i>Secondary Recommendations - Curriculum Content</i>
<ol style="list-style-type: none"><li>1. The study of medical and other conditions that have relevance for dentists in their treatment of patients should be strengthened</li><li>2. Education in the behavioural and social sciences is advocated in order to ensure that dentists communicate effectively with their patients, team members and other health professionals</li><li>3. Education in dental public health, preventive and community dentistry is advocated</li><li>4. An integrated approach to education in ethics and professional conduct is recommended</li><li>5. Practice management, and information and computer technology (ICT) should be included in the curriculum</li><li>6. There should be increasing emphasis on team work with some elements of integration between the educational programmes for the different dental team members</li><li>7. It is desirable that electives should form an integral part of the undergraduate curriculum</li></ol>

### **Learning in Dental Education**

#### ***Context***

There are in excess of 200 dental schools in Europe, with a multiplicity of learning contexts. In preparation for graduation, students must demonstrate a variety of acquired learning outcomes to practice evidence-based comprehensive primary oral health care. In order to educate a dentist to become competent, learning and teaching methods should be based on best available evidence from educational research. Education should be flexible, supporting a variety of learning styles, yet keeping a balance between the educational needs of the student and the absolute requirement that the learning objectives are attained. All modules should have their aims, learning outcomes and assessment methods clearly stated and aligned (8). Curriculum design should map clearly the learning activities, assessments and learning outcomes. These should be reviewed and updated regularly.

#### ***Learning Environment***

There is a multitude of educational methodologies available. This document does not endorse one over another but does advocate that all dental curricula encourage evidence-based, self-directed, integrated learning as the basis for producing dentists who will become life-long learners.

It is important to reflect best practice and innovation in education to satisfy the learning needs of students, whilst recognising the need for staff development and support. Traditional dental education includes a combination of lectures, group sessions/seminars and clinical sessions, with most of the theoretical content usually presented in lectures. Lectures are the classical method of traditional teaching, and are considered to be cost-effective in that the content is delivered to a large group of students at one time. However, it is well accepted that the more a situation in which something is learned resembles a situation in which it is applied (encoding specificity), the better the performance.

Student learning is probably best facilitated by use of a combination of educational methods that emphasise learning skills and competence rather than provision of knowledge alone. The emphasis should be on the learning 'contract' between the students and staff (of the School and the Institution as a whole), with agreement being made about individual and shared responsibilities.

**Learning and teaching should use an evidence-based approach which includes critical thinking and should take account of the educational needs of the student as well as the oral health needs of patients and the community**

### ***Staff recognition and student support***

To further staff development and retention dental schools need to provide staff support and appropriate recognition. Staff should have access to educational consultants and experts in the design of learning and teaching methods. Courses in continuing education for staff must be provided. Staff should be rewarded appropriately for their engagement with the educational objectives of the school and for their excellence in dental education. A process of systematic peer evaluation is encouraged in which colleagues attend the teaching sessions of colleagues in order to give constructive feedback on the process. Sharing teaching and learning experiences and methodologies will reinforce the concept of learning together in academia. Evaluation of course content and delivery should be focussed primarily on constructive feedback and learning from best practice.

Dental schools need strategies to promote faculty development in teaching and learning theory and practice. Evaluation of educational quality of dental programmes relates to developing reliable outcome measurements/tools. Faculty support for conducting and publishing results from well-designed research studies addressing learning outcomes are to be encouraged.

Dental undergraduate programmes are very demanding of students due to the high contact hours, a long academic year and the stresses of providing clinical care for patients. Students need strong supportive pastoral structures from the dental school and university. Staff in the dental schools need to be aware of these structures to enable them to guide students towards relevant support systems.

Close personal support is also required from an academic and clinical perspective; the role of academic personal mentor/tutor has much to recommend it. Regular meetings are necessary between student and tutor to discuss progress against targets and to discuss, for example, examination grades.

### ***Professional Behaviours***

Of central importance to the effective education of a dental student are issues of communication skills, professionalism and expressed behaviours. These should form part of the learning outcomes of the curriculum (1) be learned successfully and assessed in all domains.

Historically it was assumed that the role modelling provided by staff served as sufficient example for students to develop required levels of professional behaviour. The UK General Dental Council, for example is in the process of modifying its expectations of the new dental graduate. Renewed emphasis being placed upon professionalism, ethics and the behaviours of students and graduates in terms of their fitness to practice.

Schools should ensure that mechanisms are in place to educate and appraise students in these fields and have in place processes for the identification, guidance and discipline of any student found to be under-performing.

Developments first in medical education and later in dental education have led to the introduction of courses, for example in communication skills (9). Simulated patients are used to rehearse required skills as they are developed, effective methods of objective, simulated and *in vivo* assessment need to follow.

### ***Progression of learning***

The planning of learning and teaching must take into consideration the diversity of learning styles among students. For example, some students show a preference towards visual aids, while others prefer text, personal instruction or teamwork. The selection of methods should take into consideration practical factors as well, such as the resources available (human and physical).

Students must also gain insight into their own learning process so as to be able to identify future learning goals and continuously evaluate their developing levels of competence. The meta-cognitive act, to reflect both in and on action, (10) is a way to make one's own thinking accessible and therefore is essential in order to identify the need for change and improvement.

Students should experience the handling of a variety of studying/learning methods including media and technology in addition to being educated in how to interpret and value information and knowledge from all sources. Students should be given the opportunity to give and receive feedback on all courses to emphasise their shared responsibility in participating in curriculum and professional development.

**Students should experience the handling of a variety of studying/learning methods including media and technology in addition to being educated in how to interpret and value information and knowledge from all sources.**

### ***Traditional Teaching versus Student-Directed Learning***

Traditional teaching has mostly been teacher-directed and intended as a method of transmitting knowledge from the teacher to students. This does not always encourage

reflection on student learning or consider the ways in which learning is associated with teaching.

Lectures can stimulate learning and can be methodologically enhanced with student interactivity and feedback. "Lectures on demand", where students decide the content of the lecture depending on their questions, "e-lectures" saved and archived in multimedia format for subsequent pod-casting have been proposed as good examples. An increased insight into the learning process has led to discussions on alternative educational philosophies as well as methods and tools to achieve the learning outcomes. Learning may be expressed as *'it should be changing the way in which learners understand, or experience, or conceptualise the world around them* (11). 'The world around them' must include both the profession they are studying and the needs of patients within society.

To improve and support progress in dental education, faculties need to embrace and promote best teaching and learning evidence. Dental educators are instrumental in bridging clinical best practice with knowledge on pedagogy in order to enhance active and reflective adult learning.

**Learning and teaching should be student-centred with students encouraged and supported in taking responsibility for self-directed learning in order to encourage a culture of life-long learning**

### ***Use of the Internet and e-learning***

The use of technology in undergraduate dental education should be driven by learning needs and outcomes. Students need to be equipped with the appropriate critical appraisal skills in order to evaluate the quality of information available on the internet.

E-Learning has been defined as *'learning in a way that uses information and communication technologies'* (ICT) (12). Such methods of learning should not be 'add on' or adjunctive to learning but fully recognised and incorporated into the curriculum. Course designers must choose from and combine a wide array of methodologies and technologies, depending upon the needs of the learners and the objectives of the intended education.

E-Learning requires consideration of the computer literacy of academic staff and students, as well as access to computers and high speed Internet infrastructure. The use of pedagogical tools in Virtual Learning Environments (VLEs) (13) is pivotal in moving to a pedagogically sound e-learning capability. The creation of a super database of e-content for use by all schools is a desirable goal. In order to fully utilize the advantages of e-learning, schools must work together and share resources and best practices in an open manner.

## ***Primary Recommendations - Learning & Teaching***

### *Primary Recommendations - Learning & Teaching*

1. The aims and learning outcomes of all programmes and modules should be clearly defined and be aligned with content and assessment. Modules should be integrated to avoid unnecessary repetition of content
2. Learning and teaching should use an evidence-based approach which includes critical thinking and should take account of the educational needs of the student as well as the oral health needs of patients and the community
3. Learning and teaching should be student-centred with students encouraged and supported in taking responsibility for self-directed learning in order to encourage a culture of life-long learning
4. Appropriate learning and teaching methods should be selected to facilitate a variety of learning styles. Levels of computer literacy in staff and students should be monitored and appropriate training provided
5. Staff development in education and the teaching of evidence-based oral health care (EBOHC) should be provided for full-time and part-time staff. The vital role of academic staff in undergraduate learning and teaching should be formally recognised by Universities and dental schools
6. Regular feedback and course evaluation should be undertaken

## ***Secondary Recommendations - Learning & Teaching***

### *Secondary Recommendations - Learning & Teaching*

It is recommended that dental schools:

1. Access educational consultants and experts at all stages of the educational process and explore the opportunities for sharing resources
2. Recognise the value of the Internet as a source of information while encouraging students to recognise its limitations; using e-learning, and its pedagogical tools which should be embedded in the learning culture of an institution

### **Assessment**

#### ***Overview***

Undergraduate dental education aims to produce safe, competent and ethical practitioners equipped with the necessary knowledge, skills and behaviours (attitudes) appropriate for the independent practice of dentistry. A major purpose of assessment in dental education is to make decisions on a student's progression toward this competent dentist.

Assessment procedures should be timely, meaningful, transparent and appropriate. They should be based upon the learning outcomes of the individual programme/course, so that student academic and clinical learning is directed towards those desirable outcomes. It is widely accepted that assessment drives learning (14). All dental schools are encouraged to clearly present the purposes and processes associated with their assessments so that students and staff are fully informed. The outcome of an effective assessment strategy should be that students and staff are fully engaged in the development and realisation of assessments. Assessment should provide the springboard for students to adopt a positive approach to effective independent practice and reflective, life-long learning after graduation. For more information see *Appendix 2 – Assessment* on the Taskforce page of the ADEE website [www.adee.org](http://www.adee.org)

**All dental schools should be encouraged to clearly present the purposes and processes associated with their assessments so that students and staff are fully informed. The outcome of an effective assessment strategy should be that students and staff are fully engaged in the development and realisation and quality of assessments.**

#### ***Assessment and learning***

One of the elements of the hidden curriculum is the assessment process (15). The unintended effects of assessment may include the tendency to study very hard just before examinations and to substitute superficial knowledge for desired reflective learning (16). Individual assessments should map to an over-arching assessment strategy and individual tests should be developed in a way that learning outcomes are demonstrated. The challenge is how to design an assessment process that fulfils all these criteria (17).

#### ***Goals of assessment***

Assessment may be formative, to guide future learning or shape values; or summative, to make a judgment about competence at a defined level or fitness for further learning (e.g. post-graduate education) (16). Formative assessments should encourage students to develop skills in self-assessment which will be a vital skill for their future professional lives. Clearly, summative assessments are essential in monitoring student progression within the programme; formative assessments are critically important in developing student insight into a range of issues. Guidelines for *developing an assessment instrument* can be found in *Appendix 2 - Assessment* on the Taskforce page of the ADEE website [www.adee.org](http://www.adee.org)

### **Feedback**

Students should be provided with regular feedback on their performance as a central purpose of assessment is to stimulate further learning. Feedback should be clear, accurate and offer deeper insight into strengths and weaknesses, as formative feedback encourages self-reflection and provides strategies for improving learning (16, 18).

As dental curricula become more integrated in design, this integration should be reflected in assessment practice. It is not helpful to assess according to pre-existing subject domains in a situation where students have been encouraged to learn through integrated thematic delivery. In other words, the assessments should be matched to the delivery methodology, content, and to the learning outcomes overall. (17).

The challenges for dental schools in the coming decade are to develop improved instruments in undergraduate dental education for the assessment of professional behaviour, teamwork and performance during patient care. (19, 20)

### **Primary Recommendations - Assessment Procedures**

#### *Primary Recommendations - Assessment Procedures*

1. All assessments (including clinical assessments) should have clearly defined criteria and marking or grading schemes that should be set out and communicated to students and staff
2. Multiple methods of assessment should be used and multiple samples of performance should be taken
3. Both formative and summative assessments must be employed - students should receive feedback on their academic, clinical and professional performance
4. There should be demonstrable alignment between assessment, content, methods of teaching and learning and learning outcomes
5. The criteria for clinical assessments should include an estimate of performance in the various dimensions of competence (knowledge, skills, observed behaviour and safety)
6. Tools that promote reflection, critical thinking and continued learning, for example self- or peer-assessment and portfolios should be in place
7. A review of assessment must be in place to ensure quality of process and its enhancement

## ***Secondary Recommendations - Assessment Procedures***

<i>Secondary Recommendations - Assessment Procedures</i>
<ol style="list-style-type: none"><li>1. Integrate teaching and assessment of the basic and biological sciences into the clinical part of the programme in order to facilitate the development of the evidence-base for clinical dentistry</li><li>2. Stimulate dental educational research in the assessment process in higher education</li><li>3. Provide academic staff with appropriate education in student assessment to improve consistency</li><li>4. Where appropriate, employ audio visual recording to enhance self-assessment and the development of a critical self-awareness</li><li>5. Encourage the use of self- and peer-assessment in all areas of education</li><li>6. Give consideration to the assessment of learning styles and meta-cognition</li></ol>

## **Staff and Student Exchange**

### ***Overview***

The benefits gained from staff and student exchange are now well recognised with beneficial outcomes for the exchange personnel and the host schools. Dental schools can benefit from signing mutual agreements which render them eligible to receive financial support from the European Commission to support student and staff exchange (21).

### ***Academic/administrative staff exchange***

There are many good reasons for dental schools to support staff mobility:

1. Exchanges provide a broader learning environment with opportunities to share knowledge and culture between schools
2. Staff development and lifelong learning are enhanced through staff exchange
3. Broader experience fuels innovation and curriculum development
4. Understanding and appreciation of the diversities and similarities across European schools is enhanced
5. Through staff exchanges there is understanding and motivation for student exchange
6. Staff exchanges are role models for students

### ***Student exchange***

Student mobility and study abroad have encountered difficulties because of the variation in educational traditions amongst European dental schools. All dental schools should recognise the value of student mobility and encourage and facilitate it by comparing the programmes available in their own dental school with colleagues in other countries so that home and guest students develop a sense of common value.

**All dental schools should recognise the value of student mobility and encourage and facilitate it by comparing the programmes available in their own dental school with colleagues in other countries so that home and guest students develop a sense of common value.**

The benefits of student exchange are:

1. Learning to adapt to different health care settings
2. Adapting to the new environment and fitting into new teams mirrors the experience of changing job
3. Observing and learning from different disease patterns and health care systems
4. Observing and learning different approaches to diagnosing and treating patients
5. Experiencing different curricula and cultures

### ***Recommendations – Staff Student Exchange***

<i>Recommendations - Staff Student Exchange</i>
<ol style="list-style-type: none"><li>1. Schools should make resources available for staff going on exchange, by both making a locum available and providing resources for that person</li><li>2. Encourage junior staff exchange. This is one way of encouraging faculty retention</li><li>3. Encourage schools to sign exchange agreements</li><li>4. Provide information for student exchange in English on the web site of every school in addition to information on the curricula</li></ol>

### References

1. European Parliament. Directive 2005/36/EC (2005) consolidating and modernising the rules regarding the recognition of professional qualifications. Available at: [http://ec.europa.eu/internal\\_market/qualifications/future\\_en.htm](http://ec.europa.eu/internal_market/qualifications/future_en.htm) (Accessed:17/6/2010)
2. Cowpe J, Plasschaert A, Harzer W, Vinkka-Puhakka H, Walmsley AD. Profile and Competences for the Graduating European Dentist - Update 2009. Available at: <http://www.adee.org/cms/index.cfm?fuseaction=page&plD=280&ppID=200> ..... (Accessed 17/6/2010).
3. Plasschaert, AJM, Lindh C, McLoughlin J, Manogue M, Murtomaa H, Nattestad A, Sanz M. Curriculum structure and the European Credit Transfer System for European dental schools: Part I. *Eur J Dent Educ* 2006; 10(3): 123-130 <http://www3.interscience.wiley.com/journal/118575946/issue> (Accessed 17/6/2010).
4. Plasschaert, AJM, Manogue M, Lindh C, McLoughlin J, Murtomaa H, Nattestad A, Sanz M. Curriculum content, structure and ECTS for European dental schools. Part II: methods of learning and teaching, assessment procedures and performance criteria. *Eur J Dent Educ* 2006; 11(3): 125-136 <http://www3.interscience.wiley.com/journal/117991807/issue> (Accessed 17/6/2010).
5. Allen WR. Mandatory vocational training for the general dental services. *British Dental Journal* 1993; 175: 188
6. *European Commission.(2003) European Credit Transfer and Accumulation System (ECTS) Key Features Available at:* <http://www.eua.be/eua/jsp/en/upload/ECTS%20Key%20Features.1068807879166.pdf> (Accessed 17/6/2010).
7. Bloom BS (ed). *Taxonomy of educational objectives*. New York: David McKay, 1972.
8. Biggs J. Enhancing teaching through constructive alignment. *Higher Educ* 1996.32:347-64.
9. Carey JA, Madill A, Manogue M. Communications skills in dental education: a systematic research review. *Eur J Dent Educ* 2010; 14(2): 69-78
10. Schön D *The reflective practitioner: How professionals think in action* 1983 New York: Basic Books, Schön D *Education the reflective practitioner* San Francisco, CA: Jossey\_bass 1987)
11. Ramsden P. *Learning to teach in higher education*. Padstow, Cornwall, Great Britain: TJ International Ltd, 2000.
12. Department for Children, Schools and Families (2005) *Harnessing Technology: Transforming Learning and Children's Services* <http://www.dfes.gov.uk/publications/e-strategy/docs/e-strategy.pdf> (Accessed: 17/6/2010).
13. Mattheos N, Nattestad A, Schitteck M, Attström R. A virtual classroom for undergraduate periodontology: a pilot study. *Eur J Dent Educ* 2001:5:139-147.

14. Schoonheim-Klein ME, Habets LL, Aartman IH, van der Vleuten CP, Hoogstraten J, van der Velden U. Implementing an Objective Structured Clinical Examination (OSCE) in dental education: effects on students' learning strategies. *Eur J Dent Educ*. 2006 Nov;10(4):226-35
15. van der Vleuten CPM. The Assessment of Professional Competence: Developments, Research and Practical Implications. *Advances in Health Sciences Education* 1996;1:41-67.
16. Epstein RM. Assessment in Medical Education. *N Engl J Med* 2007;356:387-396.
17. van der Vleuten CPM, Schuwirth LWT. Assessing professional competence: from methods to programmes. *Med Educ* 2005;39:309–317.
18. Larsen T, Jeppe-Jensen D. The introduction and perception of an OSCE with an element of self- and peer-assessment. *Eur J Dent Educ* 2008;12(1):2-7.
19. Prescott-Clements L, van der Vleuten CP, Schuwirth LW, Hurst Y, Rennie JS. Evidence for validity within workplace assessment: the Longitudinal Evaluation of Performance (LEP). *Med Educ* 2008;42(5):488-495.
20. Wass V, Vleuten van der C. Assessment of clinical competence. *Lancet* 2001;357:945-949.
21. EU Education and Training. (2007) The Erasmus Programme. Available at: [http://ec.europa.eu/education/lifelong-learning-programme/doc80\\_en.htm](http://ec.europa.eu/education/lifelong-learning-programme/doc80_en.htm) (Accessed 17/6/2010).