Review Article

CREATING: a sustainable plan for biomedical higher education in Saudi Arabia. Phase I

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Abstract

Biomedical higher education has been acquiring increasing importance worldwide, including the Kingdom of Saudi Arabia, and effective strategies to improve outcomes and competitiveness are key for academic success. The plan presented here is divided into two major phases. Phase 1 (**C**ommunication, **R**esearch governance, **E**ducation planning, **A**ccreditation) deals mainly with adopting a systematic approach to academic activities according to the current international standards. In other words, the aim is to re-organise what is already in place, taking into account current guidelines and strategies that help improve quality of education and research. It is suggested that this is not necessarily to be achieved by major investments but, rather, by a more imaginative and structured work plan. In Phase 2 (**T**ranslational practice, **I**mplementation, **N**etworking, **G**rowth), higher education institutions are expected to invest in new strategic resources, to establish strong reciprocal links with international academic partners and industry, and to shift their attention to the hot topics and current academic challenges, leading the way in translational education models and pioneering cutting-edge research.

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Introduction

The Gulf Cooperation Council (GCC) countries have experienced a major social, cultural, and economic transformation over the last 40 years,[1,2] including the development of medical education historically led by the Kingdom of Saudi Arabia (KSA).[1]

In line with its pioneering role in education, the national government of the KSA has set rising expectations for higher education, which have been supported by strategic measures, including establishment of new universities, colleges, and centres of excellence.[3] A central point of the new national plan is to stimulate quality and performance in higher education through the agency of National Commission for Academic Accreditation and Assessment (NCAAA) in Self-Studies, Strategic Planning and Accreditation.[4,5] There has been quite diverse response of Saudi Universities to these demands, and most higher education institutions (HEIs) are still in the process of finding their way to meet the criteria set by the government. Worryingly, few if any organisations actually use a rational comprehensive model of decision-making – even if they think that they do.[6] Simple and effective strategies that fulfil the key requirements of the current plan while at the same time implementing international academic standards are needed.

Throughout most of modern history, knowledge and education maintained a rather self-sustained, national language-based education model with a stratification mechanism to select and produce future leaders and professionals. [7] Notable examples include the Far East (mainly Japan and China) and, in part, the Arab world. Over the last few decades, however, the models affirmed by Western Universities have determined an "internationalisation" of higher education and created crucial dimensions of prestige and status seeking in the global arena. These are best exemplified by the importance acquired by University ranking systems. [8] Research has become central to this new dimension, as it now permeates not only biomedical science, but also social and behavioural science that directly affects teaching and learning strategies. [9] In other words, research is indissolubly linked to all aspects of knowledge. In contrast, the primary aim of NCAAA guidelines seems to direct toward pursuing excellence in teaching and undergraduate education, whereas research has been concentrated in few centres of excellence. [10]

The ability to solve the dualism between teaching and research and promoting a modern model of higher education will be a key determinant for universities to be recognised internationally as academic institutions *de facto*. The success in facing the challenges of the coming years, however, will not depend simply on the ability of Saudi universities to meet the changing international standards affirmed by dominant models; rather, it will rely on the capacity of interpreting the leading academic models to create a solid structure that is able to sustain and deliver an original plan for higher education in the Arab world (**Figure 1**). Based on the solid ground of infrastructures and facilities, this model of medical education would integrate the four pillars of clinical academia (education, research, heath service, administration) with service to community as well as enterprising. Education-driven implementation of the latter would provide suitable human capital and economical resources that, in turn, will nurture further development of infrastructures and human resources in a *virtuous* circle.

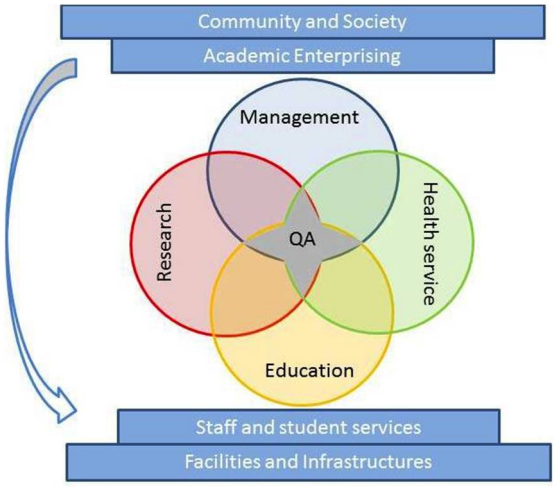

Figure 1. Representation of the *virtuous circle* of biomedical education. The four pillars of clinical academia (education, research, heath service, administration), which rely on the availability of infrastructures and facilities, will lead to improvement of health service and consequently to enrichment of

human resources. Concurrently, the higher education institutions (HEIs) will work as enterprise, thus providing new economical resources that can be used to improve infrastructures and facilities.

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The plan elaborated in this collaborative document represents an attempt to share some common aims of modern higher education among dental and medical colleges in Saudi Arabia. Our recommendations have arisen from the analysis of the current English and Arabic literature relating to this topic, performed using MEDLINE / PubMed / Ovid databases as well as data released from government and professional bodies such as NCAAA, General Medical Council (GMC), General Dental Council (GDC), UK Quality Assurance Agency (UK), Association for Dental Education in Europe, American Dental Association (US), and Royal Australasian College of Physicians.

C: Communication

The increasingly trans-national character of higher education has brought tremendous dynamism for the advancement of science and technology. The trend also provides opportunities for the improvement of higher education through collaboration, competition, exchange of ideas, and increased exposure to the international community – all aspects in which communication is the common denominator. In practical terms, communication strategy affects how HEIs are *perceived* and *recognised* by the outside world, which is mostly dependent upon ***what*** they share and ***how*** they do it.

University profile and indexing. Gaining an internationally acknowledged profile and eventually a world rank has become an essential requirement for world class universities. There is indeed increasing interest in university rankings, with the emergence of dominant models that affect internal hierarchies both within individual institutions and across national system of higher education. The most authoritative rankings of world universities are published annually by Quacquarelli Symonds (**QS)** and Times Higher Education Supplement (**THES**), as well as by Academic Ranking of World Universities (**ARWU**, also known as Shanghai ranking).[8] A new model of assessment has been recently developed by ranking based on *Web visibility* (Webometrics). [11] For instance, King Saud University has been ranked top 200 in the 2011 QS world ranking, 261st in the ARWU ranking, 214th globally and 1st in the Arab World by Webometrics, but it is not present in the first 400th world universities according to THES. This reflects different methodologies of assessment. What is important for HEIs is to look at the *criteria* considered and make appropriate plans with an aim of being included for indexing and ranking.

University portal and staff profile. Open access to appropriate information by the broader community is a key element for achieving international standards. The university portal should be structured such that information regarding infrastructures, resources, education and research should be readily and easily available in Arabic and English. Web pages detailing staff profile, research interests and contact information should also be available, at least for faculty members.

In order to be effective, the message delivered through the Web need to be professionally organised. [12] Therefore, whilst the content should be planned and carefully written at a higher faculty level, graphical and interactive interface should be set by professional companies in the field of Web design and facilitated by IT support staff.

Sharing academic information. There are different manners of sharing academic information with the community, mainly by:

- Publications: this includes scientific articles, chapter and books (which are the mainstream of academic success and depend on research strategy and governance), but also University/College's official publication media in Arabic and/or English.
- Presentation to congresses: relevant national and international scientific meetings should be individuated by Department Chairmen and attended by staff specialists on a regular basis. Most important, original data for oral or poster presentation should be submitted to such meetings and every

effort needs to be made in order to plan research accordingly.

- Scientific forums: staff should be encouraged to participate to scientific discussion on major blogs, forums and websites dealing with dental/medical specialties, in order to provide expert opinion and share ideas with the community. For instance, the European Association for Oral Medicine provides a clinical cases forum to encourage problem-based discussion in the field of oral diagnosis and medicine. These forums are usually run in each specialty and provide a useful opportunity to spread the name of Saudi HEIs among medical academics.

R: Research governance

Universities in Saudi Arabia have been established with a mission of providing undergraduate education to meet Kingdom's needs. *De facto*, this gives teaching a prominent role and undisputable priority over other academic activities. Notwithstanding the agreeable necessity of potentiating undergraduate education, research is still encouraged and acknowledged to be crucial for the development of higher education in KSA, especially in the new global context. It is surprising that despite these premises, academic products of research (e.g. publications in journals with impact factor, chapters, books) in several Saudi medical HEIs are either relatively low or rely on collaborative work with world-leading universities. Faculty members perceive that lack of time and support, as well as massive teaching loads, are major obstacles impeding research productivity. [13] The reasons that lie at the root of this performance in research include: 1. Lack of clear organizational and academic structure, planning and assessment in research; 2. Limited investments: most Arab universities are largely state owned and spend only around 1% of their budgets on research compared to an international average of 35%; [14] 3. Lack of cross-faculty, multidisciplinary collaborations. The first aspect is described in more detail in the following paragraphs. Issues related to funds and collaborations are core components of the second part of CREATING plan and therefore will be discussed in Part II.

Academic pathways. A notable difference with western universities is the absence of job pathways for academic staff. This is exemplified in **Figure 2.** Let us assume that, in agreement with the university mission, 80% of academic staff's time has to be allocated to teaching/administration and the remaining 20% to research. This does not imply that *each* member of staff has to follow an 80:20 ratio but, rather, that the overall staff time devoted to teaching and research has to be 80% and 20%, respectively. The most productive way to do so would be to establish academic pathways (**Figure 2**). So, for instance, 75% of academics could be employed to perform exclusively teaching/administration duties, 10-15% to do both teaching and research in a reasonable ratio, and the remaining 10-15% of staff would be employed to carry out research only, with few interdisciplinary lectures in their topics of expertise. With such arrangement, not only the overall ratio of 80:20 would be safeguarded but, also, it would ensure a more reliable control of academic activities and the outcomes would be most probably maximised.

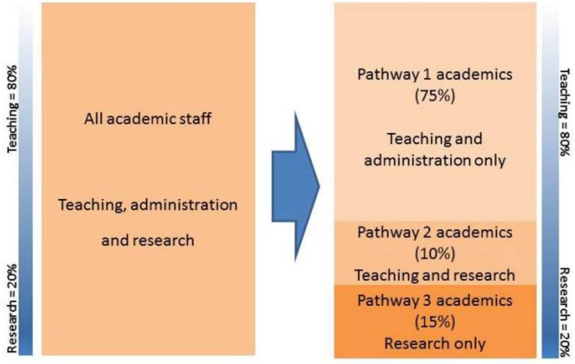

Figure 2. Scheme of academic pathways. The picture provides an example of how to maximise the academic outcomes based on a requirement for 80% teaching and 20% research. This is obtained by fulfilling the academic loads with faculty staff being assigned different academic duties (job pathways).

Research governance. Another striking aspect that explains the struggle with research of certain Saudi universities is the shortage of

academic personnel specifically *responsible* and *accountable* for research activities in each Faculty (e.g. Associate/Vice Dean for Research or Head of Research): research responsibilities usually lie with Department Chairs that directly report to the Dean.

The broad range of standards of good practice that exist to achieve, and continuously improve, research quality and ultimately maximise research outputs may be defined r***esearch governance***. The main goals are achieved by coordinating research activities through well-defined organisational structure. Here we propose a tentative structure (**Figure 3**):

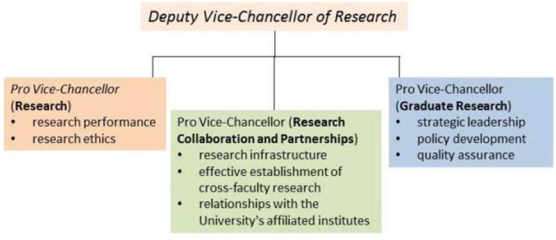

Figure 3. Organisational structure for research governance.

At **University level**, the prime responsibility for academic leadership in research, and delivery of the University's research agenda, lies with the *Deputy Vice-Chancellor of Research, i.e. DVC(R)*. This role is supported by the *Pro Vice-Chancellor (Research)* (PVC(R)) whose responsibilities include research performance and ethics; the *Pro Vice-Chancellor (Research Collaboration and Partnerships)* who has responsibility for research infrastructure and for ensuring the effective establishment of cross-faculty research institutes; he/she is also responsible for managing relationships with the University's affiliated institutes; and the *Pro Vice-Chancellor (Graduate Research)* with responsibility for strategic leadership, policy development and quality assurance for research training. The DVC(R) and the PVCs develop and drive implementation of the University's research strategy and promote University research capacity, performance and outcomes. *The research leaders should be selected on the basis of measurable achievements and experience in research and research planning.*

At **faculty level**, ***Deans*** and ***Associate (Vice) Deans (Research)*** provide 'local' leadership in research planning, target-setting, research development and performance review. ***Heads*** (or Chairmen) of Academic Departments also provide crucial leadership in research and research training, supported by Centre directors, senior staff and postgraduate co-ordinators. It is suggested that a scientific committee chaired by the Dean and/or Associate Dean (Research) is established for each College/Faculty that should provide help and guidance to effectively develop research activities in the College. Heads are encouraged to develop a research agenda to improve research outcomes in the Departments. It is suggested that they establish informal research meetings with group members on a regular basis to follow up research progress, share ideas, and discuss possible issues.

E: Education planning

An education system based on outcomes (outcome-based curriculum, OBC) has become central to biomedical universities. However, there are no pre-customized educational plans and methods that can be used without considering the local context. Since "the product defines the process",[15] one needs to be clear about what students need to be able to do at the end of their studies. These desirable outcomes represent the base for curriculum instruction, assessment, planning, and implementation. It is therefore essential to establish a professional identikit of the graduating doctor.

Profile and competencies and benchmark statements. Students from Saudi Universities benefit of an intellectually demanding, research-informed education that nurtures professional independence of mind and prepares them to achieve their personal goals and serve society's needs in the Kingdom as well as across the globe. As mentioned above, a primary goal for the Medical and Dental Colleges is to establish clear *profile* and *core competencies* of the graduate, which will guide HEIs to draft the intended learning outcomes (ILOs) specific to

the program. Key benchmark statements for medical and dental education have been extensively published by accredited bodies both within and without the KSA.[5, 16-21]

Whilst educational planning needs to meet internationally recognized standards and models of education, it is important that the activities developed in the Kingdom keep a level of autonomy that meets the requirement of local traditions as well as students and staff peculiarities. In other words, the aim is to create an original model, which is distinctive of Saudi higher education but complies with accepted international standards.

The following paragraphs detail the key points that should be considered in planning and implementing educational activities.

The process of learning: integration of research and teaching. The link between research and teaching has become one of the main topics to develop effective teaching strategies. An understanding of what is meant by linking teaching and research was published by Griffiths (2004), who developed typologies of teaching-research link. [22]

Teaching can be ***research-led***: in the sense that the curriculum is structured around subject content, and the content selected is directly based on the specialist research interests of teaching staff. Teaching can be ***research-oriented***: in the sense that the curriculum places emphasis as much on understanding the processes by which knowledge is produced as on learning the codified knowledge that has been achieved. Teaching can be ***research-based***: in the sense that the curriculum is largely designed around inquiry-based activities, rather than on the acquisition of subject content.

Finally, teaching can be ***research-informed***: in the sense that it draws consciously on systematic inquiry into the teaching and learning process itself. The results of the Teaching Informed and Enriched by Research initiative launched in 2006 by the Higher Education Academy in the UK seem to point to research-informed teaching as the most effective strategy.[23]

Code of Practice for Teaching and Learning. The Code of Practice describes the conduct of learning and teaching within a HE programme. It defines the role of academic staff that must be involved in designing, implementing and monitoring teaching and learning of all types. It defines *teaching systems and approaches* (e.g. student-centred plan, where a credit system is used that is based on student workload; problem based learning, with small group working on solving a problem in a highly structured way), and *methods of assessment,* overall referred as *teaching and learning activities* (TLAs). The code establishes general/specific teaching and learning *aims and objectives, which* need to be SMART (Specific, Measurable, Achievable, Relevant, Time-framed) as well as *learning outcomes* (e.g., knowledge and understanding, skills, attitudes).

These concepts need to be organised on the basis of Institution's teaching and learning strategy. For instance, Outcomes Based Teaching and Learning (OBTL) reflects a learner-centred approach that has been widely adopted in universities across the world. In this model, we first describe what the learners should be able to do once they have completed their programme (i.e., ILOs), and then plan the appropriate teaching approach and assessment methods accordingly. A tentative flowchart that integrates the current constructivist understanding of the nature of learning and an aligned design for outcomes-based teaching education, called "constructive alignment", is reported in **Figure 4**.

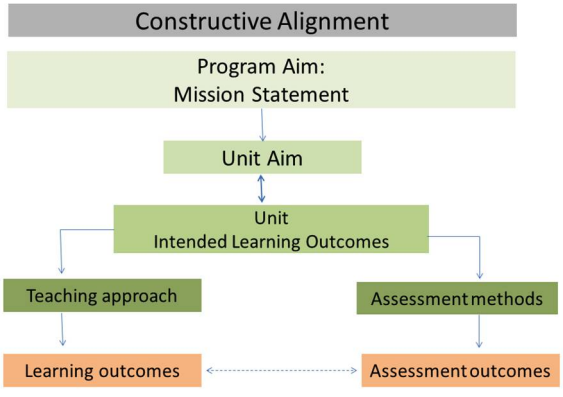

Figure 4. Constructive alignment. The flowchart integrates the current constructivist understanding of the nature of learning and an aligned design for outcomes-based teaching education.

Curriculum reform: where does KSA stand? Curriculum reform and development are essential elements in modern education. In the last three decades various biomedical education bodies worldwide were calling for reform in the undergraduate medical curriculum. Curriculum development is no longer an ad hoc process, but involves rigorous planning to assess needs, identify goals and objectives, and prepare both students and teachers for change and reform. Moreover, any curriculum should set out to meet the cultural, social and individual requirements of both – the institution and the local community that it serves. Accordingly, medical schools are broadening their educational objectives: more emphasis is being placed on skills training, communication and attitudinal development. Therefore, most dental and medical schools have adopted one or a mixture of the following approaches to curriculum: student–centered, problem-based, integrated, community-based, elective-oriented or system-based (SPICES) medical curriculum, with electives or options. In addition, increasing emphasis is being placed on self-directed study with students expected to take more responsibility for their own learning. The application of new learning technologies has supported this move. New directions can be identified too in the area of assessment: increased emphasis on performance assessment, the use of techniques such as the objective structural clinical examination, the use of standardized patients, log books, portfolio assessment and self-assessment. [24-26] In one example, a national competence framework has been developed by medical schools in the Kingdom of Saudi Arabia. The framework has seven domains and associated 30 competencies, the seven domains include: approach to daily Practice, doctor and patient, doctor and community, communication skills, professionalism, doctor and information technology, doctor and research. The framework and the associated 30 competencies were approved by the Medical College Deans' Committee held on 14 April 2010 at Tabouk University. [27] With regards to dental education, whilst several colleges have developed comprehensive curricula in the Kingdom, [1] as yet there is no clear agreement on common outcomes throughout dental schools in KSA.

Curriculum development: Modularity, integration and PBL. Following the Bologna recommendations, [28] the 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.

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,[29, 30] 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.

The competency/outcome based curriculum and the use of PBL should always be adapted to the local settings. The phenomenon of transplanting from a 'donor institution' a curriculum which was developed in a culture, values, belief systems and context of practice foreign to the institution 'recipient' which has imported it [31] needs careful consideration as it may prove ineffective or even counterproductive. [32-35] For instance, most PBL curricula have been implemented in US and Australia, where medical and dental studies are part of graduate programs and therefore students have some background knowledge of basic science. Major adaptation and contextualization as well as control of consistency between teaching and assessment methods is required by experienced educators, and faculty of the recipient institution should be educationally developed and rapidly own the curriculum in order to prevent its 'rejection'.[31]
A tentative medical and dental curriculum is proposed in **Figure 5.** The plan is based on a student-centered, competency based learning

[1] http://ksu.edu.sa/sites/KSUArabic/Deanships/quality/DocLib9/KSU%20SSR%20January%202010%20t.pdf

using hybrid PBL as an educational method, a strong emphasis upon a community oriented practice and an encouragement for students to become self-directed and lifelong learners. The curriculum is both horizontally and vertically integrated and presents with a spiral structure and emphasis for clinical teaching and comprehensive patient management (**Figure 5**).

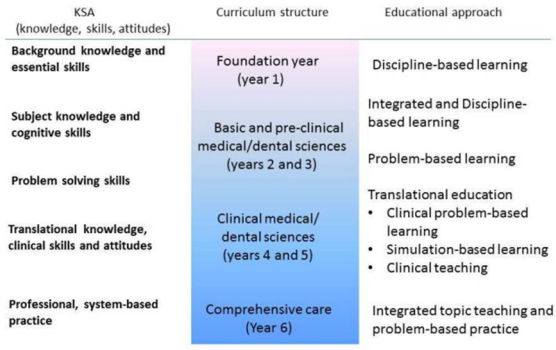

Figure 5. Schematic plan of the proposed medical and dental curriculum. The structure of the study plan (*central panel*) is accompanied in parallel by the learning outcomes (knowledge, skills, and attitudes, *left panel*) and by the educational methods and strategies that best suit the desired outcomes (*right panel*).

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Before and after: admission and postgraduate study. Attracting the best students is undeniably central to academic success. In this regard, biased procedures for admission to medical and dental programs can jeopardize the robustness of the entire curriculum. Mechanisms need to be created that minimize the role of "local influences" threatening the admission system. A partial solution could be the institution of centrally drafted, governmental entry tests to be held the same day for all medical and dental schools. This would not only reduce the influence of local factors but, also, would standardize the mechanisms for recruitment of students in the Kingdom.

It is common practice in the KSA to sponsor postgraduate study of Saudi Nationals in world leading universities in the US, UK and Australia. HEIs may definitely benefit from recruiting Saudi doctors who have trained abroad; however, this should be coordinated according to the goals that universities wish to achieve. For instance, if the expectations are that abroad-trained Saudi academics will provide leadership in their fields once back in the Kingdom, then *post-doctoral* work experiences (e.g. assistant lecturer, teaching fellow, research associate) should be pursued in foreign countries. This allows the prospective employee to take up his/her academic position in KSA *following* a first exposure to academic staff duties and responsibilities, including administrative tasks, independent work and leadership in teaching and research. A common shortcoming of the current system is that newly diplomated doctors are recruited by Saudi universities to take up academic and/or administrative positions soon after completion of their postgraduate degrees, at a career stage in which they obviously have no academic working experience or sound understanding of the mechanisms of governance and management. This is a real risk for efficiency and productivity of Saudi universities.

A: Accreditation

The desire to be one of the best schools on the world stage means accepting that this aim will be furthered by the challenges of external (international) evaluation, in addition to national assessment. Not less important is the *informal* process of accreditation, which is less tangible and more difficult to alter and reflects the values and beliefs that surround Saudi HEIs. Thus, we used the term "accreditation" beyond its bureaucratic meaning to indicate the process of "gaining credit" and recognition at a national and international level.

According to the American Dental Association, "*accreditation is a system for recognizing educational institutions and professional programs for a level of performance, integrity and quality that entitles them to the confidence of the educational community and the public*". In other words, accreditation is a process of external quality review used by higher education to scrutinize colleges, universities and higher education programs for quality assurance and quality improvement.

Whilst internal formal accreditation will be mandatory in order to be recognised nationally

as HEI, international accreditation is somewhat ill-defined and should not be taken as a primary aim at this stage.

The **benefits** of being accredited are many, and they apply especially to students (e.g. quality education, financial aid opportunities, credit transfer and exchange of students/workers).

The **criteria** for gaining formal national certification by the SMHE that a program meets minimum required standards have been set by the National Commission for Academic Accreditation & Assessment. The Commission has defined the standards it will apply in two documents, *Quality Benchmarks for Post-Secondary Institutions* and a *National Qualifications Framework*.[5,36] In addition, these documents give detail regarding the process of measuring performance in relation to established standards or criteria (i.e. assessment).[37] The literature provided by NCAAA provides clear guidelines and can be set up in a relatively short time - 2 to 4 years on average.

Accreditation of HEIs with non-Arabic associations should not be overestimated, not least because it is not necessary for pursuing their core mission. The mission of biomedical higher education in the KSA is in fact to provide a specialised workforce to comply primarily with the National needs. Furthermore, for each biomedical speciality, there are various associations dealing with higher education programs and they set different requirements. For example, the requisites necessary to be accredited with the Association for Dental Education in Europe (ADEE) will vary from those required by the American Dental Education Association (ADEA). Accreditation with international organisations should be pursued mainly for "diagnostic" purpose, i.e. to gain valuable feedback and recommendations. The steps to follow in order to seek international accreditation (Preparation and self-examination; Peer review; Visit and examination; Judgment action made by accreditation organization; and Continuous review) represent a practical exercise that will no doubt benefit any dental or medical school in the Kingdom.

The key points illustrated earlier, especially **R** (research planning) and **E** (education governance) represent the core of accreditation requirements and, ideally, should be approached bearing in mind the standards required by the accrediting organisation. It is suggested that an *ad hoc* Committee for Accreditation is put in place in each College/Faculty to facilitate this task.

Conclusion

Saudi Arabia has become an irreversible process of internationalisation that is bringing major changes in the higher education of the whole Arab world. Drawing on an analysis of the Saudi university system, here we have proposed a first step toward a sustainable model, where current setting is implemented according to international standards but also following local practices. This solid ground will lay the foundations for the next step, Phase 2 (**T**ranslational practice, **I**mplementation, **N**etworking, **G**rowth), where biomedical HEIs will be expected to invest in new strategic resources, to establish strong reciprocal links with industry and fair international academic partnerships, and to shift their attention to the hot topics and current academic challenges, thus finally becoming truly world leading universities.

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