

## **AC 2007-527: QUALITY ENGINEERING EDUCATION FOR THE ARAB STATES REGION**

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## **Quality engineering education for the Arab states region**

### **Abstract**

Reform in engineering education is needed in all parts of the world, as universities prepare graduates to enter the profession of engineering which has been transformed by massive technological developments and by globalization of all aspects of concern to engineers. Engineering educators in the Arab states region face particular challenges in addition to those facing similar educators in other parts of the world: tailoring programs to fill the needs of countries that are undergoing rapid modernization, providing access to their education programs for segments of their societies that may not have had it in the past, offering programs which are relevant to the particular needs of women in their countries, and developing local or regional quality assurance mechanisms which have positive impact on their educational program.

### **Introduction**

It would be simple to present a paper exhorting engineering educators to carry forward with the mandate of adopting world class standards of engineering education in the Arab region, but is there anyone left who does not believe that this is what needs to be done?

Rather than belabor the obvious, let us look at the world in the Gulf and beyond in the other Arab states. In particular, we will examine both the pace and the scope of change which is coming about in this region, and think about how to reconcile the global quality mandate with the circumstances in the societies in which Arab engineers work. What we see is a call for engineering educators to think in accordance with global technical standards and to devise ways to apply them creatively to the fast changing local scene. It is in the space between global technical standards and local realities that engineering educators in the Arab world need to fashion their own quality assurance efforts.

The dynamics of change in the Arab world are startling. Change is taking place in areas which just a few years ago were seen as intractable. Elections are being held where they never were before. Women are making new inroads into the power structures of their countries. The western world is suddenly scrambling to understand the region it so long neglected. Arab-Israeli relations show some new dimensions. Underclass workers are daring to assert their rights. The media are becoming more insistent in their calls for greater freedom from government controls. No one who lives in the Arab world can miss noticing that change is in the air. Not the least of these changes is the growing conviction that the Arab world must rebuild its intellectual, social, scientific and technical capacities, which have been in decline for so long.

There are four areas where change is taking place where engineering educators would do well, in our opinion, to give some serious thought to changing their ways. They have to do with national employment policies, access to higher education, the role of women, and quality assurance mandates. Each of these is undergoing substantial change and offers

opportunities for strengthening engineering education and positioning engineers as leaders of positive change.

### **Omanization, emiratization, saudiazation, and all**

Over the past several decades, mostly in countries which have benefited from an abundance of natural resources such as oil, foreign workers and expatriate specialists have been hired in large numbers to aid in the development of everything from roads and sewage systems to the most sophisticated financial and investment policies. This process has resulted in some nationals becoming numerical minorities in their own countries. A corollary to this situation is a tendency on the part of many rulers to provide financial subsidies for nationals. Without financial incentives to work, many young people have opted out of any professions or jobs that require high levels of intensive preparation and dedication.

Several countries in the Gulf region have taken steps to ensure that their own people are employed in all sectors of the economy. Oman, the United Arab Emirates and others have implemented clear policies designed to more closely link higher education to employment. In addition the countries are requiring agencies and private companies to increase their employment of nationals according to timetables and quotas. Omanization, emiratization and saudiazation are some of the terms that designate these important changes in the status quo. These efforts have an impact on the engineering curriculum and deserve the attention of engineering educators. Even while working for international standards, teaching with English texts and collaborating with western engineering colleges, engineering educators in the Arab world should keep in mind that the majority of their students will practice at home, in the region, in Amman, in Muscat, in Liwa, and not in Toronto, Los Angeles, or Bonn. The admonition to think globally and act locally has never been more appropriate. For an Arab engineering educator acting locally might include the integration of entrepreneurship skills into the engineering curriculum, collaboration with local agencies and private businesses for practical experience, requiring students to learn about their own complex and changing society, and above all, exposing students to the principles of capacity building, including the key roles they, as engineers, have in transforming their own region. These efforts will have the effect of bringing those global technical standards to bear on solving regional problems.

### **Access to higher education**

Access to higher education will likely be an increasingly important issue in the Arab world as an outgrowth of more public deliberations about the rights of the individual. We already have seen workers becoming bold enough to assert themselves. (There was even a short work-stoppage in Dubai by foreign laborers whose wages had been illegally withheld by their employer for three months.) The Arab media is pushing issues of freedom of the press, and discussing what a nation, or its rulers or its government owes its people. Since education has always been seen as the key to personal advancement, it does not take too much vision to see that the Arab world is on the leading edge of a wave of unmet need and demand for higher education, as entire segments of society that once

had limited aspiration for higher and professional learning begin to see it as their right and in their best personal interest.

Expanded access is not an enemy of academic excellence. Engineering educators should strongly support the expansion of educational opportunities in order to attract the best, brightest and most motivated students into the profession. They should also reach into underserved geographical locations in their country, and into underserved social groupings to find strong students. It is in the interests of engineering educators to reach back into primary and secondary schools as well, where premature tracking too often can result in students not making informed choices about further education. Engineering educators must support the strengthening of career counseling and advising services at all educational levels, and should be collaborating frequently with the regional schools to expose young people to the engineering profession. Building bridge programs that would enable working adults to return to school would also be a wise step, to compensate for circumstances which too often lead to wasted or unidentified talent. Certainly the Arab world is poised for change in the higher education sector. Engineering educators should be prepared: initiatives set in place now will pay off as the wave of expectations grows larger.

## **Women**

No topic is more complex than that of the role of women in Arab societies, and it is made even more complex because of the lack of information about the multiple forces that act on women as they navigate a life path between competing interests in family, school and work. While enrollment statistics of women in engineering in some Arab countries are impressive as compared to the weaker numbers in US universities, information about the career paths which women engineers follow after graduation is not adequate to enable anyone to declare victory over gender differences. Certainly patterns of women's enrollment in engineering disciplines sometimes reveal cultural constraints and restrictions in potential employment.

Many people see the expansion of participation of Arab women in their societies as a barometer for advancement of the entire region. Engineering educators could serve an important role in this time of change, and at the same time help individual women students, by establishing strong mentoring programs to support women's professional aspirations, by creating re-entry programs for women who want or need to re-engage in the profession after a period of time spend at home, by making available entrepreneurship programs which would enable women to design jobs that fit their familial obligations, and by gathering more information about their women students and the decisions they make. All these strategies will help enhance the level of education of women engineering students, and will position those students well for the changes which can be foreseen to occur during their lifetimes.

## **Commitment to quality assurance**

There is currently no lack of consultants interested in designing and establishing quality assurance mechanisms for engineering education in the Arab world: in fact, it is difficult to read anything about higher education in the region without finding the topic addressed at length. Interest is evident at the college level, as increasing numbers of Arab engineering colleges seek specialized accreditation (substantial equivalency) from the US Accreditation Board for Engineering and Technology (ABET). Universities and colleges hope to achieve overall accreditation as a means of quality assurance, and so seek such credentialing from US regional accreditors at the institutional level as well. National leaders frequently waver between establishing their own quality assurance mechanisms and calling in consultants from abroad to do the work for them using mainly US standards and models. And regional groupings of governments are increasingly banding together to create quality assurance networks as a step toward broader mutual recognition. There is no lack of interest or activity, only a lack of evidence that the benefits of quality assurance plans have filtered down into the education being offered to the students in all but the most exclusive universities. The processes are as yet too young to have achieved demonstrable results. So the quality assurance movement is at a critical stage: having gone too far to turn back, but not yet far enough to guarantee results. With time, more order should come to this arena. In the meantime, a model for transnational quality assurance in engineering is now being set in place in Latin America, under the umbrella of the Organization of American States. This initiative may be one that the Arab states should consider.

In light of this lack of a clear path forward toward a transparent set of quality assurance mechanisms in the Arab nations, individual engineering educators would do well to shoulder the responsibility for quality assurance at the undergraduate program level, where so much work remains to be done. One way of improving undergraduate education – and at the same time continuing to respect both global standards and local needs – would be to hire new engineering faculty who themselves received both their undergraduate and graduate education in exemplary western institutions. While the technical knowledge available in US graduate engineering programs remains unchallenged, it is entirely possible for an international graduate student to be oblivious to the nature of the undergraduate education being offered at their university. And yet that experience is what will be needed to be able to upgrade the quality of the undergraduate programs at the universities in their home countries that hired them. So engineering faculty job descriptions should begin to stipulate a preference for hiring people who themselves completed their graduate and undergraduate education in strong US institutions.

## **Conclusion**

In the end, the highest quality engineering education programs in the Arab world will achieve that reputation because they have successfully taught to world class technical standards while at the same time preparing their students for the local social, political and economic change process which will continue throughout their lifetimes.