

**From Region to Countries:
Engineering Education in Bahrain, Egypt, and Turkey
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Prior to the terrorist attacks on New York and Washington D.C. on September 11, 2001, Americans tended to have relatively little interest in the region of the world they understood abstractly as the “Middle East.” Indeed, over the previous three decades, the Middle East had emerged as visible to Americans mainly in news reports about conflicts between Israelis and Palestinians and about potential threats to the supply of oil. Largely ignorant of the peoples and histories making up this part of the world, Americans tended to lump them together with a regional identifier. After September 11, this tendency continued, but with the additional unfortunate feature of connecting the region and the peoples within it to terrorism. Indeed, one effect of the subsequent U.S.-led wars in Afghanistan and Iraq has been to further cement American attention on the Middle East, as military strategies unfolded in maps that included the Mediterranean Basin, parts of Central Asia, and the Arabian Peninsula, and to extrapolate from the few to the many.

At the same time, the experience of September 11 generated expanded interest among engineering students and engineering faculty in the United States in achieving greater understanding of peoples and issues in the region. For example, students enrolled in an Introduction to Global Issues course, nearly all of whom had been born after the Iranian Revolution and Egyptian-Israeli Peace Treaty of 1979, began raising serious questions about the Middle East, in many cases for the first time in their lives. They moved beyond regional generalizations to inquire into contrasts among people from the region, such as differences between Sunni and Shiite Muslims and, for one student group, different views of technology held by Muslim engineering students and leaders of a local mosque. Interest in the Middle East also expanded among engineering faculty and administrators. For example, at engineering schools whose oil-related programs have historically attracted students and faculty from the region, admission officers developed strategies to keep their institutions attractive to international students from the region. Student organizations throughout the country sought to create more welcoming environments for those Middle Eastern students who did come. Nationally, university administrators have responded quickly and enthusiastically to funded invitations to build new educational institutions in the region such as the branch campuses established by Texas A&M in 2003 in Qatar.

Despite an increase in knowledge about the region, it is clear that engineering faculty and students in the United States often presume that modes of engineering education are similar across Middle Eastern countries due to commonalities in culture, language, religion, or emphasis in oil production. Yet each country has had a distinctive set of colonial struggles, unique issues in nationhood, and particular political and economic relations with other countries in the world. One goal of this collection of papers is to take

an initial step toward documenting some of these differences and assessing their implications for the development of engineering education.

Despite the veritable explosion of research on teaching and learning in engineering education, engineering education and practice in the Middle East remains a relatively understudied arena among education researchers and practitioners. For example, an exhaustive literature search yielded one study comparing Syrian and Egyptian engineers,[1] one analysis of the Egyptian engineering profession and its role in modernizing Egypt,[2] a 1970s employment guide for engineers working anywhere in the Middle East,[3] an account that reformulates environmental systems engineering in Islamic terms,[4] and two conference reports on science and technology human resource development in Islamic countries. [5, 6] In addition, a search of awards from the U.S. National Science Foundation (NSF) found that, although NSF has supported engineering research workshops involving engineers from Egypt and Turkey, no grants had been awarded to study engineers or engineering education in the Middle East or in any Arab or Islamic countries.

The idea for this project was born in June 2002 while Lucena and Downey were attending the annual meeting of the American Society for Engineering Education. Listening to some engineering educators generalize confidently about the Middle East, we decided that we had a responsibility to help colleagues, as well as ourselves, gain the necessary knowledge to be able to understand and articulate key differences among engineers and modes of engineering education in the region. We approached NSF with a plan to support two conference sessions on the topic “Engineers and Engineering Education in the Middle East” at the 2004 ASEE meeting in Salt Lake City, Utah. Recognizing our own limited knowledge, we made contacts with engineering educators from different countries in the region and invited them to conduct research on the history of engineering education in their countries and, with NSF support, present their results at the ASEE meeting.[7]

Early in the process, we realized that we had clumsily stumbled directly into the conceptual problem of the Middle East and were living the very issues that we were planning to present. To NSF, the title “Engineers and Engineering Education in the Middle East” indicated an important and innovative intervention, reaching out to produce new knowledge about an understudied area of renewed national significance. To potential participants, however, the title had very different meanings. Some rightly felt uncomfortable being grouped under the regional label “Middle East.” For example, is Egypt exclusively in the Middle East or in both the Middle East and North Africa?

The issue was even trickier for Turkey, whose government at that time had already applied for membership in the European Union. Turkish people disagree about whether Turkey sits in Europe or the Middle East or Asia. Indeed, the rector of Istanbul Technical University (ITU) at the time was strongly committed to a European identity for Turkey. However, her successor tended to highlight ITU’s, and Turkey’s, contributions to the Middle East. For engineering faculty to make a presentation in the United States in a session on the Middle East was, once again, to take a controversial stance that contrasts with the official government position, and may detract from its foreign policy goals, while revealing an ongoing debate among engineering leaders.

Finally, at the time we had a commitment from a speaker on engineering education in the Islamic Republic of Iran. The Iranian speaker would have opted for the Islamic World and not the Middle East as a label.

Reminded of the far-reaching tensions that surround the Arab-Israeli conflict, we gave up on an initial dream of including Israeli engineering educators in the sessions and proposed renaming the sessions “Engineers and Engineering Education in Muslim Worlds.” Our purpose was to explicitly raise the question of the relationship between Islam and engineering education while demonstrating an awareness of the diversity of perspectives among Muslims. This strategy was no less clumsy than the first. We were well aware that this title would potentially extend the session topics well beyond the Middle East to parts of Africa, Central Asia, and South East Asia, as well as to Indonesia and Malaysia. However, it also walked right into ongoing debates about the distinction, and relationship, between secular and Islamic states. Were engineering educators working in countries with majority Muslim populations operating in Muslim worlds? For Turkey, to gain admission into the European Union, it has amplified secular and western orientations that first came to dominance over seventy years ago. But to Muslims, Islam is not a religion but a way of life. While it may be possible to separate church and state (an assertion still being tested in the United States), it is certainly much more difficult, and probably inadvisable, to insist on operating government from a dominant way of life. At the same time, the image of the Islamic state can be both confusing and frightening to Euroamericans, as evidenced by ongoing tensions with Iran.

Generous presenters tried to help. How about “Engineers and Engineering Education in the Mediterranean Basin”? This would be a suitable framework for Egypt and Turkey but not for Iran and Bahrain.

Eventually, we drew upon our research on engineers and engineering education in other parts of the world and, after losing the presentation from Iran, suggested the title “Engineers and Engineering Education in Bahrain, Egypt, and Turkey.” In other words, we turned for refuge to countries. It is instructive that all the presenters felt comfortable with describing engineering education in their countries and, hence, with serving as representatives of, and ambassadors for, those countries. In other words, as we elaborate further below, just as our conference initiative thrust us into contemporary debates over identity in the Middle East, the findings of our research provided a pathway out. Finally, we enrolled the expertise of our colleague Hussein A. Amery, a political geographer of the area, to help us sort out the difficult conceptual path from region to countries.

Anglo-American Conceptions of the Region: From Geography to Geopolitics

Tracing the development of engineering education in relation to nation-states runs the risk of hiding regional similarities not only in ethnicity and religion/way of life, but also in the historical legacies of the Ottoman Empire and British colonialism across the Middle East. At the intersection of Africa, Asia, and Europe, the Middle East could be said to have somewhere between six and eight million square miles, roughly twice the area of the lower 48 U.S. states, and more than 300 million people, depending on where the region’s boundaries are drawn. Geographic descriptions of the region begin with the ancient geographic description of Mesopotamia, the area that currently falls inside Iraq.

Mesopotamia is known in Arabic as the Land Between the Two Rivers (Tigris and Euphrates). Another older geographic name is the French term *Levant*, originally used to refer to the “Mediterranean lands east of Italy”. Bilad al-Sham, also known as "Greater Syria", is a geographical term which, to a large extent, overlaps with the Levant which contains modern day Syria, Jordan, Lebanon, Israel, and Palestine. Currently, the terms Mesopotamia and the Levant are used almost exclusively by archeologists and historians.

Geographers have conceptualized the larger Middle East and North Africa in different ways. [8] The *Mashriq*, or East or Orient, refers to countries along the eastern coast of the Mediterranean, which usually means the Arabic-speaking countries starting with Egypt. Meanwhile, the *Maghrib*, or West, refers to those countries in northwestern Africa from Tunis to Morocco and Mauritania. Libya is often included but not Egypt. Finally, the Arabian Peninsula is located in southwest Asia and includes the countries south of Iraq and Jordan. Bounded from three sides by the Gulf (Persian or Arab, depending on who you are), Indian Ocean and the Red Sea, the Peninsula is referred to within the region as *al-Jazeera*, or Island, a name that has been popularized in the West by the Qatar-based satellite television station of the same name. The image of Island stems from Bedouin tribes’ view of the inhospitable An-Nafud desert in northwestern Saudi Arabia as a sea hindering their movement. In sum, as a geographical concept, the Middle East encompasses lands from Egypt to Iran, and from Turkey to Oman.

The existence of the region as a geopolitical construct is a product of British colonialism and, prior to the discovery of oil, the British government’s desire to control trade routes to and from India. Early English mapmakers sitting in London labeled as East areas under the control of the Ottoman Empire. The most distant areas to the east became the Far East while areas closer to Europe, including Turkey, former Yugoslavia, and Bulgaria, became the Near East. The lands between the Far and Near East became known as the Middle East, a region that was anchored in India, the vital colony of the British Empire.

The first published use of the term “Middle East” appeared in a 1902 article in *National Review* (London), written by the American admiral Alfred Thayer Mahan under the title “The Persian Gulf and International Relations.”[9, 10] Appearing at the pinnacle of British hegemony in the region, Mahan used the term, as geographers Ian Manners and Barbara McKean report, “in reference to British naval strategy in the Gulf at a time of increased Russian influence around the Caspian Sea and German plans for a Berlin-to-Baghadad railway.” [11], p. 9] The term successfully labeled an emerging British tendency to conceptualize the region as a geographic whole between the European Mediterranean and the Indian Ocean, bounded on the north by the Russian empire in Central Asia. Explaining how the term stuck with increased use by military commands during World War II and later by the United Nations, Manners and Parmenter write that

largely through the columns of the *Times* [London], the term achieved wider circulation and came to denote an area of strategic concern to Britain lying between the Near East (another Eurocentric designation, essentially synonymous with the area remaining under the control of the Ottoman Empire), the expanding Russian empire in Central Asia, and the Indian Raj... With the passage of time, the name became both familiar and institutionalized, first in the military commands of World War II and later in the specialist agencies of the United Nations (UN). [11]

Ambiguities remain as no consensus exists on which countries make up the Middle East or where its boundaries lie. For example, the U.K.'s Foreign and Commonwealth Office hedges the problem by grouping countries in the region under the label "Middle East & North Africa," but it places Turkey in Europe. The European Union (EU) organizes external relations in the region along the "European-Mediterranean Partnership," including Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Authority, Syria, Tunisia and Turkey, as well as the "Middle-East Peace process," focused mainly on the Israeli-Palestinian conflict, and the "EU-Gulf Cooperation Council," an organization whose members are Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates, and Oman. EU relations with Iraq and Iran are treated separately. The US Department of State groups most of the countries in northern Africa, including Egypt, with countries in the Arabian Peninsula under the "Bureau of Near Eastern Affairs" while placing Turkey under its "Bureau of European and Euroasian Affairs." [12] Meanwhile, in mapping health risks and travel advisories, the U.S. Centers for Disease Control and Prevention (CDC) groups all countries in the Arabian peninsula along with Iran, Iraq, and Turkey in the "Middle East" while placing Egypt in North Africa. [13] Manners and Parmeter elaborate the question:

Does the Middle East include Afghanistan to the east? With the demise of the Soviet Union, should the region be reconstituted to include the new sovereign states of Armenia and Azerbaijan? [Also], the Maghrib states of Morocco, Tunisia, and Algeria are included in discussions of the Middle East based on the fact that they share so much of its culture and history. . . . Sudan is sometimes included despite the presence of a large non-Muslim, non-Arabic speaking population in the southern part of the country. [11], p. 9]

In 2004, the U.S. Bush administration introduced a new geopolitical term, the *Greater Middle East* (GME), as part of its initiative to democratize the region. This concept greatly expands the region to include more ethnically and linguistically diverse peoples, thus diluting dominant Arab, Islamic, and national identities. Reception to the idea in the region has ranged from lukewarm to hostile [14], and time will tell if it will develop any currency beyond the geopolitical goals of the U.S. government.

Given its Eurocentric origins and significance, countries within the region either embrace the concept of the Middle East in their own terms or avoid it depending upon how they want to relate to certain Western powers, particularly those with oil interests in the region. Manners and Parmeter report that the literal Arabic translation, *al-sharq al-awsat*, and the Turkish, *orta dogu*, can regularly be found in books, journals, and newspapers, although typically in reference to how others outside the region tend to view it. Indeed, we observed this tendency at the ASEE conference as panelists seemed comfortable referring to their countries as part of the Middle East when they were in conversation with Americans.

Ethnic and Religious Designations of the Region

Ethnically, the diversity of the Middle East challenges any geopolitical formulations. The largest ethnic group is the Arabs and the largest ethnic minorities are the Kurds in Iraq and Syria, and the Berbers in North Africa. The predominance of Arabs in the region has led some Arab nationalists to make reference to the Arab World to designate the group of countries from Mauritania and Morocco in the west to Iraq in the east. According to this view, which found political representation in the Cairo-based League of Arab States, the people of the region are united by common ethnicity and language. However, Iraq, a founding member of the League of Arab States, is now headed by a Kurdish President and its constitution, drafted and approved in 2005 amidst the U.S. military presence, avoids the long-standing reference to Iraq as an Arab country.

Although the region's dominant religious group is Muslim, a few countries have significant Christian and Jewish minorities. Given the predominance of Islam, the region is sometimes referred to as the Islamic World. Geographically, the Islamic World stretches from Morocco all the way to Southeast Asia, through North Africa, the Middle East, and Indian Peninsula. Non-Arab Indonesia, the country with the largest Muslim population in the world, is the demographic heartland of Islam while Saudi Arabia is its spiritual heartland. But by including in the region only people who are linked by a common faith, the concept of the Islamic World excludes the Jewish State, Israel. It also presents problems for many Turks and Tunisians, who despite their Islamic faith give prominence to feelings of nationalism over their religious identities. Indeed, for religious minorities, nationalism sometimes offers a more inclusive vision than one based on Islam.

From Empire to Independent Countries

The Ottoman Empire spanned a huge region from northern Africa in the south to central Europe in the north and from Central Asia in the east to the Balkans in the west, its persistence in the face of European expansionism would likely have prevented the region from becoming the Middle East, a concept that had no meaning to the Ottomans. However, European invasions from French, British, German, and Italian dynastic leaders introduced the geopolitical distinction between West and East and introduced the identity problem with which the region has had to cope ever since.[15, 16]

By completing the breakdown of the Ottoman Empire, the conclusion of World War I became a major stimulus for nationalism in the region. Historian Benedict Anderson's now classic *Imagined Communities* argues that the concept of the nation was born in the Americas through wars of independence and then appropriated into Europe both by dynastic leaders seeking to retain legitimacy for themselves and by revolutionary movements seeking to replace dynastic rule.[17]

In the region now becoming the Middle East, resistance to European rule began to take the form of emerging ethnic nationalism. To Britain, France, Germany, and Italy, the discovery of oil added a new reason to seek to maintain control. Between World War I and World War II, Britain lost its absolute control in the region but still dominated Iraq, Trans-Jordan, Egypt, Sudan, part of Somalia, and the South-eastern periphery of the Arabic peninsula. France dominated Syria, a smaller part of Somalia, and Algeria. Germany struggled to protect the remnants of the Ottoman Empire. Italy occupied Libya, Eritrea, and southeastern Somalia.

The interwar period also witnessed the initial establishment of nation-states in the region, beginning with the constitutional monarchy established in Egypt in 1922 and ruled by King Fuad I. Turkey became the first republic in the area in 1923, under the leadership of Mustafa Kemal. In 1925 Iran became a secular state ruled by Shah Reza Khan. In 1932 the Kingdoms of Saudi Arabia and Iraq were established by Ibn Saud and Faisal I. Britain retained control of Palestine, in part because of pressure from an emerging Zionist movement to create a Jewish nation-state. Meanwhile, Arab nationalists unsuccessfully pushed for a united Arab state that would bring together Iraq, Transjordan, Palestine, Syria, Egypt, and northern Sudan.[16]

Nationalism took another turn in the region after World-War II, as, first, Western powers supported the creation of Israel in Palestine in 1948 and, second, monarchies that often benefited from Western support were toppled in Egypt in 1952, Iraq in 1958, Yemen in 1962, Libya in 1969, and Iran in 1979. Significantly reduced in force by the localized nationalisms but inspired by the continuing struggle over Palestine, Arab nationalism materialized in a loose organization of Arab states in 1945, the Arab League. The emergence of the Cold War further inflected local movements as both the U.S. and the U.S.S.R. worked to limit the expansion of the other. For example, the Truman Doctrine of 1947 justified U.S. support of Turkey during years in which Egypt's Nasser received support from the Soviets, and the U.K., now positioned as a U.S. ally wrestled with the U.S.S.R. over the control of Iran's oil. The rise of nationalism would also prove important to the emergence of the engineering profession in the region.

Following these developments challenges us to shift from talking about the region, as the Middle East, to talking about countries with contrasting identities and presents us with a pathway back to engineers and engineering education.

Engineering Education and Countries

In previous and ongoing research, we have examined how the emergence of the engineering profession in different locations in the world tends to depend upon local ideas of societal development and progress. That is, what comes to count as an engineer in a particular location and what engineers come to value as their knowledge and their work all emerge, in part, as responses to distinct images of progress. Because distinct images of progress are taken up within different countries, becoming key features of national identities, the emergence of the engineering profession becomes a key constituent feature of emerging nation states. For example, in France, where progress came to be viewed as the organization and advancement of society towards a state of perfection, key engineers before, during, and after the French Revolution responded by placing high value on mathematical knowledge and the derivation of new technologies from first principles. This knowledge was created and organized mainly at the *Grandes Écoles*, elite institutions whose engineering graduates filled important State positions in *Corps de Etat* and acted as stewards of French progress through planning. In the United Kingdom, where progress came to be viewed as self-directed improvement over the past and measured as comfort achieved by distance from manual labor, engineers in 19th century Victorian England created the professional engineering Institutions to codify the foundational importance of practical knowledge and relative unimportance of academic

engineering. Throughout the 19th century, great emphasis was placed on apprenticeship on the shop floor through direct practical experience in order to prepare engineers for positions in private industry. In Germany, where progress came to mean a movement from the inside of human beings outward, as the emancipation of God-created perfection of mind and spirit (*geist*) immanent in all human beings, engineers helped *techniks*, the production of high-quality artifacts, become a site for the realization of progress. Engineers eventually came to learn that no significant work in engineering can take place without first gaining an intrinsic feel for precision, and their community was bifurcated into those at the technical universities, who learned to advance the reason behind quality *techniks*, and those at the *fachhochschulen*, who learned to implement quality *techniks* directly.[18]

Advocates for engineering education across the Middle East, including within Bahrain, Egypt, and Turkey, regularly turned to France, the U.K., and Germany for models to emulate. While this process typically began during periods of European colonial rule, what is remarkable is how quickly interest in engineering education expanded after the establishment of the nation state. We often talk about this as the establishment of a “we.” In other words, once a country is established members think of themselves as a we and quickly face the question of how to advance the we. Facing the question of advancement always brings engineers and engineering into the picture, and engineering education becomes a key site of discussion and debate.

It is important, then, to resist the urge to think about European influences in engineering education as the export of British, French, or German “models” to other countries. Not only do such models have numerous exceptions and instances that do not fit in the host country, but also the establishment and growth of institutions for engineering education always requires local efforts to adapt and integrate structures that originate in other countries. The “model,” then, tends to be a local image of a foreign phenomenon. To overemphasize its importance is to render invisible key local features of local developments. The key questions to ask are: what locally specific ideas of societal development and progress have challenged advocates for engineering education in this national context? And how have these ideas challenged advocates to adopt, resist, and transform foreign “models” or to create their own?

Engineering Education in Bahrain, Egypt, and Turkey

The papers in this special issue constitute an initial attempt to document the emergence of engineering education in relation to three nation states whose identities have been shaped by their location at intersections among Africa, Asia, and/or Europe. The focus in each paper is on conducting spadework, an initial documentation of specific historical developments pertaining to engineering education in each of the three countries. The authors are not professional historians but are, for the most part, engineering practitioners from the country in question who have an interest in the history of engineering education in that country. Accordingly their emphasis is not on linking their accounts to historiographic trends in recent historical scholarship but on documenting specific developments in engineering education.

In their description of the historical and economic dimensions of the development of engineering education in Bahrain, A-Imam Al-Sammak and Hisham Al-Shehabi position the emergence of Bahrain at the historical and geographic nexus of the Persian, Ottoman, and British empires and show how the emergence of engineering education followed, first, the needs of the oil industry, initially dominated by the British, and later those of the Gulf region. The story of engineering education in Bahrain is especially notable because it expresses a regional sense of progress, illustrating historical and geopolitical connectedness between countries that is recently becoming national. This transformation, from regional to national, is reflected first by establishment of the Gulf Technical College, eventually transformed in the Gulf Polytechnic with the creation of the Gulf Cooperation Council in 1981, and later with the incorporation of the Gulf Polytechnic as the College of Engineering of the University of Bahrain.

Osman Lotfy El-Sayed and two of us show the significance of the 1952 Revolution in the development of engineering education and practice in Egypt by creating technical institutes, launching infrastructure projects for national development, and elevating engineers into key State positions. This turning point in the history of engineering education and practice in Egypt came to shape the subsequent role of Egyptian engineers in State administration and politics and in the Arab region.

In their account of engineering education and practice in Turkey, Birgül Tantekin-Ersolmaz, Ekrem Ekinci, Gülsün Sağlamer reveal the importance of the creation of the Republic in engineering education and practice and how the challenges of development, liberalization, and globalization to the Turkish nation created the diverse set of existing engineering education institutions. More recently, Turkey's ambiguous relationship to Europe, the Middle East, and the US has come to shape ongoing debates over accreditation, curricular innovation, and program creation in engineering education.

In her paper about management engineering education in Turkey, Lerzan Ozkale's account shows how developments in Turkish engineering education have been shaped by Turkey's historical relationship to both Europe and the US and, in the case of management engineering, by engineers' anxieties brought by wanting to increase managerial control of Turkish companies while wanting to retain the 'engineer' label through basic engineering knowledge in the curriculum. These anxieties only increase as more Turkish companies move into European markets and more European companies move into the Turkish market.

Taken as a whole, the collection illustrates linkages between the emergence of engineering education and the development of the country itself. However many questions remain. For example, to what extent did a specific image of progress scale up to become dominant in each national context, and how might institutional innovations in engineering education be responding to this image? For example, might it be the case that Arab nationalism in Egypt led the country to become a supply source of engineers across the region? Or Turkey's desire to emulate Europe born with Kemal might have led Turkish engineering schools to measure themselves with respect to European educational standards? Could it be that Bahrain's efforts to build a two-track system for technologists and engineers reflect a twin desire to build a national infrastructure for its citizens and attend to the needs of the oil-industry under the shadows of British protection? As initial steps that provide important introductions to the diversity and complexity of the

region, these accounts can help readers interested in engineering education and education reform to better understand and anticipate both opportunities and constraints in the countries of the Middle East.

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