

Bridging the Gap in Engineering Advancement at NED

Introduction

Nadirshaw Edulji Dinshaw University of Engineering and Technology is one of the oldest and most prestigious engineering institutions in Pakistan. Graduates from NED have successfully completed further studies at leading international universities and have also been recruited by well-known companies based anywhere between Silicon Valley and Down Under. Indeed, NED alumni have done their alma mater proud, proving the quality of the education they have received.

However, in its 2006 rankings of engineering universities, the Higher Education Commission of Pakistan ranked NED as tenth among thirteen universities.¹ While these rankings may not give adequate consideration to the fact that NED is a government university with limited funding, and that its focus is not on research but on “teaching and training engineers for Pakistan’s thriving industry,”² particularly at the undergraduate level;³ nonetheless, they prove that there is room for improvement.

The best institutions are those that prepare their graduates to meet the various challenges and avail the opportunities they will encounter in their professional careers. As a mechanical engineering student in today’s rapidly changing world, my peers and I will join very competitive workplaces. Thus we have to be well-able to engage in the development and utilization of technology; possess familiarity with the latest trends in the field; have a proactive attitude demonstrating interest and curiosity in exploring new possibilities and expanding one’s knowledge; and be able to serve our communities with professionalism. Improvements at NED should therefore focus on certain core areas, which will be elaborated on below.

Quality of Facilities

Firstly, the quality of the infrastructure and facilities, especially the laboratories, at NED, could be improved. Students often remark that NED concentrates more on theoretical knowledge and does not sufficiently prepare students for practical situations. According to an article published in *Journal of Engineering Education*, “the

function of the engineering profession is to manipulate materials, energy, and information, thereby creating benefit for humankind. To do this successfully, engineers must have a knowledge of nature that goes beyond mere theory—knowledge that is traditionally gained in educational laboratories.”⁴ Thus, the importance of well-equipped, state-of-the-art laboratories cannot be understated. The article continues with a list of thirteen fundamental objectives in engineering instructional laboratories, such as using the appropriate instrumentation and employing creativity in the lab.⁵ Therefore to improve the practical experience of NED students, not only must NED laboratory equipment be enhanced, but the practical instructors may also need to be given training. Additionally, perhaps it can be ensured that all new faculty also have some amount of industrial experience, and that both the theory and practical classes of a single subject are taught by the same professor so that students have a greater understanding of the theoretical subject matter’s real-world implications.

Teaching Quality and Methods

A second area that may warrant attention is the teaching quality and methods of the faculty. While NED professors have excellent knowledge of their respective fields, teaching is often considered an art. The necessary skills can be developed and honed through various engineering education training workshops, such as those hosted by SUCCEED (Southeastern University and College Coalition for Engineering Education).⁶ NED faculty could be sponsored to attend such workshops.

Furthermore, faculty members will also be able to teach more effectively if they employ more variety in their teaching methods as this will enable them to improve students’ learning outcomes. Students differ from one another, and teaching strategies have been suggested to help professors deal with this variation. For example, giving a variety of assignments is a crucial way to address “the full spectrum of learning styles.”⁷ In addition, professors should try to make their lectures more interactive and improve teacher-student coordination. Undoubtedly, these propositions cannot be fully implemented and effective unless the student-to-faculty ratio is decreased – another crucial issue for the NED administration to consider.

In addition, it is considered paramount that clear objectives be defined for every course so that students are well-aware of what they are to learn and how it fits in the overall body of knowledge they are acquiring. “Since they are fundamental to the

development of an engineer, learning objectives and their outcomes are critical.”⁸ Faculty members typically can ensure this by distributing the syllabus in the first class of a given course and by properly introducing the subject, thereby triggering students’ interest in, and appreciation for, what is to be taught in the course, as is often the practice in leading international universities.

Furthermore, if the university undertakes various measures to improve teaching quality, this will undoubtedly affect the way new faculty is hired. According to a study published in *Journal of Engineering Education*, at the University of Oklahoma, “Position descriptions now state the importance of educational responsibilities. During the interview process, faculty candidates teach a class, and reactions are solicited from the students...”⁹ Moreover, the teacher/course evaluation exercise that is already done at the end of every academic year at NED should also be done once in the middle of the academic year, so that problems can be addressed and rectified at that time.

With all these measures to improve teaching quality and methods, the rapport between students and faculty will likely also improve so that faculty may be viewed as better role models, mentors, and even counsellors. In fact, student counselling should be given more importance, and each department can be allotted a counsellor who may help students make more informed decisions both while at NED and at the time of graduation.

Professional Skills

For NED to rank among the leading institutions of science and technology, the professional skills of the students also have to be addressed. These would include: “an ability to communicate effectively... a recognition of the need for, and an ability to engage in, lifelong learning; and a knowledge of contemporary issues.”¹⁰ While awareness of such professional skills may be raised among NED students by the university, students can actually acquire these skills as a result of their own endeavours.

Another very important issue that relates to professionalism is ethical behaviour. “All that knowledge and creativity, collaboration and communication, must be accomplished within a matrix of social and environmental responsibility. Thus, engineering education is both intellectual and practical, both creative and ethical.”¹¹ Ethical behaviour does not permit plagiarism and cheating, but

unfortunately these are present on many university campuses today, including at NED. Perhaps stricter measures can be taken to ensure that such acts are not tolerated; and a greater consciousness of the importance of professional skills would hopefully deter NED students from engaging in such activities.

Industrial Alliances and Research Projects

A final area that should be addressed is that of industrial alliances and research projects associated with the university. With increased alliances both locally and internationally, whether sourced through university administration or alumni, internship and employment prospects of graduates would be improved. Moreover, having industry reach out to NED for research and corporate projects – and alumni can facilitate this also, particularly for international projects – would broaden the exposure of NED students and increase the contribution of the university to the industrial community. Furthermore, alumni could arrange linkages with universities in their areas of residence or universities that they themselves have attended, to facilitate joint research between faculty as well as faculty exchanges. All this would help in the cross-fertilization of knowledge. Additionally, the Directorate of Industrial Liaison at NED could organize career fairs on campus.

The Role of Students and Alumni

One the most important roles of alumni, and today's students who will be tomorrow's alumni, is to provide financing. NED, as a government institution, has limited access to funds, and this will likely be one of the greatest obstacles the university faces in making much-needed improvements. Therefore it is imperative that the alumni of NED, who have benefited from it and are thus in a position to gain 'incredible knowledge and expertise' abroad, serve it in as many ways as possible. A fundraising unit at the university can be tasked with mobilizing resources from alumni. Not only would this include donations but also endowments that could be created using funding arranged from various sources, drawing on the contacts that these NED alumni have in their sphere of influence. They must promote NED overseas and carry out the branding essential to procure such endowments.

Tables 1 and 2 rank British and American universities by size of endowment, with the top universities clearly having the largest endowments.¹² In fact, as of June 2008, the value of the Harvard endowment was US\$ 36.9 billion.¹³ With the current exchange rate, this is approximately equivalent to Rs 2900 billion.¹⁴ The national budget of Pakistan for 2008-09 is Rs 2010 billion!¹⁵

While money is not sufficient to attain excellence, it is certainly essential in order to initiate growth and improvement and attract and retain the most qualified faculty. Other advancements would come with these improvements, such as increased involvement in research work on corporate projects, following the provision of state-of-the-art equipment, which would also enrich the students' academic experience.

Table 1. United Kingdom University Rankings by Size of Endowment (2002)

RANKING	UNIVERSITY	SIZE (£m)
1=	Cambridge	2,000
1=	Oxford	2,000
3	Edinburgh	160
4	Glasgow	120
5	King's	100
6	Liverpool	93
7	Manchester	90
8	UCL	81
9	Birmingham	65
10	Surrey	59

Table 2. United States University Rankings by Size of Endowment (2002)

RANKING	UNIVERSITY	SIZE (£m)
1	Harvard	10,700
2	Yale	6,600
3	University of Texas	5,400
4	Princeton	5,200
5	Stanford	4,800
6	MIT	3,400
7	Emory	2,800
8	Columbia	2,600
9	University of California	2,600
10	Texas A&M	2,300

Source: http://www.suttontrust.com/reports/endowments_report.pdf (accessed January 17, 2009)

In order to ensure that students and alumni feel that very important sense of responsibility to serve their alma mater, it is essential to also give them a 'voice' in university affairs. This is of benefit to the university also, for students do have very innovative ideas and solutions, and responsive university administrations raise more loyalty among their students. Alumni, on the other hand, who have joined industry,

would also bring fresh perspectives to the academically-oriented university administration. This involvement of students/alumni is twofold. While they are students, a wholly student-run committee/council should be formed to liaison with the NED administration. This will give students an effective channel of communication with the university authorities, assuring them that their concerns and suggestions will be given due consideration. Alumni, on the other hand, could be included in the relevant university boards.¹⁶ This would hopefully ensure that alumni maintain interest in their alma mater and contribute to its continued betterment.

The Case of the H.E.J. Research Institute of Chemistry

A good example to consider is the case of the H.E.J. Research Institute of Chemistry, which is part of the International Centre for Chemical and Biological Sciences (ICCBS) at the University of Karachi, and is therefore also a public institution. The H.E.J. Research Institute of Chemistry "...remains at the pinnacle of excellence and sustained growth."¹⁷ Just a cursory glance at the faculty of the ICCBS reveals how many PhDs are affiliated with it.¹⁸ Furthermore, the H.E.J. Research Institute of Chemistry has "...succeeded in winning several major projects for the institute from the west, which have transformed the institute into ... one of the best in the world in the field of natural product chemistry."¹⁹ However, all this could not have been possible without the required funding. There was an initial grant of DM 2.3 million from the Government of Germany, followed by a generous donation in 1976 from the Husein Jamal Foundation, which represented "the largest donation at that time in the history of the country."²⁰

Conclusion

NED enjoys much prestige in Pakistan, with numerous achievements to its credit over the many years of its existence. However, in today's increasingly dynamic world, there is still much to be done. One concise view on NED's priorities as it moves forward, in the words of NED alumnus Riaz Haq, is:

"NEDUET leadership needs the vision to pick one or two major national challenges and respond to them by developing the expertise

and excellence required to succeed. The NED alumni can, and should, help in this endeavour with a lobbying effort to improve NEDUET leadership and governance, an alumni-managed endowment fund and alumni-sponsored industry alliances around the world.”²¹

Clearly all of these activities cannot be accomplished by one individual or group. It is only when all of us, the former and current students of NED, and its staff and faculty, work together towards our common goal, that results can be achieved. This is the least we can do for an institution that has given, and continues to give us, so much. Undoubtedly, with our efforts channelled in the right direction, NED will one day be among the leading institutions of science and technology in the world, *InshaAllah*.

NOTES

¹ “University Rankings”, Higher Education Commission of Pakistan, available online at: http://hec.gov.pk/QALI/Others_QALI/Ranking_Universities.html@129 (accessed January 22, 2009)

² *Ibid*

³ See online: <http://www.riazhaq.com/2008/10/hec-university-rankings-in-pakistan.html> (accessed January 22, 2009).

⁴ Lyle D. Feisel & Albert J. Rosa, “The Role of the Laboratory in Undergraduate Engineering Education”, *Journal of Engineering Education*, January 2005, Vol. 94, No. 1, pp. 121-130.

⁵ *Ibid*

⁶ See online: <http://www.succeed.ufl.edu/default.asp> (accessed January 22, 2009).

⁷ Richard M. Felder & Rebecca Brent, “Understanding Student Differences”, *Journal of Engineering Education*, January 2005, Vol. 94, No. 1, pp. 57-72.

⁸ Feisel & Rosa, “The Role of the Laboratory”, *op. cit.*

⁹ L. Dee Fink & Susan Ambrose & Daniel Wheeler, “Becoming a Professional Engineering Educator: A New Role for a New Era”, *Journal of Engineering Education*, January 2005, Vol. 94, No. 1, pp. 185-194.

¹⁰ Larry J. Shuman & Mary Besterfield-Sacre & Jackmcgourty, “The ABET “Professional Skills” – Can They Be Taught? Can They Be Assessed?” *Journal of Engineering Education*, January 2005, Vol. 94, No. 1, pp. 41-55.

¹¹ Lee S. Shulman, “If Not Now, When? The Timeliness of Scholarship of the Education of Engineers”, *Journal of Engineering Education*, January 2005, Vol. 94, No. 1, pp. 11-12.

¹² See online: http://www.suttontrust.com/reports/endowments_report.pdf (accessed January 17, 2009).

¹³ See online: http://www.hmc.harvard.edu/investment_performance/2008_performance.php (accessed January 17, 2009).

¹⁴ See online: http://coinmill.com/USD_calculator.html#USD=36900000000 (accessed January 28, 2009).

¹⁵ See online: <http://www.finance.gov.pk/admin/images/budget/budgetbrief.pdf> (accessed January 28, 2009).

¹⁶ “Authorities”, NEDUET, available online at: http://www.neduet.edu.pk/about_us/authorities.htm (accessed January 24, 2009).

¹⁷ “About Us”, ICCS, available online at: <http://www.iccs.edu/aboutus.htm> (accessed January 21, 2009).

¹⁸ “Faculty”, ICCS, available online at: <http://www.iccs.edu/faculty.htm> (accessed January 21, 2009).

¹⁹ “History”, ICCS, available online at: <http://www.iccs.edu/history.htm> (accessed January 21, 2009).

²⁰ *Ibid.*

²¹ See online: <http://www.riazhaq.com/2008/10/hec-university-rankings-in-pakistan.html> (accessed January 22, 2009).