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World Class Institutions and Student Mobility
The Indian Institutes of Technology

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Preliminary

A very thorough study of academic exchange and student mobility in general higher education in India is given in Chapter 6. An equally thorough parallel study was made of student mobility in the technological institutions in India and this chapter presents some extracts from it. The interest of the Indian Institutes of Technology is in their high prestige, so that their position as exemplars would be of special importance, both in India and in other Commonwealth countries. This chapter focuses on that aspect of the study. Two institutions were selected for investigation: the Indian Institute of Technology, Delhi, a 'national institute of excellence' and the University of Roorkee, the oldest technical institution in India. The latter is also mentioned in Chapter 6.

The technical education system in India

India has a large system of technical education with over 350 institutions offering degree level courses, and nearly 500 polytechnics offering diploma level courses. These are spread all over the country. Restricting ourselves to the higher level institutions, offering undergraduate and postgraduate courses, we need to be aware that there is a wide variation in the nature of these institutions, in such a large system. Though there is no formal accreditation provision in the country, these institutions can be broadly classified into five major categories. These are:

1 The National Institutes
2 Technological Universities
3 Regional Engineering Colleges
4 State Level Government Engineering Colleges
5 'Capitation Fee' Colleges

The National Institutes include the five Indian Institutes of Technology (IITs) which have been established by an act of parliament as institutions of excellence. These can be compared to the best institutions anywhere in the world in terms of course offerings, infrastructural facilities, faculty, R&D contribution, etc and offer very high quality technical education. These are fully residential institutions, set up in large campuses with excellent facilities. There are five technical universities which also offer very high quality technical education. These are also residential in nature with very good campuses and other amenities. Seventeen regional engineering colleges have been set up with support from provincial governments to meet the requirements of technical education of the region. These too are residential and have reasonably good facilities and do offer quality education.

The other engineering colleges are located all over the country and affiliated to the respective universities in the region. While some of these colleges are good, the quality of education imparted in others leaves much to be desired, because of the lack of infrastructure facilities, poor quality of faculty, etc. To maintain and monitor the quality of Engineering Colleges, the All India Council of Technical Education (AICTE) has now been given statutory powers to give or withhold recognition to colleges that do not meet the prescribed norms. Of the 337 colleges listed in 1990, only 206 have been approved by the AICTE and the other 131 institutions are listed as unapproved.

The quality of the various institutions can be assessed, based on some indicators. The amount invested in the training of each student provides a ready indicator of the quality. It has been estimated that the IITs invest about Rs. 350,000 on the training of each undergraduate student. Similarly, the University of Roorkee has estimated that it costs about Rs. 250,000 per student trained in the university. The AICTE has set up a norm of at least Rs. 50,000 as cost per student. It has been reported that some of the unapproved institutions spend less than Rs 20,000 per student.

Another indicator of the quality of institutions is the demand for admission. The high quality institutions conduct their own entrance examination. The Joint Entrance Examination (JEE) for admission to the

IITs is taken by about 90,000 students for the 1,500 places available. Similarly, the entrance examination conducted by University of Roorkee is taken by over 70,000 students for the 2,000 places available. The regional engineering college admissions are also based on entrance examinations. Admission to the unapproved colleges are often based on other than academic criteria. In the year 1990, the intake of students in the 206 approved colleges was 34,290 and the intake in the 131 'unapproved' colleges was estimated at 32,300. It is significant that 'unapproved' colleges admit as many students as the approved ones and on an average have a larger intake but much fewer facilities.

Policy for training foreign students in technical education

The Report of the Review Committee on Postgraduate Education and Research in Engineering and Technology, June 1990 says:

> 4.22.1 India has a leading role to play in the new concept of 'Technical Co-operation among Developing Countries' (TCDC). Apart from putting large numbers of Indian scientists, engineers and technologists at the disposal of many other developing countries, India is giving training facilities for thousands of overseas students. While most of the advanced countries have clear cut policies for training overseas students, India has not yet formulated any such policy. Consequently several problems have arisen.
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> 4.22.2 There is increasing pressure on India from many countries for training facilities in engineering and technology, especially at advanced levels. Even some of the advanced countries have come forward to fund the training of students from Third World countries in India. These developments have added a new dimension to the whole problem of training overseas students. It is in the interest of India to formulate a coherent 'country training policy' for training overseas students. While doing so, the special needs and requirements of the countries concerned should also be taken into consideration.

This is evidence of an awareness in India about the leading role that the country could play in technical co-operation, through training students from other developing countries. There is an appreciable demand for such training opportunities. Enrolment of foreign nationals in various technical institutions has, however, been going on for the past several

years without any clear policy guidelines and there is an urgent need for such a policy.

Discussions with various authorities at the two institutions and other organisations indicate an absence of any written or unwritten policy. Admissions for foreign students are guided by the overall objective of the Government of India of providing co-operation and assistance under the broad Technical Co-operation schemes. There is, however, said to be a guideline that the total number of foreign students in technical education shall not exceed 10 per cent of the total intake of students. In comparison, Ahmad and Basu in the research which they report in Chapter 6, were informed that the guideline for Indian higher education as a whole is five per cent foreigners in the total student intake.

IIT-Delhi has a limited number of undergraduate places for foreign nationals, including students from both developed and developing countries. Recently, policy directives have been given to admit only students from the developing countries. Since, however, the overall objective of admitting foreign students is to build good international relations, it should, in principle, be a good idea to encourage students from all countries.

Enhancing the inflow of foreign students

The Commonwealth Secretariat is specially interested in enhancing the inflow of foreign students from both developed and developing countries to other developing countries like India. To elicit the views of concerned persons, they were asked whether India should encourage more students to come for higher technical education and what advantages they perceived in this. Some of the answers highlight issues already discussed earlier in this book, but a brief report of them is given here.

There is a general consensus that technical institutions in the country should enrol more foreign students. It is felt that the presence of foreign students in the campuses contributes to better international understanding. Students get to know various cultures and this broadens their horizons and perceptions. Students learn to live with each other and this is an enriching experience. Foreign nationals develop a certain attachment and favourable attitude towards their host country. They make valuable ambassadors in promoting goodwill towards their host country. They feel proud of being the products of good technical education received in this country. Their stay here influences their under-

standing of India and its thinking. When these students get back to their countries, they do well and when they reach positions of decision making they are very supportive of India and Indian technology capabilities. As one student put it, he would recommend that his country should look up to India for getting technical know-how, have joint technical projects with India and buy Indian engineering products.

Another student reported that if he were to join a university in his own country, he would recommend that more students go to India for higher technical education. He felt that a student from a developing country studying in another developing country gets a better exposure to the problems which are common to developing countries and as such would benefit more by being trained in India. Another very significant advantage pointed out was the arrest of a 'brain drain'. When students from developing countries go to developed countries, they get carried away by the affluence and opportunities there and never return to their own country. But, this does not happen when they go to another developing country.

The experience of the University of Roorkee is that many students trained there do keep in touch with the University. Further, the successful training of a large number of students from Nepal, Ethiopia, Indonesia and Iran has created continuing interest and other countries like Nigeria have shown interest in sending their students. Though UOR is set in a small town, senior diplomats from these countries keep visiting the University to express their satisfaction and explore further opportunities for collaboration. Thus, the receiving institutions gain in their status and image by having foreign nationals studying in their campuses.

There is a positive attitude about the long term intangible benefits that can accrue to the country and to specific institutions whose reputation is enhanced in admitting foreign students. It is, however, agreed that it would be inadvisable to increase their numbers beyond five per cent of total intake, certainly not beyond 10 per cent. Also the admissions should be distributed over a number of countries, instead of having large numbers from a single country. The experiments of having large batches under bilateral arrangements have not been very satisfactory. Such groups of students do not integrate with the local students and lose the benefit of international experience.

It must be observed that, though admission letters were issued to fill all the seventeen places reserved for foreign students in IIT, Delhi, only eight finally registered. It would be worthwhile obtaining data about the full utilisation of the 450 places allocated in the 30 different

institutions and find out what inhibits candidates from taking up offers from high-prestige places of learning.

Discussions with foreign students brought out some of their positive perceptions of the advantages of studying in India. India, as a multi-cultural country has a lot of tolerance and acceptance of people from other cultures. This is a definite advantage in integration in campus life. It has also been observed that some foreign students do very well in sports activities. For example, at IIT Delhi in 1992, a student from Jordan was elected as sports secretary. Further, the rich cultural and historical heritage of India, its varied art and tourist value were also cited as attractions for coming to India. The most important factor however, is, that the cost of living and cost of education is very economical compared to other places. This brings out the issue of financing foreign students.

Financing foreign students As is well-known, Indian higher education is very highly subsidised by the government, especially technical education. Though the government has been resisting a differential fee structure for foreign students, the general consensus among educational administrators is that it is time that the government accepted the policy of differential fee and charged the actual economic cost of education to foreign students (as already noted in Chapter 6). Most of the developed countries have already implemented this differential fee structure for overseas students. Even rich countries are expected to raise about 70 per cent of their operating cost of education from student fees. There is a strong mood of questioning why India should subsidise the education of foreign students, especially those students who come from the rich Middle East, which accounts for a large number of enrolments in the technical institutions in India. Further, it is argued that charging the full economic cost to foreign students would generate additional resources for the institutions that can be ploughed back to improve institutional facilities, a point which was borne out by the research done by Dr Ahmad and Dr Basu (Chapter 6).

They have explained that a differential fee structure is already in existence. The so-called 'Capitation Colleges' are already charging a fee that covers the actual economic cost of technical education, not only to students from outside the country but also to Indian students who can pay for it. It is argued that these differential fees may be rationalised and the government supported institutions also be permitted to charge the actual economic cost. When foreign students are placed through organisations like the Ed-CIL, even in state supported institutions like UOR, actual economic cost is charged.

Discussing this issue with the foreign students brought out a totally different perspective. A large number of students come to India as 'self-financing' students because the cost of education is very economical compared to any other place. A differential fee structure would arrest the inflow of foreign students. Thus, there is a dichotomy between the thinking of some educational administrators who feel that the actual cost of education should be charged to the foreign students and the foreign students' desire that there should be no differential fees for foreign students.

Though India is a poor country, it offers very high quality technical education. It is suggested that either the sponsoring country should pay the full cost of the education or international agencies should provide substantial scholarships to meet the cost of education. For instance, the ADB has already instituted eight fellowships in IIT, Delhi.

One of the suggestions made is to consider the feasibility of having some link between the fees charged and the per capita income of the country from where the students come. An interesting formula that may be considered is to index fees with per capita income. This would take care of the paying capacity of foreign students from the rich and poor countries. In fact, that is virtually what is happening in the mutual exchange of students between IIT, Delhi and the University of Massachusetts. The American student pays the American fee and the Delhi students pay the Indian fee.

Quality of foreign students The genuine interest in admitting foreign students is balanced by considerable concern about the quality of students seeking admission. Neither the faculty nor administrators are interested in admitting poor quality students. A preference has been indicated for mature postgraduate students who come with a specific objective, preferably sponsored by an employer. It is felt, however, some selection procedure should be evolved so that there is check on the quality of student intake.

There is a wide variation in the standard of education and preparedness of the students who come from the various countries. Many faculties have observed that the undergraduate students in general are weak in the basic fundamentals of Physics, Chemistry and Mathematics. One reason could be that the standard of education in the high schools of these countries is not up to mark. The other reason could be that good quality students are not enrolling for studies here.

In this connection, a question arises whether it would be possible to match the quality of students to the standards of education imparted. In India, there is a wide variation in the standards of education provided

by the different types of technical institutions. The five IITs have a very high standard and are geared to the capabilities of the cream of the student population. These are admitted through a very difficult and highly competitive Joint Entrance Examination (JEE) conducted as a common examination for the five IITs.

It was reported that, as an experiment, the JEE papers were administered to students of California Institute of Technology, by one of the teachers. It was found that few could perform creditably. That was not because the students were not good, but because JEE requires a thorough preparation. Such a preparation itself gives the IIT students a head start. Because foreign students have not come through the drill of JEE, they begin with a serious handicap. They are unable to cope with IIT standards right from the very beginning. The situation is similar with regard to other prestigious technical universities like UOR.

The data on the performance of foreign students, as reported in the case study on IIT, Delhi, showed that a number of students left without completing their course. Discussion with foreign students revealed that some students left voluntarily because they were unable to cope with the high academic standards and pressures. There have also been instances where the students were forced to withdraw as the institute regulations did not permit students to continue in the course if they failed to make the required grades. The foreign students have been permitted a slow pace and they have often taken about six years to complete the course, whereas almost all the Indian students complete the same course in the prescribed minimum of four years.

In the UOR no separate analysis of the performance of foreign students was available. The observations of the faculty, however, were very similar to the experience of IIT, Delhi. It has also been observed that the self-financing students are comparatively less competent academically. These students are unable to cope with the studies and fail to complete the requirements. Terminating their registration creates human problems, as these students have spent all their money and they have nowhere to go.

There is a general feeling that the performance of foreign postgraduate students is better than that of foreign undergraduate students. Most of the latter have obtained their first degree from an Indian university. Often they are mature persons who are working in some organisation and have been sponsored for a specific purpose.

In discussion, foreign students accepted that they did find it difficult to cope with the high standard of education in the IITs and that they were not able to compete with Indian students. On the graduate

programme, the pressure is very high. They fail in the first semester itself, unable to keep up with the academic pressure which starts from day one. This totally demoralises them and the academic handicap becomes cumulative, as there is no time to make up for the deficiency. Though remedial programmes are offered, they find it difficult to manage simultaneously both the regular assignments and the remedial programme. Academic failure leads to many other problems. These students do not mix freely with the more competent Indian students, and feel isolated. Further, this has a negative psychological impact affecting their self-concept. Sometimes, this leads to discipline problems.

Poor command of the English language, which is the medium of instruction in these technical institutions, is another problem which compounds the issue.

Some suggestions have been made for handling this problem. One obvious solution is providing remedial or bridge courses for these students. The questions are where, when and who would provide the remedial programme? Discussions with IIT and Roorkee faculty indicate that they are neither interested, nor have the time nor the motivation to provide such a service. It is reported that some students do take help from outside agencies at an exorbitant cost. It would be worthwhile examining the feasibility of identifying an external agency who could provide this service.

There are very high quality prestigious schools in India which prepare the students for engineering education. Foreign students might benefit by enrolling in these schools for a year. During this time, they could improve both their subject and language proficiency. Setting up remedial coaching laboratories using educational technology and language laboratories might help to bridge the gap to some extent. Alternatively the foreign students could be given a slow paced programme giving them more time to complete their courses.

In any case, as other writers in this book have stressed, proper counselling about the differential standards of education in the various institutions in the country is important. Given the choice, foreign students would like to study in high-prestige institutions as these are recognised as institutions of excellence all over the world and have a better market value. Yet, in their own interest, it is better to direct them to an institution where they will have a good chance of completing the course successfully. The choice is between better assurance of completion in an institution with less demanding standards and the risk of non-completion in a more demanding one. In either case, it would be better

to select, at the beginning itself, the right type of students.

Selection of foreign students For the group admission of foreign students, the UOR conducted its own examinations at the countries concerned and 'selected' the best of those who took the examination. As regards the Government of India cultural exchange sponsored students, and self-financing students, the institutions in the country have no say in the quality of students being admitted. The equivalence of the qualifying examination in the respective countries is verified to check against the entry requirement, but the experience is that this does not give any indication about the actual level of competence of individual students. It has been suggested that India should conduct its own examination to screen the students. Foreign students agreed that this would give them an indication of the standard required and they would come prepared. The logistics of conducting an examination outside the country appear formidable, however. As an alternative, these students may be asked to take internationally recognised standard tests like SAT, GRE, GMAT, etc, and admissions may be based on such scores.

Another issue relating to the selection of foreign students pertains to the procedure adopted. This has already been discussed in Chapter 6. It may be noted here that where an MOU exists between identified institutions, the admission process is smooth. Clear guidelines, criteria and procedures are laid down in the MOUs and this makes the process of admission easy. For decentralised admission to succeed, the capabilities of institutions in India for foreign students should first be identified. Specific institution building schemes should be instituted to enhance the capacity to train foreign students.

The IITs and other apex institutions have the required capacity and competence. The problems lie lower down the vast and varied system of technical higher education, where inadequacies are already experienced by Indian students. If the apex institutions are to relate to the rest of the system, there is a clear need for capacity-strengthening in the colleges, to serve both Indian and any foreign students. The components of a coherent strategy for developing capacity have been identified earlier in this book.

Reflections

India's Institutes of Technology and Technical Universities comprise a unique asset within the nation's higher education, which is of demonstrable benefit to its scientific and economic development. They are also

an asset to world scholarship and are in a very particular way India's contribution to an international commonwealth of scholars. They should thus give India an advantage when it comes to international student mobility. Foreign graduates of these institutions should certainly be able to enhance India's reputation, both generally and in the field of higher education, and the goodwill mentioned earlier should certainly be generated by them.

The study of student mobility in India's technological institutions showed that there is still under utilisation of available potential for training foreign students. The top institutions have, in general, a favourable disposition towards admitting them. At the same time, there is considerable concern about the quality of candidates who currently present themselves for admission. Ways and means have to be found for attracting good quality students and thus matching the calibre of students coming in to the standard of higher education imparted.

The starting point would be a clear policy, both governmental and institutional. Strategies on admission procedures, finance and information must also be put in place, along lines suggested in earlier chapters. *Information* is essential if potential applicants are to have an awareness of what India has to offer in high-class technological education. Only when awareness spreads, will scholarship opportunities be fully taken up by foreign students and will the foreigners who come to the IITs and the technological universities will be able to compete with their Indian counterparts and provide challenge and stimulus to both fellow students and teachers.

Only when this happens will India begin to capitalise on a major asset in Commonwealth higher education and will the Commonwealth itself reap benefit. Because of these institutions' importance is it too visionary to suggest the possibility of a Commonwealth Institute of Technology, to be set up in India along the lines of the Asian Institute of Technology in Bangkok? Such an Institute would gain from being part of the IIT network, but would perhaps be in a stronger position to cater to the needs of international students.