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SORTING AND SHAPING: EXPLORATIONS IN
HELPLESSNESS OF HIGHER EDUCATION
INSTITUTIONS

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S.R. Ganesh
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OF HIGHER EDUCATION INSTITUTIONS

By

S.R. Ganesh
Dulpat Sarupria

Abstract

After independence, the Education Commission called for creation of new institutions to undertake the task of higher education in technology, agriculture and management.

Three models of higher education were imported. In the field of technology, the 'MIT model' was advocated by the Sarkar Committee. The five Indian Institutes of Technology (IITs) were the results of this thinking. The 'Land-grant University Model' provided the basis for development of agricultural universities. The 'Business School Model' was instrumental in the creation of the Indian Institutes of Management (IIMs) at Ahmedabad, and Calcutta. In this paper, we explore the implications of importing the 'MIT model' in the case of IITs and venture some possible explanations of the feelings of institutional helplessness through in-depth data collected in one IIT. We believe that the "sorting" process implicit in the MIT and the Business school models, in particular, when imposed on the Indian socio-economic milieu has aggravated the isolation of the elites from the realities of the country as well as increased dependence on the west. This, has in turn, resulted in mediocrity and irrelevances even in those islands of intended excellence. The IIT experience serves to illustrate this argument. Our limited experience suggests that the IIMs may be no better off. Our argument is developed through--

- 1) understanding the phenomenon of sorting and how this distances the IIT graduate, in particular, from the rest of the engineering graduates, among others;
- 2) understanding the phenomenon of institutional helplessness in shaping the career choices of the IIT graduates, and finally through
- 3) placing the argument in the perspective of transfer of intellectual technology from the west.

SORTING AND SHAPING: INSTITUTIONAL HELPLESSNESS
IN HIGHER EDUCATION

S R Ganesh
Dalpat Sarupria

I

Introduction

When India attained independence in 1947, the new government was faced with an unprecedented task of nation building which in many ways, was unique in history. Among the many fronts on which the new government concentrated in order to accelerate the process of nation building, education, in general, and higher education, in particular, was the most important. The government formed the University Education Commission on November 4, 1948, under the chairmanship of Dr. S. Radhakrishnan who was later to become the President of India. A year later, this commission reported its findings in a comprehensive report spanning three volumes. Basically, the Commission envisaged a wider conception of the duties and responsibilities of the universities in the task of nation building. Among others, the commission called for sweeping changes in the existing pattern of higher education and voiced concern with the inadequacies of the existing system for the new tasks facing the nation after independence. Many of the recommendations of the Commission called for creation of new institutions to undertake the task of higher education in technology, agriculture, and management.

Creation and development of a variety of institutions in higher education was given the utmost importance in the first two decades of free India. In this task of institution building to accelerate the process of development and modernisation of a new nation, the Indian government called upon other nations to assist in the process. The Americans, among others, responded to this challenge of assisting Indians to build new institutions for higher education. Under the umbrella of technical assistance programmes, various American universities and agencies collaborated with the Indians in building new institutions during the 1950's and the 1960's. Three important fields in which these institution building efforts have left a lasting imprint on higher education in India are technology, agriculture, and management. That their contribution has considerably accelerated the process of bringing about new patterns in higher education cannot be questioned.

Three models of higher education were imported. In the field of technology, the 'MIT model' was advocated by the Sarkar Committee. The five Indian Institutes of Technology (IITs) were the results of this thinking. The 'land-grant University Model' provided the basis for development of agricultural universities. The 'Business School Model' was instrumental in the creation of the Indian Institutes of Management (IIMs) at Ahmedabad and Calcutta. In this paper, we explore the implications of importing the 'MIT model' in the case of IITs and venture some possible explanations of the feelings of institutional helplessness through in-depth data collected in one IIT. We believe that the

"sorting" process implicit in the MIT and the Business school models, in particular, when imposed on the Indian socio-economic milieu has aggravated the isolation of the elites from the realities of the country as well as increased dependence on the West. This has, in turn, resulted in to mediocrity and irrelevance even in these islands of intended excellence. The IIT experience serves to illustrate this argument. Our limited experience suggests that the IIMs may be no better off. Our argument is developed through --

- 1) understanding the phenomenon of sorting and how this distances the IIT graduate, in particular, from the rest of the engineering graduates, among others;
- 2) understanding the phenomenon of institutional helplessness in shaping the career choices of the IIT graduates, and finally through
- 3) placing the argument in the perspective of transfer of intellectual technology from the West.

Understanding the Sorting Phenomenon

On the entry side

The IITs are institutions of national importance. They have had the benefit of collaboration with prestigious institutions and universities abroad (Ganesh, 1979). Therefore, there is demand for admission to IITs because of the high demand for its graduates. In 1979, there were about nine thousand eligible candidates who appeared for the Joint Entrance Examination (JEE) in one IIT of which 479 were called for personal interviews, which comes to nearly 5.3 percent of the total applications. Finally, only 3.2 percent were admitted in various disciplines. With such heavy competition, IITs are considered elite institutions beyond the reach of the common man. The UGC report on Development of higher education in India also indicates that 70 percent of the seats in secondary schools and 80 percent of the seats in higher education are taken by the people at the top 30 percent of the income group. Possible reasons are that people in this income group can only afford to send their children to secondary schools and colleges. Others who are not economically so well off need financial support from their children instead of spending large amounts on their higher education. Even if one took the risk, there is no guarantee that the children will be successful and even, if successful, there is no guarantee of good employment. Secondly, all the institutions are located in big cities which means that either one should be a resident of these cities or ready to pay for hostel expenses. Rao (1978) found that students'

choice of a particular university or institute depends upon reasons like: location in own city, reputation of the institute, no admission elsewhere etc. These were reported by five professional groups - engineering, medicine, agriculture, social work and education.

Higher education represents one of the great sorting devices of society. Therefore, society has a clear interest in who enters higher education and who does not. The IIT Council which represents all the IITs, is anxious to avoid intrusion of legal qualifications into the selection process and restricts itself to the broad principle about the need for equality. It accepts that no student should be admitted who can not meet the general academic standards set for all the students. For the selection of students some standard tests are available, which are used for selection of competent students. The Joint Entrance Examination (JEE) to IITs is based on these standard tests. All these are adopted from ^{the} western countries. Among these, the top scorers are called for personal interviews. Computer facilities are available to rank the students, depending upon the total number of seats available in a particular institution. Students and parents both are aware of the status and the occupational opportunities of the institutions, in general. Entering into any high status institution depends upon factors such as students' academic background and knowledge which can be predicted on the basis of family background e.g. parents' educational qualifications, their interest in higher education, their economic status, family structure, type of family, residence in a big city or town, number of dependents, parent's occupation, etc.

There is a general impression about the IITs that one gets in if ~~one~~ has a sound academic background because the admissions are based on the performance in the entrance exam and not on the basis of University or earlier academic performance unlike other engineering colleges where admissions are based on the performance in any recognised university. So people, in general, have a very high image of IITs. Heyneman (1980) compared the economic return for various academic and professional qualifications. He reported that economic returns are much higher for university engineering, agriculture and other specialisations than for general B.A. and B.Sc. degrees. He also found that the parents' economic status influences the children's academic achievement to a great extent. Tables 1(a) and 1(b) report the background information based on the 1979 JEE in for one IIT and the enrolment in education data, 1977-78, respectively.

As mentioned earlier, the IITs conduct a joint entrance examination (JEE) to select students from all over the country. But, it is strange to note that the major portion of ^{the} students come from four states, either where the IITs are located or from the nearby states. In this case no measure has been taken to separate the outstation candidates who are residents (or have migrated) of the same state i.e. residence of a particular state has been taken into consideration rather than the state from where they might have migrated. Tables 2(a) and 2(b) highlight the state-wise admission in IITs in 1977-78 and the break-up for all states.

Table - 1(a)

Background Information based on JEE 1979 admission,
IIT, Bombay

1. No. of students who registered in 1979	9,000
No. of students who qualified in 1979..	..	479
No. of students who were admitted in 1979..	..	288 (excluding direct admi.)
Percentage of student who qualified in JEE..	..	5.32%
Percentage of student who were admitted in 1979	3.2%
2. No. of students coming from District town..	..	15 (5.2%)
No. of students coming from city..	..	266 (92.4%)
3. No. of Male students..	..	281 (97.6%)
No. of Female students..	..	7 (2.4%)
4. Place of schooling		
Students who have taken both the exam (pro-qualifying and qualifying) in city..	..	273 (94.8%)

5. Father's/Guardian's annual income in Rs.

<u>Income group</u>	<u>N</u>	<u>Percent</u>
Upto 2000	7	2.4
2001 to 4000	15	5.3
4001 to 6000	13	4.5
6001 to 9000	23	8.0
9001 to 12000	37	12.8
12001 to 15000	30	10.4
15001 to 20000	40	13.9
20001 to 25000	42	14.6
Above 25000	81	28.1
	-----	-----
	283	100.0
	-----	-----

(Income Tax group)
12001 and more cover about 67%

IIT, (Bombay) internal document, 1979-80.

Table - 1 (b)

Percentage of Enrolment in Schools

	1975-76 (Prov.)	1977-78 (Prov.)
Primary Schools	83.9	82.8
Middle Schools	36.9	37.9
Secondary Schools	22.4	20.0

		1977-78 000's	
A. Engineering and Technology			
	Degree	252	(97.6)*
	Diploma	347	(89.6)
B. Science	Post Graduates	243	(93.9)
	Graduates	1182	(83.9)
C. Agriculture	P.G. & Graduates	113	(98.0)
D. Medicine	P.G. and Graduates	174	(98.1)
	G. Total	2311	(89.1)

* Percent employed from the total.

TATA, Handbook of statistics, 1980-81.

Table - 2(a)

State-wise Admission in IITs in 1977-78

S.No.	Overall	Kharagpur	Bombay	Madras	Kanpur	Delhi
1.	403 Maharashtra	106 WB	256 Bombay	123 Tamil Nadu	91 U.P.	96 Delhi
		32.9	78.0	45.7	27.8	38.9
2.	177 Tamil Nadu	45 Bihar	9 Gujarat, Abroad	27 Maharashtra	61 Maharashtra	28 U.P.
		14.0	2.7	10.0	18.6	11.3
3.	144 West Bengal	40 Maharashtra	7 Karnataka Indians, Abroad	25 AP and Karnataka	29 Delhi	19 Maharashtra
		12.4	2.1	9.3	8.9	7.7
4.	136 Delhi	25 Orissa	6 M.P.	19 Kerala	27 Bihar	17 Tamil Nadu
		7.8	1.8	7.1	8.3	6.7
5.	130 U P					
	76.56%	67.1%	86.9%	81.4%	71.9%	64.8%
N =	1293	322	328	269	327	247

Table - 2(b)

Representation of States not covered in Table 2(a)

S.No.	Total No. of Students admitted	State
1.	0	Sikkim
	0	Arunachal Pradesh
3.	0	Nagaland
4.	0	Chandigarh
5.	1	Manipur
6.	2	Goa
7.	4	Meghalaya
8.	4	Jammu & Kashmir
9.	6	Himachal Pradesh
10.	8	Assam
11.	10	Haryana
12.	19	Gujarat
13.	21	Punjab
14.	23.	Rajasthan
15.	23	Madhya Pradesh
16.	30	Orissa
17*	41	Kerala
18.*	50	Karnataka
Total	242	
	18.71	Percent of total
	11.67%	excluding (*)

IIT (Bombay), internal document, 1980-81.

These tables are drawn from the information available for JEE in 1977-78. There are, in all, 1293 candidates selected for all IITs of which more than three fourth of the students came from mainly five territories, viz., Maharashtra, Tamil Nadu, West Bengal, Delhi and U.P. On the other hand, 11.67 percent of IIT admissions cover as many as sixteen states (Table 2.b). After combining Kerala and Karnataka, the percentage goes upto 18.71 which is even less than one fifth of the over-all admissions. Reasons are manifold. Some are given below:

1. Literacy rate in these selected five states are comparatively high (But this is not unexceptional, because the literacy rate is quite high in Kerala);
2. High awareness in these states because most of the IITs are in these states or in the neighbouring states;
3. Alumni of IITs are around these states;
4. Big industries are clustered in these states;
5. In these states much emphasis is given for higher education;
6. Students' preference/education is in their own city/ for state.

There is a danger in generalising this finding because the data is only for one year. Table 2(a) gives basis for a more sound prediction and the also supports this finding.

IIT Bombay is located in the state of Maharashtra. Table 2(c) presents the number of students and the state they belong to over three years. This table does not cover the total admissions, but, only the first four states, rankwise. In the year 1977-78, the states were ranked from which highest number of students were admitted. The first and the top most state from where 256 students were admitted in the IIT

Table 2 (c)

Admission Pattern of IIT Bombay

1979-80		1978-79		1977-78	
Total No.	State	Total No.	State	Total No.	State
205	Maharashtra	188	Maharashtra	256	Maharashtra
11	Gujarat	17	Gujarat	9	Gujarat, Foreign
10	Karnataka	12	Karnataka	7	Karnataka, INRA n
8	Andhra Pradesh	7	Tamil Nadu	6	M.P.
Percentage	76.47	76.98		89.63	
Total Admissions	306	291		328	

IIT (Bombay), internal document, 1980-81.

was Maharashtra and the rest of the states were not even near to it. Second rank was of Gujarat and foreign students with a very small number (9). Combining the first four states, covers, slightly less than ninety percent (89.63%) of the total (328) admissions. This comes down in the year 1978-79 and 1979-80 to slightly more than three fourth of the admissions. But the pattern remains more or less the same. In all the three previous years, Maharashtra contributes the maximum number of entrants. Thus, even on the entry side, the sorting leads to concentration of incoming students around advanced and industrially developed pockets. This filters out students from states which might benefit more from technological education.

On the output side

IITs are perceived as . reputed institutions. Getting admission in any of the IITs means there is something exceptional about the students. Once admitted there is an impression that after getting the degree, one need not approach any one for jobs. Jobs seek the students. So the students need not worry about the future. By and large, everyone gets a remunerative job irrespective of academic grades and areas of specialisation.

In India, unemployment and underemployment are burning problems. Government and various other agencies try their best to solve the unemployment problems. The IIT graduates are quite removed from this problem.

Every IIT also has a placement department, which keeps in close touch with industry where these graduates find a suitable entry. Most of the organisations which recruit these graduates have similar recruitment strategies as well as induction and training programmes. They are paid a stipend to start with and after confirmation their emoluments increase. Table 3 gives the salaries offered after graduation and obtained in the second year of jobs. Minimum starting salary of a graduate in the first year was Rs.800/- p.m. in 1979 and Rs.700/- p.m. in 1978. In the second year, most of them become Income Tax payers. The maximum offer reaches Rs.1500/- p.m. to Rs.1800/- p.m. in the first year and nearly Rs.2000/- p.m. in the second year of their jobs. To reach these levels in other disciplines and from other institutions takes years. Sometimes, these graduates prefer a job with more perks than salary, to get more benefits and pay less income tax.

It was also observed that these graduates frequently change their jobs as it suits them in terms of the working conditions, facilities, job satisfaction, salary etc. Again, job mobility is a luxury denied to most graduates from other colleges.

Most of the Alumni with job experience upto eight years earn upto Rs.25000/- per year and about one fifth (19.9%) earn Rs.25001/- to Rs.30000/- per year. Some of them (4.6%) also earn more than Rs.45001/- per year. After gaining this experience, and changing jobs only 20.3% of these Alumni earn Rs.25000/- per year with the experience of 9 years

Table - 3

Monthly salary received by IIT, Bombay graduates
in 1978 & 1979

Year of Graduation	Year of entering into job	Total amount received per month after graduation	
		Maximum Rs.	Minimum Rs.
1979	First year	1500	800
	Second year	2000	900
1978	First year	1800	700
	Second year	2000	800

Source: Annual Report, IIT (Bombay), 1980.

and more. Distribution of income becomes more or less homogenous, i.e. yearly incomes in all the groups are nearly equally distributed. More than one fourth of the alumni reach the high income bracket (i.e. Rs.45001 and more) after gaining an experience of 9 and more years. Table 4 depicts the change in salary with experience. As indicated earlier, with increasing experience their salaries change: at the same time, their job responsibility also changes. Table 5 illustrates this. Nearly sixty (58.8%) percent of the alumni with an experience of less than 8 years hold primarily engineering jobs. This comes down to 44.5 percent with experience of more than 8 years. Similar is the trend for the management and R & D professions.

Does quality of education pay? There are problems of bias: good schools attract good students. In broad terms, of course, quality pays: graduates of good schools earn more money than graduates of weak schools. For example, average students of a public school will be much better off than a private or a government school. Similar is the case of of colleges. The problem is how one can say which is good or bad or what is the basis for that. One of the alternatives is to compare their performance and facilities provided, quality of teachers, job opportunities, employment etc. One of the quick and dirty methods is to see how many of the graduates of school A are employed and how fast on suitable positions compared to school B. as

Table - 4

Alumni's yearly income and years of experience

Years of experience/ income	Upto 25000	25001 to 30000	30001 to 35000	35001 to 40000	40001 to 45000	45001 and more	N
Upto 8 years	68.2 (103)	19.9 (30)	0.7 (1)	5.9 (9)	0.7 (1)	4.6 (7)	151
9 years & more	20.3 (27)	18.8 (25)	11.3 (15)	19.5 (26)	3.7 (5)	26.3 (35)	133
N	130 (45.8)	55 (19.4)	16 (5.6)	35 (12.3)	6 (2.1)	42 (14.8)	284

Table - 5

Types of jobs held and years of experience of Alumni

Present job/ years of experience	Engineering	Management	Teaching	R & D	N
Upto 8 years	58.8 (90)	30.7 (47)	2.6 (4)	7.8 (12)	153
9 Years & more	44.5 (61)	46.0 (63)	0.7 (1)	8.8 (12)	137
N	151 (52.1)	110 (37.9)	5 (1.7)	24 (8.3)	290

Data are available on this criteria for graduates from engineering colleges, management institutions, IIT graduates etc. Table 6 highlights this in the case of management graduates: A similar pattern prevails in the case of IITs.

Table - 6

Details of job announced and Management students placed in different years.

	1980	1979	1978
Number of students who accepted Job offers	153	140	137
Number of jobs announced	1664	1019	751
Number of organizations conducting interviews	146	109	116
Number of organizations whose job offers were accepted	60	74	67

Source: IIMA placement report, July 1980.

Thus, one could say that a graduate of an elite institution like the IIT or IIM has more choice than his counterpart from the regular university stream. In this, again, he is far from the Indian realities.

Data of four years about employment indicate that most of these graduates who are not interested in higher education at the moment were attracted by private organisations. (Table 7).

Table - 7

Employment Position of the B.Tech. Graduates

Year	Total Graduates	Information available	Employment break-up					Total graduates interested in further studies
			Employed in private org.	Employed in Govt. org.	Employed in Entrepreneurship	Venturing into Engg. Mag. Mang. studies	Further studies Abroad India	
1979	214	178	101	10	4	42	12	66
1978	213	191	109	30	7	30	8	45
1977	269	236	130	23	6	33	15 23	77
1976	202	178	101	20	3	33	5 10	49 5

Source: Annual Reports of IIT, Bombay.

A large number of students (for whom information is available) after graduation were placed in private organizations. There is a consistent pattern in the past. There is a slight variation in the number for each year. A few prefer to serve in Government organizations and a very few (less than 4 to 5 percent) prefer to start their own enterprise. One of the important and dominating factors for the choice may be because of the family background, parents' occupation. Because most (and of the parents (of IIT graduates) are either engineers or managers and officers; and very few are from the business families (about 10%). Rao (1978) found that only 16 percent students have come from business families in six different professional education like: engineering, social work, medicine, education, management and agriculture. There is strong research support that the children from the business families are more tempted towards business as compared with the nonbusiness families. Their chances of success in the enterprise are fairly high, in contrast with the children of the nonbusiness families.

Ward (1977) argued for a socialisation model of entrepreneurs. On both theoretical and empirical grounds, a family tradition in business is thought to be the most conducive for the production of entrepreneurs throughout the world. Numerous international studies also reveal that, at least, 50 percent of all entrepreneurs studied, have come from families who have had past experience of business formation and operation.

The occupational choice literature (Warner and Abegglen 1955) tends to support ^{this} generalisation and indicates that a son's occupation is still most highly predicted on the basis of the father's occupation. It appears that entrepreneurial families are the focal progenitors of the systemic and antecedent ^{preconditions} of entrepreneurship. This has been supported by several researches done in India and abroad. Children prefer to go for their parent's occupation, the reason being that they are socialised or professionalised in the same environment.

Another reason for the choice may be because of the role of the institute in terms of input provided to these graduates. Since these IIT's have a close touch with the industries, in general, and try to fulfill their needs, it is possible for these graduates to have an easy opening in the industry. Most of the skills and training provided by IIT's can be effectively utilised in big industries. In the final year, much emphasis is given for specialisation in a particular area or discipline. This makes the graduates concentrate on a small portion of a big industry and forces them to sacrifice a gestalt appreciation of reality. This may be considered as an advantage in one way and a disadvantage in another way.

As indicated earlier, these graduates prefer to accept jobs in the private sector more frequently compared to the government sector. There may be several reasons behind this some of which are as below:

1. Mostly Government jobs are secure so preference is for those who need job security. This is comparatively less in private concerns. Since there is a high value for the IIT degree, irrespective of their academic grades and discipline, every body gets a good return. So job security is low in their preferences. Some of those who join government concerns may be doing so because they are from a family of administrators, teachers, clerks etc. This pattern is also prevalent among IIM graduates.
2. After four or five years of training at an institute of national importance where the culture is very much different from the government organisation these graduates may find some adjustment problems.
3. Rigid rules and regulation in the government organisations hamper the creative work or new ways to deal with problems.
4. Future prospects in a private concern are much brighter than in the government organisations. Since the private concerns have a profit motive, the employees are rewarded based on merit and performance. This may or may not be true with government organisations.

King (1970) also supports these results that the choice of job and the amount of expected salary is partly governed by the family members and the family circumstances. As indicated earlier most of these students are from well-to-do families, where the parents can afford to have their children wait for some time to get a good job of suitable salary. The parents of lower economic groups will prevail upon the student to accept a job immediately irrespective of the amount.

It is quite likely that the person with some education will try to acquire further educational qualifications. This is also true for IIT graduates. A bachelor's degree stimulates the graduates for higher education in engineering, management etc. either abroad or within the country itself. This depends upon one's interest in the subject and what one wants to become. Out of the total graduates from IIT, Bombay, nearly 25 percent to 37 percent seek admission for higher education. But, again, there is a dilemma in that all who are interested in a particular subject or institution may or may not be getting admission where they want. Later on they rationalise and feel satisfied with whatever they get.

Results show that more of these graduates want to go abroad for higher education in engineering than management as compared with higher education in management from the country than abroad. This indicates that the IIT graduates value higher education in engineering from abroad and higher education in management from the country itself.

Some possible explanations are:

1. Higher education in management (MBA) in the country has higher market value in India compared to higher education in management from abroad.

2. As IIT's are meant for technical education, they give more emphasis on technology rather than on managerial skills.
3. More than half of the faculty at IIT (Bombay) have taken their last degree from outside the country and they are the reference group for the students. From them the students get detailed information about higher education in engineering from abroad.
4. To be in an academic career one needs to have a higher degree, and a Ph.D. is a must. From impressionistic data, not many who go abroad go in for Ph.Ds. They get employed after a master's degree and work abroad. In many cases they also settle abroad.
5. Since the IITs have collaboration with one or the other country for various reasons, these countries also give some preference to these graduates for professional development.

Thus, both on the entry side as well as on the output side, the IIT student is part of an elite removed from the realities of the Indian environment. On the output side, the sorting phenomenon results in his being captured by the large industry in the private sector which is dependent on import of technology from abroad. The IIT student becomes an unthinking instrument in this process of increasing the technological dependence of the country. This is also evident from the preference of IIT students not to go into R&D.

In a recent thesis on work value orientations of scientists and engineers in industrial research and development, out of a sample of 313 R&D workers from six reputed public sector, private sector as well as governmental R&D organisations, it was found that only just over 5% of the total number of R&D workers had degrees from any of the 5 IITs.

Even including those who had the masters degree, less than 13% of the sample came from IITs. More than 80% of the respondents had received their first degrees from institutions other than these of national importance like IITs. This raises the fundamental question about the technological excellence that is being fostered through R&D departments and organisations within the country. In the next part we explore the phenomenon of shaping in the IIT.

Understanding The Shaping Phenomenon

An under-graduate student at an elite technological institute like the IIT, spends anywhere upto twelve thousand academic hours over five years in the most formative of his life. Therefore, it is not unrealistic to expect that the student who spends twelve thousand hours at anyone of the five IITs would contribute towards technological excellence in India.

Based on an exploratory research undertaken in collaboration with one IIT², we argue that due to several organisational contradictions which permeate the institution neither the preparation for nor the pursuit of technological excellence has come about nor can come about under the prevailing conditions. While the data pertains to one IIT, the parallels for similar professional institutions in science, technology, medicine and management are too striking to be brushed aside.

Base for Interpretation

The larger study relies on data from internal and public documents, perceptual data from questionnaires, open ended as well as some structured in-depth interviews and observations. Questionnaires were designed and administered to all the students (1496), their parents (1496), faculty (301) and alumni (856) during late 1979. While mailing was used for administering the questionnaires in respect of parents, faculty and the alumni, whose addresses were available with the IIT,

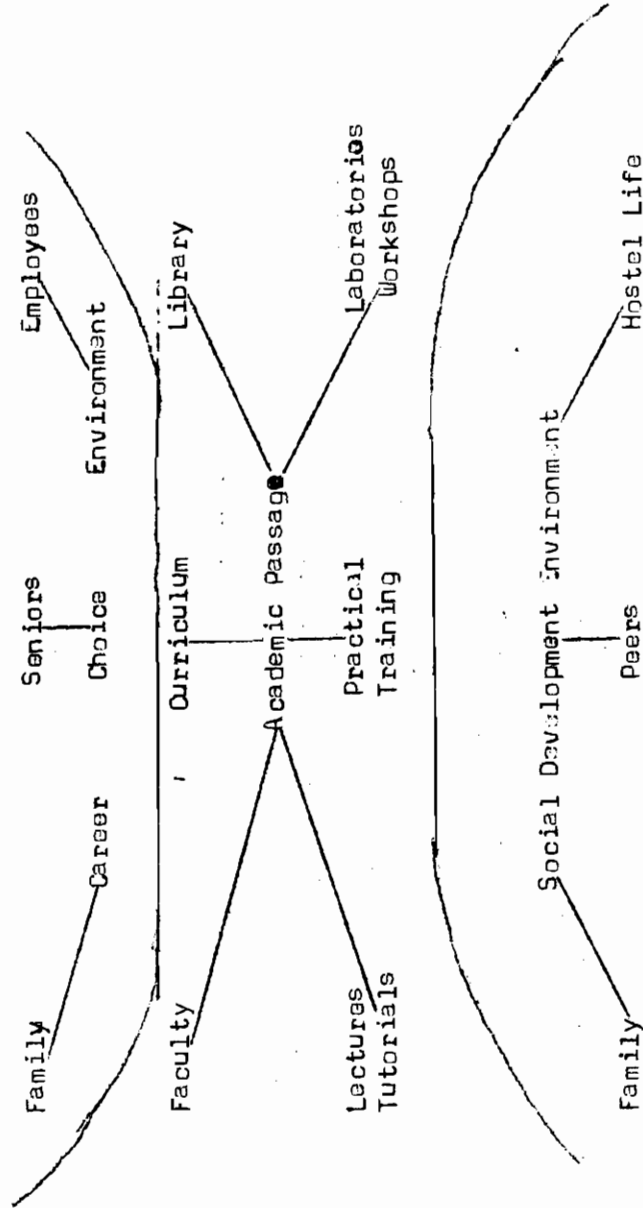
the students' questionnaires were designed, administered and collected by a small group of students from within the institute. While 153 faculty (49.5%), 832 parents (55.6%), and 291 alumni (34%) returned these questionnaires only 265 responses were collected from the students (17.7%). Some implications of this would be discussed later. Till 1979, about 4200 alumni (under-graduates) have taken their degrees from the IIT. However, the addresses of only 856 were available with the institute and, quite possibly, many of these are obsolete. In spite of this, in terms of number, both the sample and the responses are such as to enable meaningful generalisations. It is also interesting to note that among many surveys conducted in India none of this type has received such a high response without any reminder, particularly, in respect of faculty, parents and the alumni.¹

A model of the IIT influence environment

As originally conceived, the research was intended to map the IIT environment in such a way as to isolate influences on the aspirations, ambitions, expectations and career choices of under-graduate students. A simple model that emerges out of the study which maps the influence environment of the undergraduate students can be depicted as in Figure 1.

¹ Pareek, U; Dixit, N; and Sarupria, D; "Psychologist in India", Bombay Psychologist, 1979, 1(2), 5-16, for example, could get only twenty six percent responses after reminding twice.

FIGURE 1



A MODEL OF INFLUENCE ENVIRONMENTS OF AN IIT UNDERGRADUATE

* The lines indicate fragmentation and low interaction between the three environments.

The influence environment can be conceived of in three distinct categories

1. the career choice environment
2. the academic passage, and
3. the social development environment.

The important influences in these three environments are also depicted in the figure. In the temporal sense, these environments span the five years of the under-graduate students life and, in the spatial sense, the environments extend beyond the physical boundaries of IIT. The most striking aspect of the model that emerges is the compartmentalized nature of the three environments as a dominant pattern for the under-graduate students. This implies that there is very little interrelationship between what goes on in the different settings which constitute the three environments.

Thus, while the family (not just parents but, including close relatives) emerges as the common link in the career choice and social development environments, its influence appears to be primarily in the direction of developing "dependent" relationships. The parents, faculty, alumni and the students acknowledge the primacy of the family when it comes to making career choices. It is as if the "exit" from the academic passage is used as an occasion by the family to assert its claims on the student - whether he takes a job, pursues higher studies here or abroad (extending the academic passage?). One wonders how "dependent" our elite IIT graduates are and what implications they have for the society.

Seniors and peers emerge as major influences in shaping professional interests and career choices, and development and maturation of the student's personality, respectively. Their dominant roles are identified distinctively. Perhaps, "ragging" which has been listed as an influential event by about 31 per cent of the responding students accelerates this role differentiation. Hostel life is the setting in which the undergraduate blossoms out as a social (asocial?) being. The faculty, the curriculum, the lectures/the tutorials, the library, the practical training and the laboratories and workshops are "entombed" in the academic passage and have insignificant influence on the career choice and the social development of the under-graduate although twelve thousand hours are spent in this "passage"!

The model raises questions as to the kind of persons and professionals the IIT education makes available to society. This model is helpful to synthesize the various contradictions which culminate in a student spending twelve thousand hours at the IIT and coming out and, not making, in most cases, contributions in the direction of technological excellence. Some of the important contradictions which have gone into the creation of the model are discussed in the following sections. These and other similar contradictions have to be resolved before an IIT can truly prepare an under-graduate for technological excellence.

Contradiction One: Integrated development through piece-meal approach:

While the faculty, parents as well as alumni expect that IIT an contributes towards integrated professional development, the students value academic aspects like lectures, tutorials, laboratory, and work-shops fairly low. Further, both faculty and students admit that there is very little interaction between each other which might contribute towards personal and social development. The curriculum also provides for fragmented inputs over five years and leaves the responsibility for putting professional ideas together to the students without providing for opportunities do so. It is also interesting to note that while to one would have expected practical training to emerge as a major influence for professional development, neither faculty nor parents, or for that matter, neither alumni nor students, consider it as significant. On the contrary, practical training has been given a very low value by all concerned. Besides the absence of informal interaction with faculty, extra curricular activities also receive a short shrift as perceived by faculty, parents, alumni and students. All these point to the inevitable conclusion that, intentions notwithstanding, IIT has moved farther and farther from its ideal of integrated professional and personal development.

The low response rate from the students in spite of the collaborative design, distribution and collection was puzzling until one isolated this contradiction. Unlike the faculty, alumni and parents' questionnaires, the students' questionnaires had open ended responses.

They were, on the advice of the small group of collaborating students, designed to encourage reflection on what are the influence on a student. However flawed or inadequate the questionnaire one suspects that in an environment which neither fosters self-reflective thought nor encourages divergent thinking, the students are bound to be anxious in responding to an open ended questionnaire. As a result of this experience, more reliance is being placed in the study on in-depth interviews with students. These are still in process. The piece-meal approach has, perhaps, left indelible impressions of the student. The next contradiction also supports this point.

Contradiction two: Encourage inquiry through spoon feeding:

In order to pursue technological excellence, it is important that one creates an environment where inquiry is encouraged. Inquiry rests on ideas and thrives on debate. While the curriculum revision efforts in the early '70s were intended to encourage "an integrated approach towards the quantum and methods of instructions and assessment", this has not taken place.

The lectures are generally perceived as spoon feeding sessions. The series of quizzes or tests held during the semester are converted into chores rather as settings for greater faculty - students dialogue. By and large, the mode of an assessment that is predominantly used is the quiz or the classtest which not encourage much inquiry. Methods does like the home assignment, the group assignment and a project are used

very rarely. Only such modes can bring about dialogue and debate as well as encourage ideas. Yet another piece of evidence which supports the existence of this contradiction is the high value placed by students on the library in relation to the low value placed on class room lectures. This reflects that if providing information is the thrust of the classes, the students are better off gathering these from the books which the faculty use to teach. Thus, the class rooms are not interaction settings but primarily information transfer settings where the students are treated as "passive tablets" and not as "inquiring persons".

One of the other indicators that debate is discouraged in the institution is the taboo generally accepted by the students in their participation in politics. The students strongly indicate that, as a topic, politics is taboo in hostels. Students and faculty also confirm that there are no forums for debate in the "academic passage" of the institute which is what is mirrored in the other settings as in politics.

Contradiction three: Avid contact and evade responsibility, but, desire involvement:

The path towards excellence lies in the direction of involvement and participation. Besides the low value placed on informal interaction, there is only nominal involvement of faculty in students' activities. The physical setting of IIT also discourages such interactions. Further, there is also very little "social interaction" among the faculty. Most encounters take place in public places - on corridors,

on the road and around culverts. The whole philosophy of creating a learning community appears to have been defeated. This has resulted, over the years, in contact between various groups coming about as confrontations. These confrontations have been around issues concerning gymkhana activities in respect of faculty and students; in the creation of a "Faculty Forum" in respect of the faculty and the "academic administration" and in respect of the recent closure in March 1980, as a result of confrontation between students, on the one hand, and the administration and faculty on the other hand.

These major confrontations which have come about in the institute's history also confirm that the IIT environment discourages contact and initiative. Further, while the students are expected to take responsibility in respect of their affairs in the hostel and the gymkhana, the institute's rules and practices tend to discourage such initiative. The "Faculty Forum" when formed, was a manifestation of the absence of a strong "voice" mechanism in the institute and the weakness of dialogue between those who manage the institute and "those who are employed in it". That there is as much participation and involvement as is, at present, only redounds to the credit of those in IIT who are still in Bombay striving to create a learning community.

It is also interesting to note that the media which are considered as major influences on the students are spectator/audience oriented viz. music, television and radio rather than sports. Gymkhana is given low

value by the students also. Another setting which the students use are the eating houses just outside the campus. Rarely are these used by the faculty and somewhere along the line invisible boundaries are drawn around settings which the faculty use and those which the students use.

One begins to visualise the environment as producing "social islands". The major media which provide a setting for "interaction" among the faculty and staff is also the weekly film shows. It is also interesting to note that the days for screening the films for the faculty and the staff are different from those of the students lest such interaction should, willy nilly, come about!

Contradiction four: Desire excellence, but, do not put in efforts:

When asked why they had joined IIT, about one third of the faculty who responded mentioned that their interest in teaching has impelled them into joining IIT. As a second reason, the excellent research facilities which the institution provides has been mentioned. In terms of ranking their commitments and involvement between teaching and research, teaching ranks first and research, next. Consultancy ranks the last. While this would lead one to expect that both the faculty and the students would highly value academic interactions and settings in which academic interactions take place, the reality is otherwise. It is surprising that very few of the faculty see class-rooms, lectures, tutorials and less than an handful see laboratories and workshops as influencing the students' career choices. The students also

perceive such academic interactions and settings in an equally lukewarm fashion. Apparently, own intentions and original reasons notwithstanding, the faculty do not put in efforts to make these academic interactions interesting, stimulating, meaningful and rewarding. It should also be noted that there are hardly any alumni (less than 2% of the respondents) who are in teaching. One would have expected that given the importance attributed to teaching by the faculty, more than such meagre number of students would go into the teaching profession.

A similar fate awaits research and development. Less than 10% of the responding alumni (and this data includes M.Tech. students also) are in R&D. Slightly over 50% of the alumni, almost equally divided between those who have upto eight years experience and those who have between 9 and 14 years of experience, are still in engineering job. Over Slightly less than 40% of these alumni are in managerial positions. Of course, as might be expected the movement to managerial positions takes place generally after the fifth year and more markedly after the eighth year. While the faculty aspire that the institution should be renowned for technological excellence and should be on par with similar institutions abroad, apparently, they do not put in efforts to make this a reality. This is evidenced from the low value they place on laboratories and workshops as influencing the students in addition to the low value placed on practical training. Further, if one goes through the annual reports of the institution, for over two decades, one hardly finds that major technological break-throughs are reported. Until the,

early 70s research did not take off and sponsored research started making some inroads only after 1972. Since then, the quantum of sponsored research has gone up to around Rs.30 lakhs per annum. However, the impact of such research is not felt by the under-graduate students. Therefore, it is surprising to see that the faculty expect the IIT graduates, over a period of 10 years after their degree, to move more into R&D work than they would upon graduation. It is not clear how the faculty can expect the graduates to move into R&D after acquiring job experience. The alumni data, in any case, contradicts this expectation. Thus, while the faculty would like to work towards excellence it is not very clear whether they are able to do so both in teaching and in research. One of the interesting observations in this regard is the defensive feeling that many faculty carry with them that the students expect too much of them and they are not "Einsteins". Notwithstanding the excellent facilities which the institute offers, and this is admitted by both the faculty and the students, efforts towards technological excellence have not come about readily and in a proportionate fashion.

Thus, it can be seen that faculty involvement that is very much necessary for 'shaping' of the students does not come about. The faculty express feelings of helplessness and inability to move out of the 'double-hind' they have placed themselves in. Whatever high expectations the students might have at entry also begin to evaporate as the years pass. The majority end up alienated from the Indian environment and only the minority feel committed to doing something about the present condition of mediocrity and irrelevance by working towards self reliance.

IV

Increasing Dependence

Padaki (1981) presents in succinct terms the historical process of increasing dependence and alienation of the elite in the third World: "Historical Sequelae"
"Continued exploitation of all resources in one society class by another society class leading to rapid development of the latter, chiefly in indices of consumption and its correlates.

Acceleration of scientific and technological innovation in the beneficiary societies, and a concentration of techno-economic power.

Rapid development of education and training facilities and of administrative and managerial tools and techniques to cope with the overall progress in the utilization of new technologies.

Accelerating demand for resource supplies to maintain rates of growth and consumption leading to (a) rapid increase in the disparity between a small number of developed societies and the large number of exploited societies; and (b) a corresponding disparity within the exploited society between a small number of elite sections serving the purpose above and the large number of deprived sections.

The exploited society's turn towards independence, self-reliance and self development.

Transplantation of the already developed technology, including the non-separable managerial tools and techniques, either by emulation

or by imposition into the developing society.

Technologies and managerial tools and techniques generating with the new society, predictably, the value context of their original purpose and thereby reinforcing the process of selective development.

The value context of the new technology shielded and isolated from the remaining institutional forces in the developing society by the owner-participants of the new technology.

Further disparity between the few beneficiary and the many exploited sections of the developing society." (p. 93)

In a similar vein Chossudovsky (1977) highlights how the Third-World countries become dependent intellectually on the West and how internationalisation of knowledge aggravates this. He says: "Finally the transmission of information, knowledge, scholarly research work and scientific propositions in the Social Sciences has become increasingly part of a complex network of international relations involving international monetary arrangements, aid programmes, the investment activities of multinationals, international diplomacy, etc. The 'internationalisation' of knowledge, research and ideas has developed in close correspondence with this 'new international order' reinforcing the latter by providing the required intellectual rationalisations of the complex relationships of international capitalism". (p.1583).

At the outset, we argued that the development of higher education in India after independence was through importation of American models. Wholesale import without Indianisation has only helped in aggravating the alienation of the elites and in mirroring the corruption and mediocrity that have inevitably become entrenched due to increasing dependence intellectually, financially and technologically on developed nations, on the one hand, and to increasing regulation to prevent this, unsuccessfully, on the other hand. Where private sector was once accused of importing technology, today the public sector giants are doing nothing less.

Today, the boundaries that are necessary for fostering islands of excellence appear to have vanished. No longer can one distinguish between the larger society and the IITs. Would the key actors in these institutions wake up, mobilize and act to develop distinctive identities for these institutions and not succumb to the overwhelming pressures of societal processes that enervate talent and downgrade excellence? Would they act in time to influence the sorting and shaping processes to develop elite who are in touch, in tune with the Indian reality, but, who would have the will and commitment to move the country away from intellectual and technological dependence? These are questions we have sought to bring into focus through this paper.

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