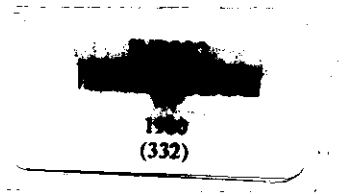# Working Paper

(332)

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD

ELUSIVE EXCELLENCE

(TWELVE THOUSAND HOURS AT AN IIT:
PREPARATION FOR ELUSIVE EXCELLENCE)

By

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W P No. 332

September 1980

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD

ABSTRACT

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 years of his life.
Since the pre-independence days there was a plan to establish
an Indian MIT and this had found concrete expression in the
recommendations of the Sarkar Committee Report in 1946. The
objective of setting up such an Indian MIT was conceived of
as to produce creative scientist - engineers in India.
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 IIT, Bombay, this paper argues that due to several
organisational contradictions which permeate the Institute
neither the operation 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
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<u>prevailing conditions.</u> While the data pertains to one IIT,
the parallels for similar professiomal institutions in
science, technology, medicine and management are too striking
to be brushed aside. The research is still in process

and the arguments of this paper have to be looked at from the

point of indicative interpretations based on preliminary

analysis and not as definitive conclusions. The attempt

of this paper is to stimulate examination of contradictions

where they exist and to find ways to resolve these so that

such institutes can make meaningful contributions to the

society in which they are embedded.

Base for interpretations

While 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,

this paper draws heavily from the questionnaire data supple-

mented by others. 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 student's questionnaire was 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 under-
graduate students can be depicted as in Figure 1.

Insert Figure 1 about here

The influence environment can be conceived of in three distinct
categories:

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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.

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 student's 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 inter-
relationship 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 pro-
fessional interests and career choices, and development and
maturation of the students' 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, con-
tributions 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 contributes towards integrated professional development, the students value academic aspects like lectures, tutorials, laboratory and workshops 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 to do so. It is also interesting to note that while 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 curriculur activities also receive a short shrift as perceived by faculty, parents, alumni and students. All these point to the inevitable conclusic, 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 on 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 quizes 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 predominently used is the quiz or the class test which do not encourage much inquiry. Methods 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 on
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 : Avoid 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 defested. 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 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 "inter-action" 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 providers 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 date 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 over 14 years of experience,
are still in engineering jobs. 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.

In a recent thesis on work value orientations of scientists and
engineers in industrial research and development[2], 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 those 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. To revert back to the alumni
data, upon closer scrutiny one may find that many of the alumni
of IIT are working in large engineering enterprises which are
heavily dependent on imported technological know-how. However,
this is only an impression and has to be checked more thoroughly.
If the alumni data as well as thesis sample are any indicators

2. Sethia, N. K. "Work Value Orientation in Industrial Research
   and Development", unpublished Ph. D. thesis, Department of
   Humanities and Social Sciences, IIT, Bombay, 1980,
   Chapter 5.

then, the faculty are really satisfying the needs of the Indian industry, but, not translating the vision of the Sarkar Committee!

Towards excellence : A new model

While four important contradictions have been discussed in this paper, it should be appreciated that there would be many other contradictions which regulate the functioning of the IIT. While these contradictions may be unique to IIT, Bombay, one suspects that this may not be so. Therefore, both the model that has emerged as depicting the influence environments for an under-graduate as well as the contradictions that operate in the institution, have far reaching policy implications for management of elite higher education institutions, particularly, those which have been conceived of as residential learning communities. A few words may be in order to suggest concrete measures to be explored to resolve the contradictions. It is creditable that IIT, Bombay has opened itself to such self-reflection. One would also hope that it would take a lead in bringing in a quiet revolution (hopefully along the present academic revolution on the Harvard Campus in the U.S.A) and set the pattern for other institutions to follow. In order to do this, a revised model of an integrated professional and social development environment may be in order. Figure 2 depicts some of the suggestions for such a model
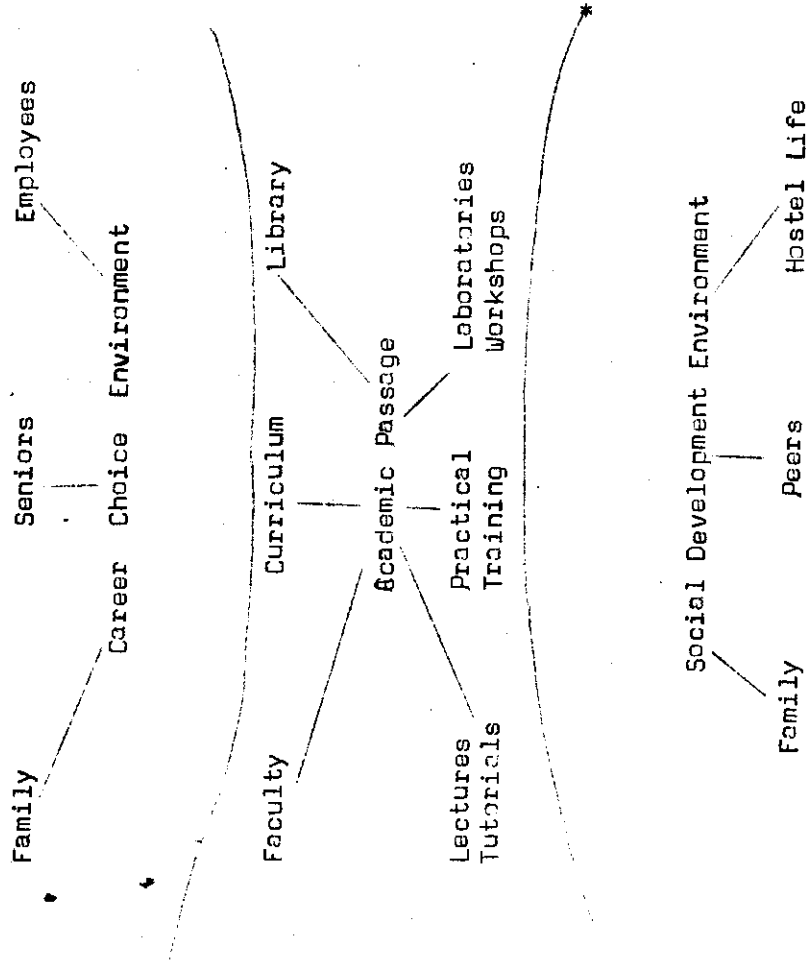
Insert Figure 2 about here

Some of the salient features of providing an integrated
professional and social development environment are contained
in the faculty involvement in intellectual development, career
choice as well as social development of the under-graduate
student. If one has to justify investment of national resources
in IITs, there is no alternative, but, for most faculty to
become influential in all these aspects unlike today. This
would call for new skills and for learning new roles. Only,
then, can a meaningful curriculum be developed and operationalized
through academic interactions in class-rooms, tutorials,
laboratories and workshops in such a way as to foster inquiry.
Again, unless something is done to prevent IIT graduates from
becoming "social islands", we would not be in a position to
develop responsible elite "citizens" who would replenish the
society from which they have drawn vast resources. One would
perhaps look to the gymkhana activities as well as hostel life
as important elements of bringing this about. The role of
seniors in social development should be emphasised and, in
career choice, should be enlarged to include the post graduate
students, especially, if the quest for technological excellence
is to be fostered. Presently, it is only the under-graduate
seniors who are perceived as major influences. Unless
post-graduates also get involved in the influence process,
it is inconceivable that the twelve thousand hours spent

at an IIT would ever become preparation for technological
excellence. Another element that is not so effectively used
to day is involvement of students in project work which can
be done at all stages during the five years with faculty acting
as resources and as learners too!

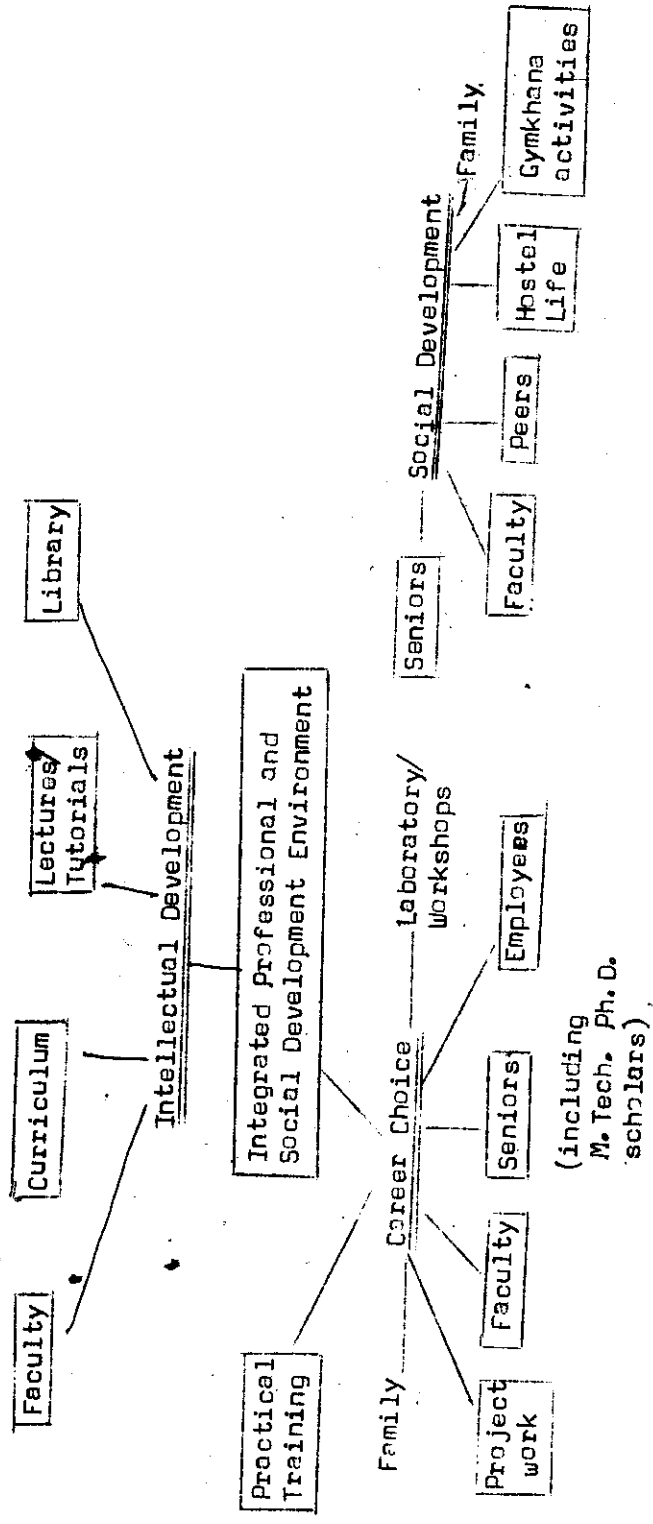In the last analysis, the solutions have to be sought within
each elite institution by those people who are courageous enough
to confront the contradictions and see the catastrophies these
would lead the institution toward, unless resolved. Cosmetic
changes which leave such contradictions intact are no solution.
On the contrary, they entrench contradictions deeper in the
culture of the institution.

FIGURE 1

Family

Seniors   Employees

Career Choice Environment

Curriculum   Library

Faculty

Academic Passage   Laboratories
                        Workshops

Practical
Training

Lectures
Tutorials

Social Development Environment

Family   Peers   Hostel Life

A MODEL OF INFLUENCE ENVIRONMENTS OF AN IIT UNDERGRADUATES

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

Faculty

Curriculum

Lectures/Tutorials

Library

Intellectual Development

Integrated Professional and Social Development Environment

Practical Training

Family

Career Choice

Laboratory/workshops

Project work

Faculty

Seniors

Employees

(including M. Tech. Ph. D. scholars)

Seniors

Faculty

Social Development

Peers

Family

Hostel Life

Gymkhana activities

A MODEL OF AN INTEGRATED INFLUENCE ENVIRONMENT FOR ANN IIT UNDERGRADUATE.

Note: The boxed items indicate aspects within the control of IIT but, not deployed effectively for integrated professional and social development.