
IMPROVING ENGINEERING EDUCATION BY INDUSTRY INSTITUTION INTERACTION

* ASHOK K. GUPTA

ABSTRACT

The success of Technical Institutions in the country today is doubtful in that they are unable to meet either industry's demand for well prepared graduates or their own objective of securing placement for their students. Ignorance of what is actually desired by industry is one of the factors creating this undesirable and unsatisfactory situation. Both industry and institutions can overcome this stalemate only by collaborating with each other and making a serious attempt to understand the reasons behind others inadequacy in performance. In this paper several methods, like consultancy and industrial training, have been discussed for increasing this Institution-industry interaction and for creating a climate for a mutually beneficial relationship between the industry and the institution.

1.0 INTRODUCTION

Historically, the need for imparting large scale technical education arose in an attempt to meet the demand for technical manpower, who were needed to manage the country's natural and industrial resources. The Industrial Revolution in Europe and America and the post-independence industrialization of our own country have been two major events which have provided great impetus to this demand. The emphasis was laid on the necessity to have institutes of higher learning to impart high quality, state of the art training to students of mathematics and natural sciences so that, on completion of their training programme, graduates are sufficiently skilled to assume positions in government and industry. With the total number of such institutions reaching a figure of around 1200 and jobs in industry showing a healthy, increasing trend one would be led to the conclusion that the purpose of both industry and institution are being safely met.

This figure includes degree level

institutions [i.e.] State Engg. Colleges, unaided Engg. Colleges] and diploma level institutions [i.e., Govt. Polytechnics, Unaided and women's polytechnics]. However, the estimate of unaided degree diploma institutions is conservative.

Contrary to this inference, the actual situation presents an entirely different story. Engineering institutions are producing graduates in larger numbers than they can manage to find placement for or industry can absorb. The industry on the other hand is quite dissatisfied with the level of preparation of graduate they recruit and feel that institutions have failed in their objective of imparting education. And it is for this reason, amongst others, that a majority of the private sector organisations insist on a training programme for fresh employees before they are sufficiently ready to work in an industrial environment.

This dissatisfaction of industry has led them to narrow down their recruitment to a few select institutions and virtually ignore the

remaining ones. Fig.1 graphically represents the diverse inequality in job recruitment amongst institutions.

In fig. 1, figures in brackets represent the percentage of students from these institutions securing jobs out of the total number of students from all institutes gaining employment.

This trend has only bred frustration amongst institutions who are becoming averse to industry's disinterest in their products and have all but given up trying for placement. The shift of focus from the primary objective of technical institutions, i.e., job placement has also contributed to a general lack of drive and enthusiasm to other equally important aspects of technical education namely industrial training, research, etc. Understandably this lack of interest has permeated down to the students who, having resigned themselves to unemployment, are satisfied with fulfilling just the minimum requirements of the degree programme in order to graduate. Such a vicious circle is responsible for general decline in the standard of education in the country and for the production of a large number of mediocre engineers and technicians.

This is a very dangerous and undesirable trend and can be discouraged by attempts to bridge this gap of misunderstanding and dissatisfaction between the industry and institute. I feel that all such attempts, in particular industry-Institute Interaction and Industrial Training [discussed in the subsequent paras] can go a long way in helping to rectify the situation and simultaneously fulfill both industry's demand for well qualified professionals and meet the Institution's requirement for placement of their graduates.

2.0 INDUSTRY INSTITUTE INTERACTION

A prominent feature of all the major industrialised nations of the world-American, European and Japanese-has been heavy

commitment to and investment in Research & Development [R&D] activities. Except for the very large corporations, which have the revenue to establish and maintain their own research laboratories, the remaining industry has looked towards technical educations, institutions for consultancy and research.

In India, however, there is a yawning gap between industry and the institution. The absence of such a relationship between the two, has led to a situation in which the industry is dissatisfied without the level of preparation of outgoing graduates and institutions are frustrated by industry's disapproval and consequent lack of interest in their educational programme and products. The reasons that industry cites for their disapproval is that fresh graduates are ignorant of current trends and new technologies being used and that most of their knowledge is in processes and techniques that have long been outdated and are now seldom, or no longer, used. However it is not so easy for institutions working in isolation to adopt themselves and subscribe to the rapid pace of technological advancement. The system of formal education needs time to incorporate such changes in curricula; often, they are unaware of such changes taking place due to the lack of feedback from industry or have dearth of trained staff [qualified in those areas] to communicate such changes to students. This situation can only be overcome through closer collaboration of industry and institution.

Industry is primarily interested in growth in turnover and profit and institutions must realise that in order to attract industry's attention they [i.e., institutions] will have to offer the former services which will enhance their manufacturing and sales potential. The most direct of these is the supply of well trained technical manpower. Other services include research, consultancy, testing and laboratory facilities, training imparted to industrial workers, etc. Industry-Institution Interaction can be established by adopting a number of measures such as :

- i] Formulating curricula according to industrial demand. Through a bilateral feedback system, institutions can be made aware of the various areas of specialisations and expertise that industry requires and industry can know about the effectiveness of the programmes offered by institutions, and to what extent they serve their purpose. The participation of professionals from industry in curricula formulation will enable their greater involvement in shaping the manpower, they may absorb.
- ii] Industrial engineers can also participate in tailoring coursework by suggesting new courses and doing away with obsolete one and play a more direct role in education as visiting faculty through exchange programmes to teach such specialised courses [of longer duration] or conduct short-term seminars, symposiums and workshops.
- iii] Exchange programmes can be arranged wherein institutional faculty can be deputed to spend time in residence in industry in order to make themselves conversant with the latest in applied technology being employed by the industry. This will be very useful when they [the faculty] return and translate their observations into upgrading coursework, focussing on potential areas of employment and organising research and consultancy to requirement of industry.
- iv] Institutions can carry out sponsored projects for industry. This will simultaneously fulfill industries purposes as well as providing good exposure to students who will work under the concerned faculty on the institutions to real life situations. It has been observed [especially in Business schools] that the case study approach is invaluable for greater understanding. Real time or simulated models of problems help the students apply their skills to situations which are actually encountered or close approximations to those they are likely to encounter in their career.

- v] Arranging in-plant training for students. This by itself is a major factor and has been discussed in detail in 3.0
- vi] Conducting development programmes, orientation courses arranging for special lectures, by working engineers.

3.0 INDUSTRIAL TRAINING

Despite the fact that almost all engineering and polytechnic institutions in the country have provision for an industrial training or vocational training programme a part of the degree/diploma requirement, most existing programmes have been found to be lacking in either student participation, industrial participation or effectiveness. The industrial training programme which is conducted once or twice for pre-final and final year students, requires them to spend one to two months of their summer holidays working in organisations on specific projects or for general exposure. A combination of factors like poor placement, unreliable evaluation, lack of interest and absence of any monitoring by the institution has resulted in meaningless training programmes. The training period strives to educate students about the industrial environment, to give them a feel of how work actually gets done in industry, tries to build self inquiry and self reliance in trainees through exposure. However, most training programmes are in Government or semi-government organisations where there is little or no monitoring of the trainee's performance and very little participation of the organization in training the students. This has resulted in the training programme being treated as more or less a sort of formality. Such programmes are meaningless and in order to improve their effectiveness the following points must be borne in mind.

- i] Most programmes are of insufficient duration for trainees to achieve anything substantial. Ideally 4-6 months should be provided preferably at the end of the degree period so that graduates are fully equipped to participate in the training.

- ii] Training programmes should focus more on specific areas of study rather than being more general in nature and should be subject to both interest of the trainees and availability of such training. Specific training in the form of project work will be equally beneficial for both industry as well as to the trainees.
- iii] The training programme should be carefully monitored either through regular visits of faculty or by placing trainees under the supervision of either faculty or industrial staff throughout the training period. This will provide both industry and institute with a comprehensive parameter of the trainees progress at work.
- iv] Due weightage should be given to the training programme in the degree as it would involve such time and effort on part of the trainee. The programme may be evaluated by a faculty member present during the period or based on feedback from the trainee's supervisor in the industry.

Thus it can be seen that an effective training programme provides industry with a first hand means of evaluating and assessing possible future employee's and trainees with an opportunity of working full time in industry under real life conditions. It often leads to full-time employment relationships and can hence serve as an outlet for job placement. It also involves the industry and institution working closer, together and creates industry-institute interaction.

4.0 CONSULTANCY

The institutions can offer Industry with creative solutions and improved techniques for design or production through consultancy. Institutions should, therefore, learn to exploit their resources of research and laboratory/testing facilities to come up with answers that industry is looking for. This will improve the interaction of the Industry with Institution to a large extent and can also provide the Institution other added advantages like:

i] Increased Revenue

The offering of consultancy service will bring much desired funds into the Institution which can result in greater self-reliance or in upgrading existing programs, facilities, etc. More research work can be sponsored for continuing consultancy or for purely academic reasons. The Institution will no longer remain handicapped due to unpredictable and irregular Government funding. It will also increase the investment of Industry in institutional programmes and research in areas which are of interest to the former.

ii] Increased Interaction

Consultancy will involve the close collaboration of both industry as well as institution and will encourage a free flow of information and ideas between the two. This will successfully bridge the communication gap between the two and promote a healthy working environment which will make one more sensitive to the others demands, difficulties and requirements.

5.0 CONCLUSION

From the above it can be concluded that appropriate job placement of its students should be the ultimate goal of any technical institution. This placement can be brought about by three major factors :

- 1] Significant Industry - Institution interaction.
- 2] Vigorous and closely monitored Industrial Training.
- 3] Institutions offering comprehensive consultancy services to industry.

In a nutshell, the basic component of our argument is Industry-Institution Interaction. This may be achieved through Industrial Training, Constancy, offering laboratory and testing facilities, doing specific projects for industry etc. These sub-components will, by themselves provide greater opportunity for job placement and help making the technical programme more meaningful. This has

been summarised in figure 2. It can also be seen that :

- Interaction between the industry and the institution creates an atmosphere in which both can work together on current problems and exposes the institution to the demands of the industry.
- It also ensures greater participation by Industry in framing syllabi, programmes, etc. to meet the requirements of industry.
- Collaboration provides students the opportunity to work on projects through case study, consultancy and industrial training.
- Industrial training provides industry with a better opportunity to observe and select manpower and trainees with experience and job opportunity.
- Similarly, through consultancy, the industry can get their problems solved by institutions and such services will earn institutions much desired capital for investing in the upgrading of their research programmes.
- Thus, through industrial training and

consultancy, the institution forges links with industry and such interaction leads to greater collaboration and association of industry with institute. This yet again creates opportunities for research and development, consultancy, etc.

Thus we can summarise this as a dynamic and two-directional equilibrium between industry-institution interaction [and in particular of all its subcomponents, Industrial Training] and placement which establishes strong ties between the two [i.e., Industry and Institution] and acts as a kind of symbiosis in which each contributes and fulfills the demands of the latter. This can be diagrammatically represented by figure 3.

Fig. 3 consists of three distinct components:

- i) Industry - Institution Interaction
- ii) Industrial Training
- iii) Job placement

The equilibrium can be understood by following path

- [1] From [i] to [iii] or by following path
- [2] from [i] to [ii] via. [iii].



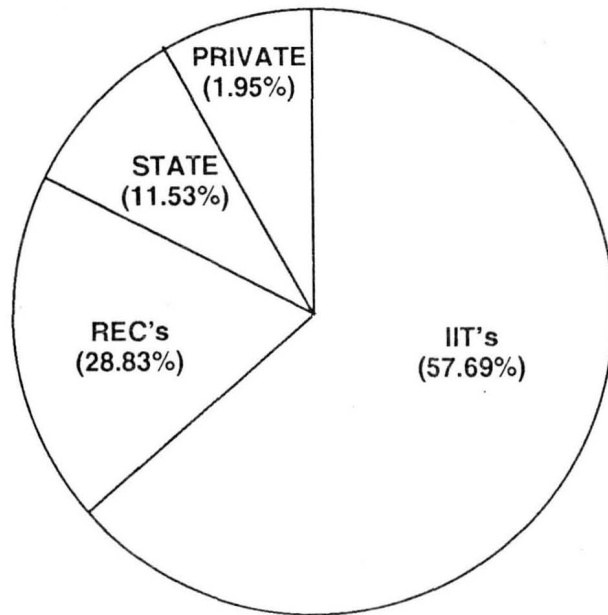


FIG. : 1

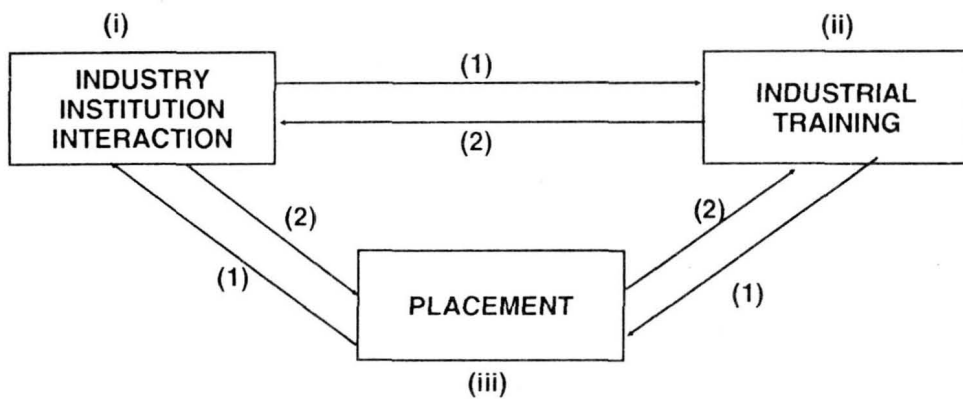


FIG.: 3

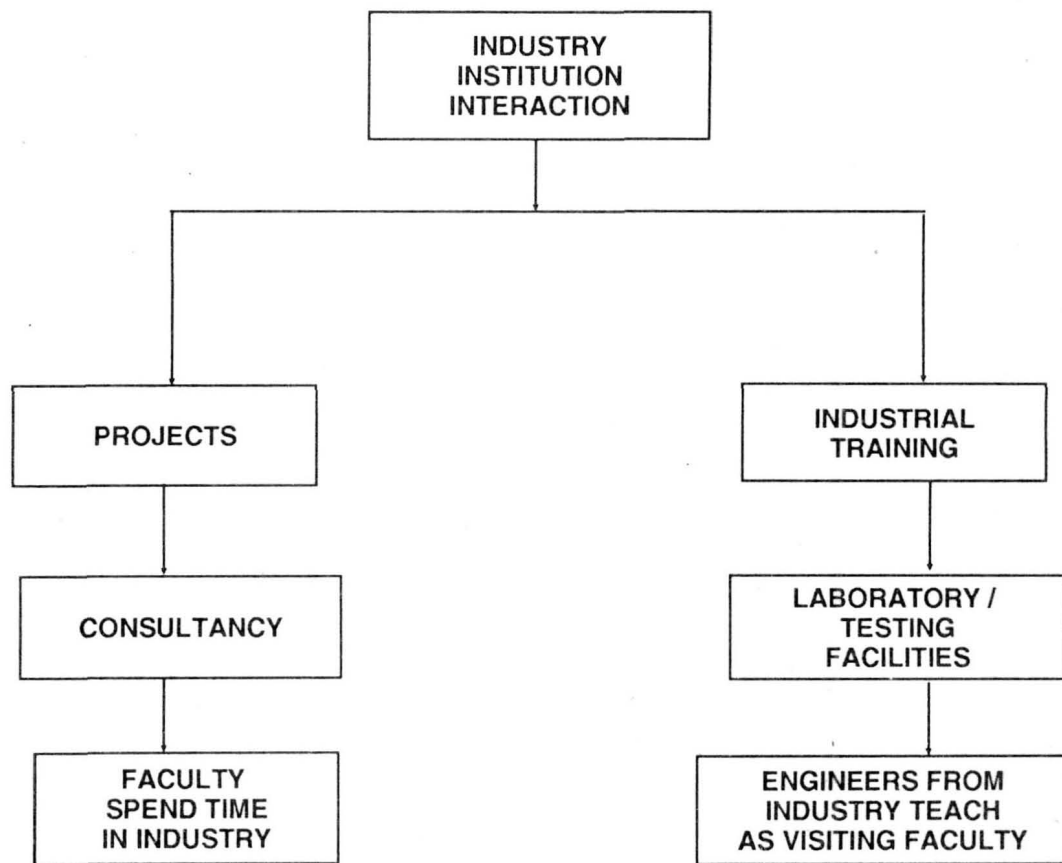


Fig. : 2 COMPONENTS OF INDUSTRY INSTITUTION INTERACTION