

LINKAGE BETWEEN INSTITUTE AND INDUSTRY

* K.B.Raina ** B.S. Rathore *** J.S.Saini

INTRODUCTION

The educational reform of linking technical education with industry has been amongst the important educational innovations undertaken in this century. Linkage between institute and industry is now widely recognised as an essential requirement to train and develop the right kind of technical manpower necessary to sustain and promote industrial growth. Educational planners in India have been engaged in the task of bringing about a proper match between technical education and the needs of industry; and it is in this context that schemes such as Practice School Programmes, Sandwich Programmes and Cooperative Programmes have been introduced in the system of technical education. Many technical institutions have developed linkages with industries and improved quality of their courses to varying degrees of success. However, the vast majority of technical institutions in our country have little interaction with industry.

While considering Industry-Institute Linkage, industry is usually considered as the organised industry in its various forms. However, it is important to realise that increasingly a large number of employment avenues are occurring outside the fold of the organised sector; unless concrete and deliberate efforts are made to link technical education with this sector also, the goal of preparing young boys and girls for gainful employment through the technical

education system will keep receding. This paper, in the absence of any meaningful data about the requirements of the unorganised sector, deals mainly with the linkages with the organised sector. Also, this paper deals with the subject in the context of polytechnic education with which the authors are mainly connected.

GROWTH OF TECHNICAL EDUCATION

Technical education in India is aimed at training skilled workers and craftsmen at the ITIs and other vocational and trade institutions, technician engineers in polytechnics and other technology institutes and engineers in engineering colleges and higher technical institutes. There has been a phenomenal growth in the number of these institutions since 1947, making India among the largest technical manpower producing countries in the world today. However, despite the phenomenal expansion, technical education in this country leaves much to be desired in terms of quality and relevance. The almost complete isolation of the world of education from the world of work has made teaching-learning in the polytechnics largely theoretical, thereby rendering the polytechnic product often unemployable and without the essential abilities for problem solving and attributes of self-reliance.

INTERACTION WITH INDUSTRY - EXPERIENCE OF TTTIs.

Over the years the TTTIs and some polytechnics in the country have developed

* Principal, T.T.T.I., Chandigarh.

** Prof. & Head, Entrepreneurship Development & Ind. Coordination Dept., TTTI, Chandigarh

*** Assistant Prof., Entrepreneurship Development & Ind. Coordination Dept., TTTI, Chandigarh.

active linkages with industrial associations; large, medium and small industries; central and state level public sector undertakings; government departments and other related organisations. TTTIs have been involving working professionals from industry in the design and revision of curricula for diploma and advanced diploma courses in various disciplines and in the development of teachers guides, text books, laboratory manuals and video films. These institutes have involved professionals from the industry in the training of teachers through long and short terms courses and have been seeking participation and involvement of the industry in identifying the role of the technician engineers and therefore, the knowledge, skills and attitudes required to be developed among the manpower being trained. TTTI Chandigarh, has, through Career Opportunity Fairs, enabled industrial personnel, along with their products, to be made accessible to the large body of students and teachers to create better perceptions about mutual expectations. Continuing education programmes for working technicians and engineers being offered by TTTIs and some other technical institutes in the country are yet another step towards bringing the industry and the technical institutes together for mutual benefit.

ACHIEVEMENTS

The vast infrastructure in the country created since independence for manufacturing, construction, service and other sectors of industry and economy owes itself very largely to the technical manpower produced by the technical institutions in the country. Indeed, our engineers, technicians and craftsmen are to be found today all over the world working in the most sophisticated areas in the USA and other European countries and as construction, production, maintenance and

service engineers in a large number of countries in Asia and Africa.

There has, indeed, been a tremendous growth in the technical education facilities at all levels and in diverse areas. However, because of the imperatives of rapid growth of industry and to meet the manpower requirements thereof, attention was focussed more on quantitative expansion. However, in the process, the available resource inputs were spread rather too thin covering a large number of institutes. The result has been a general lowering down of quality. The question of quality has always been a matter of concern but is now assuming serious proportions in view of the set back that the image of Indian made goods is receiving in the international market.

Our share in world trade has steadily eroded, while many of our Asian neighbours have overtaken us. As compared to our share in world trade of 3.6% in 1938, it stands at 0.4% today. It is interesting to note that in 1950 our share of 1.4% in world trade was the same as that of Japan then. Within this decline, the performance of engineering exports is particularly worrying. They form a small percentage of total exports, while the share of engineering imports to total imports is rising.

The technical education system has taken steps from time to time, over the years, to enhance the quality and relevance of the technical work force by introducing schemes such as sandwich programmes, improvements of laboratories and workshops, creation of industry-institute interaction cells etc. These measures have brought about some success in that a few institutions are operating at a high level of satisfaction from the point of view of the user industries, but the number of such examples is small.

In sum, whilst commendable efforts have been made in creating a vast technical education infrastructure, immediate steps are called for in order to answer the need of quality and relevance.

FACTORS INHIBITING INDUSTRY INSTITUTE LINKAGE

i) Curriculum :

In the case of polytechnics, the curricula have in the past been generally designed as watered down versions of engineering degree courses. The philosophy of curriculum in polytechnics was originally based on the concept of a technician occupying a level between engineer and craftsman. With the vast expansion of the industrial sector and the rapid development of technology, a significant and qualitative change in the role of technician manpower has occurred. It can no longer be classified as a single type of position between craftsmen and engineers. The nomenclature of the technician in the changed context, should preferably be "technician engineer" who is a person occupying multiple level positions in the horizontal and vertical bands of technical manpower spectrum and who, further, performs and/or manages activities related to shop floor or field work in industry and other sectors of employment.

Whilst the TTIs, through their intervention, caused the curricula to be developed on scientific lines with the involvement of the industries, the implementation of many of these curricula have not taken place in accordance with the above mentioned concept of technician engineer for lack of policy support. Therefore, a change in the strategy of technician education is called for which would require a shift in the concept of polytechnic education and the programmes to be offered therein, the instructional strategies, system of student evaluation, system of managing technician education

and the role of industry in training of technician engineers.

The above referred policy constraints do not permit operating a curriculum with built-in industrial experience, and such other activities as would result in Industry-Institute Interaction.

ii) Teachers :

The attraction for teachers to join the polytechnic system has suffered a serious setback because of the non-acceptance by large number of states of the status of teachers prescribed by the AICTE. This, coupled with polytechnic education system not having developed and expanded its training programmes in order to meet the changed manpower needs of the industry, as mentioned in the earlier paragraphs, has reduced both the challenge and the motivation for the teachers to join the system and to be retained in it.

Thus almost 70% of teachers in the polytechnics in the country, as revealed in a study, have neither the attitude towards nor the experience of the industry.

iii) Contact With Industry :

In general there is no encouragement in polytechnics to undertake such activities as would cause an on-going interaction with industry. Activities such as consultancy, continuing education programmes for working professionals and students evaluation with the involvement of professionals from the world of work are by and large missing.

iv) Innovation And Developmental Activities :

There is no deliberate policy to encourage among teachers the culture of innovation, development and problem solving. The lack of flexibility in the system and the necessary incentive are responsible for inhibiting the development of such a culture among the teachers. This, in turn, is because of lack of functional autonomy

coupled with an appropriate system of accountability.

v) Leadership :

There is often, among persons at the senior levels of teaching and management, a lack of appreciation of the goals of the system and of the institutions. This is because of lack of motivation, qualities of leadership and knowledge regarding the various other organisations with which the institutes ought to interact.

TECHNICAL EDUCATION INDUSTRY LINKAGE - FUTURE SCENARIO

i) Multiple Level Technician Engineer Courses :

As indicated in the earlier section, polytechnic education must respond to the needs of the changed pattern of technical manpower requirements of the industry. The system should produce technician engineers who will occupy multiple level positions in the horizontal and vertical bands of technical manpower spectrum.

Selected polytechnics should be able to offer several programmes of training at certificate, diploma, advanced diploma, degree and post degree levels to cater to the manpower needs of the multiple level technical engineer positions in the manpower spectrum. These programmes will be oriented towards technology, application and practice. The focus will be on learning industrial practices, practical skills, problem solving techniques and entrepreneurship.

The polytechnic programmes, therefore, will have to be flexible providing lateral entry of students from different streams. Since the concept is to provide highly trained and skilled manpower to the industry at various technician engineer levels, a large body of student entrants at many entry levels will be from the industry. This will necessitate close collaboration between institutes and industry.

ii) Quality assurance and continuing education :

Improving the quality of industrial products is directly linked with the quality of technician engineers. The recent changes in industrial policy are bound to mount pressure on the polytechnics to train, retrain and update a large number of working technicians in new technologies, techniques, processes and management. National competency standards will have to be evolved for various occupations. Continuing education for working technician engineers must and will become mandatory. The polytechnics in collaboration with leading industrial associations develop a quality assurance system to embody accreditation of continuing education courses. It must provide certificates for continuing education undertaken and declare and monitor the standards required to maintain a competent engineering workforce.

Continuing education programmes for working technicians must, therefore, form an important activity of the polytechnics.

iii) Participative Management Of Technical Institutions And Autonomy :

Recently memoranda of Understanding (MOU) have been signed between some state governments and industrial associations; as well as between some industrial units and individual institutions. It is hoped that more such collaborations will be struck. The aim is that as many polytechnics as possible may be run jointly in partnership with industry. At this point it is important to stress that what is called for is not funding by the industry which, of course, may be one of the byproducts; the main idea is that industry must be involved as a joint partner in the determination of policies, development of courses and instructional materials, prescribing the characteristics of teachers, teacher appraisal and development,

admission of students, evaluation of students and certification.

This is being experimented in some states and institutions but a major break-through in the actual implementation has not yet been made because of the lack of flexibility in the administrative rules and procedures of government institutions.

In order that industry-institute linkage in the form of participative management of institutions may take root in a meaningful way, the concerned polytechnics must be given functional autonomy, so that it is possible for such a participative management to have full control over the type of students admitted, recruitment of staff, appraisal and development of staff, evaluation of students and ultimately certification. It should be possible to offer incentives, where necessary, to motivate staff towards innovation and development.

iv) Unorganised Sector :

All attempts, so far, to make technical education relevant have been aimed at treating the organised industry as the totality of the world of work. We have failed to recognise the need to respond to the training needs of the unorganised sector which provides source of livelihood to the largest section of population and has the potential of opening out avenues of employment and self-employment to appropriately trained technical persons.

Making concerted efforts to relate technical education to the unorganised industrial sector is important not only for the limited objective of providing employment but also for the overall socio-economic development of the country.

The authors would strongly suggest that the ISTE may fund a project to identify the type of personnel required to facilitate the development of unorganised sector, to make its management more scientific and ultimately to enable this sector to become

competitive. From this would follow the type of training programmes and linkages required to create the necessary technical manpower for this purpose. A scientific study may reveal that a number of different models may have to be tried. The exercise is necessary and must be urgently undertaken.

ACTION REQUIRED TO FURTHER PROMOTE INDUSTRY INSTITUTE LINKAGES:

On the basis of what has been stated in the foregoing, the following actions are suggested to be initiated to promote industry institute linkages to improve the relevance and quality of technical training programmes.

i) Autonomy :

Technical institutions must be given some minimum autonomy so as to be released from the rigour of rigid rules, regulations and procedures which inhibit initiative and the spirit of innovation necessary to interact with the external world of work.

ii) Curriculum :

Curricula should incorporate problem solving activities and on-the-job training. Laboratories and workshops should be used for developing basic engineering and problem solving skills. For this purpose involvement of industry is necessary at all stages of curriculum development viz design, implementation and evaluation.

iii) Cooperative/participative education programmes:

There are different theoretical models, some of which are being practiced in a limited way, for the involvement of industry in the management of institutions and programmes. It is time that some polytechnics are selected for participative management and cooperative education programmes. This will entail these institutions to be jointly managed in which industry will have equal say and

responsibility in all the aspects of institutional and programme management. Such participative management will make it easier to enable incorporation of industrial experience of students as a part of curriculum requirement through training stations in industries and other forms of industrial training and exposure of students, jointly planned and organised by the industry and the teachers.

iv) Research and Consultancy :

Teachers, particularly in polytechnics, are generally isolated from the world of work, causing teaching to become theoretical and stereotyped. Undertaking research/innovations and consultancy must be an expectation from the polytechnic teachers so that they remain in touch with the current industrial processes, practices and problems. This is likely to help also in the generation of resources which could well be utilized for the development of the institutes, while a part of it should be given as incentive to the concerned teachers.

v) Continuing Education :

Yet another area through which the polytechnic teachers may remain upto date with the training needs of the industrial manpower is by having to face the challenge of offering continuing education programmes for working professionals. In this way the technical institutions will be seen as being beneficial for improving the quality and productivity of industries, while at the same time, the teachers will also keep themselves continuously updated. The quality and relevance of training of the regular fresh students will thereby also improve.

vi) Staff Development :

The above actions in regard to curriculum implementation, participative management, research and consultancy by the teachers and the offering of continuing education programmes, will, by themselves, through a system of planned guidance and counselling by senior members of faculty,

cause an inbuilt system of staff development. Any further staff development needs, based on staff appraisal, may be met through appropriately structured training programmes. Further, arrangements should also be made to enable teachers to work in industry for predetermined purposes and periods, from time to time.

CONCLUSION

The question of active participation between industries and institutions can no longer be left at the stage of discussion. The present structure and system need to be modified to answer new challenges. The new concept of technician engineer as being a person who may occupy, not a single, but multiple positions in the technician band of technical manpower spectrum, needs to be recognised. Polytechnic programmes and courses should reflect this need and, therefore, should offer not single terminal courses but a number of courses of different durations linked to each other through a flexible credit based system on a continuing education basis. This system will enable the working technicians in the industry to look to the polytechnic as a place for their continuous updating and upgrading.

Inviting the industries for joint management of institutions in all its aspects in which rights as well as responsibilities are equally shared, will improve the commitment of industries in the total management of the institutions, including the teaching learning process.

Flexibility of programmes will entail developing innovative methods of delivery and student evaluation. Methods of rewards and incentives for good work will need to be introduced. Encouragement to the teachers will have to be given for innovative work and consultancy, and to travel around to forge linkages. All this calls for at least some minimum functional autonomy.

Industry-Institute linkage is a dire need to improve the quality and relevance of technical education. The only way to achieve this is through specific actions,

some which have been outlined in this paper.

REFERENCES

1. National Policy on Education-1986, Ministry of Human Resource Development, Govt. of India, New Delhi, May, 1986.
2. Programme of Action (NPE-1986), Ministry of Human Resource Development, Govt. of India, New Delhi, August, 1986.
3. Report of working Group on Technical Education, Ministry of Human Resource Development, Govt. of India, January, 1978.
4. Challenge of Education - A policy Perspective, Ministry of Education, Govt. of India, New Delhi, August 1985.
5. Thrust Areas in Engineering Sciences, Department of Science and Technology, Govt. of India, New Delhi, December 1983.
6. Review of Technical Education in India, Ministry of Human Resource Development, Govt. of India, New Delhi, March 1988.
7. Chander Kant LS, Sandwich Courses, A Study on Technical Institutions - Industry Cooperation in Indian setting, IIM Bangalore, June 1982.
8. Industry Institute Interaction - Project Report; Ministry of Human Resource Development, Govt. of India, New Delhi, May 1987.
9. Mason Ralph E; et al. Cooperative Occupational Education and Work Experience in the Curriculum; Interstate Printers & Publishers Inc., United States of America, 1981.
10. Mandke Vijay V; BITS Practice School - A Case Study in Industry-University Collaboration; Birla Institute of Technology and Science, Pilani, India 1980.

* * * * *