

CHANGING SENARIO IN INDIAN TECHNICAL AND VOCATIONAL SYSTEMS IN 2000s STRATEGIES FOR THE MANAGEMENT OF CHANGE

* P.C. JAIN ** N.P.TIWARI

Introduction

Hundreds of research institutions all over the world are busy in conducting fundamental and applied researches in science and technology. The rate of development is exponential. Newer and high Technologies are being evolved everyday. Rapid developments in science and technology have influenced the total environment. This has forced all the systems and the sub-systems to change and adjust with the emerging environment. "Management of Change" has become the talk of today.

The Indian Industrial Scene

The Indian industrial scene is very much impressive and encouraging. Today, India is one of the largest industrial country in the world with respect to range of manufactures and the technology level. During the last three decades, tremendous growth has taken place in the industrial system in all the sectors, like Public ,private. State Government and local bodies. Central Government small scale industries, cottage industries and young entrepreneur development Because of the favourable governmental policies, availability of manpower, easy accessibility to technology and conducive environment in the country. The country is now self-supporting as far as heavy machinery, machine tools, petro-chemicals, drugs and pharmaceutical

plants, automobile and transport vehicles, electronics and communication systems, steel, forest products, etc. is concerned. To support this industrial expansion, infrastructures like power, transport, communication, and industrial estates have been developed in a big way.

AS far as the research and development in industries is concerned, it is mostly a marginal activity in most of the enterprises. A very insignificant investments is made by industries in product research, design and development. R & D efforts to generate indigenous technology to meet the changing demands of the domestic market also do not get much importance from Indian industries. They depend on import of technology, plant and equipment and also on foreign collaboration. Indian enterprises are very much protected against foreign competition. Although this has led to accelerated development and expansion or industrial base but R & D efforts do not figure in their organization development plans.

The Indian Technical And Vocational Scene

India has established one of the largest systems of technical and vocational education. The system in operation consists of about 289 Engineering Colleges, 746 Polytechnics and 1580 Industrial Training Institute which produce about 58,000

graduate engineers, 1,15,000 diploma technicians and 0.26 million skilled workers every year. The system also produces 6,600 master's degree and 3,00 doctorate degree holders annually.

Over and above this, there are a large number of laboratories undertaking research and development activities in almost all disciplines or science and technology.

In spite of having such a strong base of human resource development programme in the country, the R & D efforts are far from satisfactory. There is a wide mis-match between what is expected and what is developed in the institutions and laboratories. There is very little interaction between industry and institution as far as research and development is concerned. Industry looks upon the education system as a mere supplier of manpower and not as a capital resource.

Future Scenario Of Research And Development Activities

Industry in future will be more willing to invest on research design and development activities for its survival. R & D efforts of the industry, technical institutions and research laboratories will be multiplied manifold. High and new technologies will be developed and conventional technologies will be modified. There will be more emphasis on the development of indigenous and appropriate technologies using the indigenous resources, thereby reducing the dependence on imported technical knowhow as well as capital aid. The users will start creating conditions to enhance applications of existing, new and appropriate technologies.

Industry and institution will act as an equal partner in promoting and sustaining R & D efforts for the development and expansion of industries. Both the systems

will supplement and compliment each other. This will lead India to become a potential exporter of technical know-how.

Patterns Of Manpower Employment And Occupations - Future Scenario

In future, the new and emerging technologies will dominate every sphere of activity for improving productivity, ensuring cost effectiveness and providing quality goods and services at competitive prices. The rural population will engage themselves in more productive and higher income generating activities. The demand for highly competent engineers and technicians in diverse areas like new, improved, high and emerging technology applications, rural development and service sectors will increase. Information systems and manpower forecasting and development strategies will bring about significant changes in planning and programming processes.

It is envisaged that the three tier structure of technical manpower spectrum will continue to remain i.e. engineering degree, diploma and certificate holders. The number of degree and post-graduate passouts will proportionately decrease as compared to the craftman and tradeworkers coming out of ITIs and vocational institutions. The proportion of technicians is likely to remain unchanged.

The technical passouts will be employed in both the rural and urban areas for technology transfer and usage. Appropriate and new technology would become an embodiment of technology transfer to rural areas.

The technicians job will not be looked upon merely as a single set of middle level occupation in the technical manpower spectrum. There will be a wide variation within the technician level itself. More and

more occupations are expected to emerge with-in this level with the induction of improved new and appropriate technologies in industry and other sectors.

The technician will be predominately engaged in technology application and manning the devices of new and high technologies. For the new and improved technology area, technician will tend to be a knowledge oriented worker with reduced requirement of psychomotor skills. In the context of rural development, the technician will be employed in large numbers as a village developer, a change agent, a surveyor or technology needs and technology transfer specialist.

The job spectrum of degree holders will also widen. They will not only generate new technology and its devices but also create conditions to enhance applications of existing and new technologies. They will be employed in the areas like design and development, research, project management and general management. They will be required to develop a high level of intellectual and managerial skills including the skills for adopting to changes.

The certificate holders will also be working in a wide variety of areas involving skilled jobs in both rural and urban settings. They will be involved in large numbers at village sites for technology transfer to rural areas. Vocational craftman and trade workers will pursue their own vocations in the villages. They will also be employed for handling machines and small scale units in the villages. In the urban settings, they will be manning and maintaining a variety of new and high technology devices.

A large number of technical passouts will be self-employed and will become entrapreneurs. This is another occupational

category which would require a wide variety of technical and managerial skills.

The future technical passouts will be required to develop abilities in adjustment to new settings, higher capability to learn, capability to cope with changing situations and uncertainty and willingness for high mobility.

ENGINEERING AND VOCATIONAL EDUCATION IN 2000s

The massive development in technologies and their adoption by the user systems, the changed scenerio in manpower pattern and employment and changed Governmental policies towards industrial development and technical education will greatly influence all the educational systems.

The curriculum, nature of programme, teaching-learning roles and characteristics of technical institutions and teachers will undergo drastic changes. These changes are described below :

Curriculum Changes

All the future curricula will take in to account the emerging needs and capabilities to be developed in technical passouts to cope with the changing scenerio and uncertainty.

The following capabilities will be developed in technical passouts through appropriate curriculum development processes :

- (i) high degree of ability for technology application and utilisation.
- (ii) ability to tackle inter-disciplinary and real life problems and situations.
- (iii) ability to cope with uncertainty and mental stress and fatiue.
- (iv) ability to solve local issues of technology transfer.

- (v) ability of self-learning (learning to learn).
- (vi) entrepreneurial ability.
- (vii) ability to demonstrate consciousness towards productivity, quality, energy conservation, environment protection, safety and cost.
- (viii) ability to generate solutions for societal problems.
- (ix) ability to deal with cultural differences between rural and urban settings.
- (x) ability to undertake welfare and service activities in remote and under-developed areas. and
- (xi) ability to overcome resistance to change and counter the barrier to progress.

Nature and Types of Programme

The educational institutions will not offer time-bound and rigid programmes. The programmes will have in built flexibility with a wide variety of optional course offerings based on modular concept. The life cycle of programmes will get reduced to cater to the fast changing needs. The programme design will be based on the concept like Multi-point Entry and Credit System, Multidisciplinary and diversification. The programme will not only cater to the general needs but also the specialised and local needs.

A variety of continuing education opportunities will be available following different modes of distance education system. Parity of educational programme will be established.

Programme through television, computer networking and interactive video system, will make inroads into the fabric of educational provision. Industry, other service sectors and voluntary organisations will play an important role in sponsoring

educational programmes reducing the gap between the world of work and the world of education and also the demand and supply of manpower. Many programmes will lay emphasis on self-employment and developing potential entrepreneurs.

Teaching - Learning Process

The teaching-learning process will cross the boundary of traditional classroom and extend to the field, site and industry. The process will be closer to real life situations. The students will be developed to tackle real-life problems and also situations involving greater complexity, uncertainty and risk through a wide variety of learning experiences. The students will be made to accept a high degree of accountability and responsibility for their performance.

Self-learning, individualised learning and ability of learning to learn will be emphasized. The students will be given more autonomy to learn. Specialised package and media will be made available for this purpose.

The concepts of learning by doing, learning through project work, learn while you earn and sophisticated teaching methods using multimedia approach will dominate the scene in laboratory, workshop, design and drawing work etc. Computers will become an important tool for teaching-learning processes.

Working personnel from industry and employers will come closer to the institutions and work hand and glove with the teachers to develop desired skills and attitudes in the students.

Instructional Resources

Education Technology related resources like A.V. aids, multi-media package, self-learning package, video films, and

computer assisted learning material will be available in the institution.

Existing facilities in the laboratories, workshops and library will be enhanced and modernised. New laboratories in the high, new and appropriate technology areas will be established.

More facilities will be made available to the students for self-learning.

Industry -Institution interaction will increase to a high degree and function as an important resource.

A majority of technical teachers will undergo well-planned content updating, teacher training and industrial training programmes. Over and above all this, the teachers will also be exposed through staff development programmes of short duration to the specialised areas like computer applications, curriculum development, instructional resources development, examination reforms, educational research and educational technology.

Nature of Technical Institutions

Most of the technical institutions will be awarded a higher degree of academic and administrative autonomy. Each institution will develop a mechanism to sense the environment and identify local needs in order to develop a unique mix on academic programmes, some of which will be common with others and some will be purely related to local needs. The institutions will be more accountable and responsible to the society.

Most of the institutions will cater to the needs of all the three tiers of technical education under one roof through continuing education programmes. The institutions will offer not only full time programmes but also part-time, short

duration and distance education programmes.

All the programmes will be accredited by National and State level accreditation bodies.

The rigid bureaucratic structure of the institutions will be transformed into multi-dimensional matrix structures. The cooperation of personnel from industry other employers and voluntary organisations, in the managing committees will increase. New norms conducive to innovation and development will be generated.

It is envisaged that many technical institutions will develop the capabilities to undertake research and development and project consultancy with industry to generate some finances.

Emerging Roles of Technical Teachers

The role of technical teachers, in future will not merely be as feeders of information to the students. Multi-dimensional roles will emerge out in the light of changes brought in the institutions.

The technical teachers will become the designers and managers of learning, guides and counsellors to students, parents and society, at large, academic planners and dynamic leaders. The technical teachers will act as catalysts, change agents, innovators and coordinators. They will initiate, sustain and manage the changes.

These abilities will be developed in the teachers through well designed teacher training programmes.

Need of Innovations

If the changes are thrust upon the institution, there is less probability of its

bearing fruits. Adjusting to changes should become part and parcel of the institution. The changes will become useful when a proper environment is created for innovations and experimentations to foster. Innovations will be planned properly and implemented effectively. Innovations will be consciously and purposefully directed with the aim of improving upon the present system. This will require teachers to change their attitudes, relationships and roles.

Five characteristics of innovations namely relative advantage, compatibility, complexity, trialability and observability have to be perceived properly by the innovators.

The innovators have to appreciate the consequences of failure to innovate, and also generate the alternative solutions to the problems associated with the innovations.

Management of Change

Whenever there is a change, resistance to change is built up. It is, therefore, essential to understand what precisely are the underlying forces within the human components of engineering education which act as change resistors.

Change Resistors and How They Act ?

According to Dr. L.S. Chandrakant (1987) the following change resistors are in operation in the Indian context:-

1. Homeostasis

This property is the organic desire to maintain balance i.e. security and permanence.

Educational institutions do not like to change. They prefer stability rather than change. Most of the Indian institutions have been established with common goals and are viewed as social organisations. Since goals do not change frequently, the activities

of the institutions are very well structured and are carried on with a great deal of built-in stability.

It is the very property of stability and permanence which constitutes a powerful resistance to change within the institutions.

2. Habit

This property means preference for familiar rather than for the unfamiliar. Habit has become a permanent feature of teachers. Their way of working is being influenced by the way they had learnt in a particular environment. They tend to behave in a similar fashion with the students. They rarely explore the novel ways to make the teaching-learning process more efficient and effective and generate newer types of learning experiences. They try to practice the same what they have learned on the job through experience.

3. Primacy

This property represents the following of a pattern set by tradition or practice.

In the engineering institutions patterns of working are set by traditions or practice or imposed upon by the university or boards. These patterns are viewed as unalterable. Whenever an institution successfully copes with a situation or solves a problem or devises a particular way of doing things. It sets a pattern which tends to persist. The institution or the teachers remain unwilling to break the traditions to accommodate the changes.

4. Selective Perception and Retention

This is the property of admitting only those new ideas that matches with the established outlook.

In the educational institutions the traditions, values and attitudes influence the total working and the relationship with social and economic environment. Only those ideas are accepted which are in tune with the traditions and those which are contradictory, are rejected.

This property of resistance to change is the main reason of blocking the entry of any fundamental changes in the system.

5. **Dependence**

This property relates to group identity or group behaviour restraining individuals from following a different path.

Teachers in general do not want to lean away from the peers. They want to share their ideas, views and methods with others and desire their acceptance.

It is this common bond which prevents an individual from treading a different educational path and losing his group identity.

6. **Self-Distrust**

This property represents a lack of self-confidence, lack of motivation and sense of diffidence.

Teachers and administrators distrust themselves. They are not confident about their own capabilities of introducing new or innovative educational path in spite of the fact that they appreciate that the system in which they are working needs major changes.

7. **Insecurity and Regression**

This property deals with the feeling of insecurity and regression with respect to changing environment.

The environment is continuously changing with the explosion of new scientific and technological knowledge. The traditional institutions find themselves unable to

cope with changes and thus they feel insecure. The institutions would like to remain in isolation comparatively unaffected by the turbulence in the environment. Such institutions raise barriers, minimise interaction with the environment and seek protection of the traditions.

Overcoming Resistance to Change

The management of change and innovations is a complex process involving multiple points of intervention. It requires the adoption of multi-pronged strategies to minimise the resistance to change. Some of the strategies used by the successful institutions in India are listed below. These strategies are also equally applicable to all other technical institutions :

- i) agreement on objectives and strategies of bringing about changes and improvements by consensus and participation.
- ii) Participative processes for decision making by frequent involvement of faculty.
- iii) more freedom to be given to the faculty to select directions of work in tune with their interests and set their own targets derived from the broader framework proposed by the management.
- iv) barriers to participation to be overcome through breaking up faculty into levels and encouraging participation within these levels.
- v) leaders using different styles of leadership depending upon the situations; styles being directive, supportive, participative and achievement oriented.
- vi) Counselling by the leader, as and when, required.
- vii) delegation of considerable authority to the Heads of Departments and senior faculty.

- viii) providing reward and recognition to faculty in order to motivate them to take initiative towards undertaking innovates tasks.
- ix) establishing a problem solving infrastructure and feedback mechanism within the institution.
- x) making the resources, expertise and experience readily accessible to the faculty.
- xi) anticipating and planning for potential problems of implementing changes leading to less changes of failure causing less frustration amongst the faculty.
- xii) taking reasonable risks and helping the faculty in actions involving high risks which facilitate undertaking of innovative projects.
- xiii) involving personnel from industry in various innovative activities of the institution.
- xiv) providing academic autonomy to the institution.
- xv) establishing an internal mechanism in the institution by identifying the working groups as interdependent sub systems along with their main responsibilities.
- xvi) making channels of sanctions and communication more accessible.
- xvii) promoting team working.
- xviii) formulating and executing sincerely and regularly staff development plans. and
- xix) providing attractive career-development opportunity to the faculty.

Conclusion

In the past two and a half decades, the technician Education component of the technical and vocational education system has shown a lot of dynamism. The development of need based curriculae in

various disciplines in close collaboration with the industry on scientific line has been a major breakthrough. The growth and development in related aspects viz. teaching-learning processes, design and development of instructional materials, reforms in the examination system has taken place. Administrators, curriculum planners and a wide cross section of teaching community have been oriented through a variety of staff development programmes which enabled them to cope with these changes and internalise the innovations gradually. The developments in science and technology and changes in the industrial practices had a considerable effect on other components of technical and vocational education which responded to the changing environment by way of introducing subjects relating to the emerging technologies in the curriculae and applying educational technology in the teaching learning processes.

But still a lot more needs to be done to make technical and vocational system more effective and efficient. The following verses of the great American poet Robert Frost remind all those concerned to continue the efforts with courage and confidence -

The woods the lovely, dark and deep,
but I have promises to keep
And miles to go before I sleep
And miles to go before I sleep,

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A teacher is the most crucial element in the social fabric. The teacher must internalise the national values and present himself as a model to the society.

Prof. S. N. Saraf

V.C. Sri Satya Sai Institute of Higher Learning Prashanthi
Nilayam & Education, Advisor G.O.I.