

Vocational and Technical Education

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THE STATE OF ART

In the Indian way of thinking, a human being is a positive asset and a precious national resource which needs to be cherished, nurtured and developed with tenderness and care, coupled with dynamism. The history of Indian education is testimony to the fact that the need for introduction of occupational education for students was highlighted as far back as in 1854. However, no significant breakthrough was noticeable in this regard except for a few attempts to integrate work with general education. It was only after Independence in 1947 that a comprehensive programme for the development of technical education and vocational training was launched, creating a large network of technical and vocational institutions that offered a wide variety of programmes in different areas. At present, the following broad categories of institutions offer vocational and technical education/training: (a) institutions for higher professional technical education, (b) institutions preparing technicians, (c) institutions preparing craftsmen/skilled workers, (d) apprenticeship training programme, (e) schools/junior colleges with the vocational stream.

Although the Radhakrishnan Commission (1948) and the Secondary Education Commission (1952-53) identified secondary education as a complete unit in itself capable of preparing students for a variety of vocational areas, not much was achieved in terms of

concrete outcomes. The most comprehensive recommendations towards vocationalisation of higher secondary education came from the recommendations of the Education Commission (1964-66). It presented a blueprint for complete transformation of the educational system in the country. The recommendations of the Education Commission found due acceptance in the National Policy of Education Resolution of 1968. The National Policy on Education (NPE 1986) gave a new impetus to the programme. In pursuance of the policy, the entire nation's efforts are being guided by a Centrally Sponsored Scheme (CSS) since 1988. The scheme aims at providing diversification of educational opportunities so as to enhance individual employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education. The CSS is being presently implemented in 24 states and five Union Territories.

The CSS envisages an elaborate management structure at various levels, which is yet to take on the desired shape and functions in states. The Apprentices Act has been amended to include vocational products such as Technician Vocational Apprentices. To date, hardly any systematic research has been done, except a few papers here and there, to evolve a viable model of vocational teacher training. As at present, pre-service training of vocational teachers is practically non-existent; in-service training is not adequate and competent vocational teachers are

just not available in desired numbers. The nationally developed curriculum design and competency-based curricula have been adopted or adapted by most states and UTs. However, these lack sound research support, especially within the Indian cultural and educational context.

Vocational courses at the +3 level have been drawn up by the University Grants Commission, which are likely to provide much needed practical vocational content to the highly academic curricula. The school-industry linkage, which can rightly be termed as the backbone of the collaborative model, is mostly left to local initiatives thereby showing only sporadic success. Two other areas which require major attention by way of planned efforts and actual implementation are the promotion of self-employment through inculcation of entrepreneurial culture among students and adequate impetus and support to the programme of Work Experience in pre-secondary classes. Further, the need for evolving vocational programmes for special groups like school drop-outs and out of school youth, girls, the disabled, the 'working learners', the rural poor and others has neither been systematically assessed nor worthwhile programmes offered through the non-formal mode except for some innovative projects taken up by a few voluntary organisations on a local basis with partial financial assistance from the Centre. Vocational education through the open and distance learning mode is yet to take proper shape on a significant scale.

The experience in the implementation of the CSS indicated the need for taking several steps on a priority basis for making the programme a success. These include the establishment of the credibility of the programme through its quality, relevance and acceptability; establishing education-employment linkages on a firm basis; arranging massive in-service and pre-service training of teachers; creation of effective management structures at all levels; and establishing some criteria of equivalence among the vocational, technical and academic courses.

A multipronged strategy envisaged during the Eighth Plan includes: (a) a gradual expansion of the programme at the +2 stage and consolidation and strengthening of the courses already started, (b) continuation of the programme of assistance to voluntary organisations for innovative projects in the area of vocational education, (c) providing pre-vocational courses at the lower secondary stage (Classes IX and X); (d) providing a generic vocational core course at the higher secondary stage for academic stream students.

Emergence of vocational courses, particularly at the senior secondary level in many of the countries in the Asia-Pacific region, may be attributed to the following trends (Mishra, A.K. and Sen Gupta, M. 1991): (a) expansion of secondary education system; (b) diminishing quality of higher education due to excessive pressure on it; (c) high unemployment rate amongst the educated (secondary to degree levels); (d) vocational education being viewed as the instrument for the remedy of dangerous social trends; (e) the need to siphon-off a sizable segment of student population to vocational stream through proper guidance; (f) inclusion of non-traditional, technology oriented courses for girls in larger numbers and of greater variety; (g) the increasing demand for vocational courses to suit the rural context; (h) promotion of self-employment and entrepreneurship.

Thus vocationalisation of education is a much broader concept of education. It tends to bring real life and education closer for meeting the national goals. Vocationalised education provides skills in addition to providing education for the development of personality and for successful performance of responsibilities as good citizens.

MODELS OF VO-TECH EDUCATION

Analysing historically, one may discern three models of imparting vocational education or their variants. These are: (a) acquiring vocational skills through apprenticeship where the father

or an experienced teacher passes on occupation skills to the son or disciple; after the industrial revolution, this got structured in the form of on-the-job training, (b) vocational education in separate schools or technical institutions imparting vocational instruction—mainly skills along with a little bit of theory. The schools that were opened based on this model were independent of and different from the secondary education system; (c) vocational subjects are taught in secondary/high schools side by side with general education. The approach underlying this model stems from the philosophy that vocational education should concern itself with the broadest possible knowledge about occupations and not merely about training in specific and narrow skills associated with different occupations.

In India, the system of vocational education has been of the mixed type. Model (a) has been in operation through enactment of the Apprentices Act, 1961. The Vocational and Technical Education (Vo-Tech) system run by the Ministry of Labour and others primarily follows the model (b) whereas, the vocational education at the +2 stage is largely based on model (c). There are a variety of alternative avenues available to students in the field of Vo-Tech education. These include technician courses in polytechnics, craftsmen—training programme in Industrial Training Institutes (ITIs); para-medical courses in nursing, dental and pharmacy schools; other specific courses offered in forestry schools, veterinary and animal husbandry schools, commercial institutes, fishery schools, schools of fine arts, etc.

The country, at present, has over 200 recognised technical education institutions at the first-degree level and more than 500 at the diploma level, with the annual admission capacities of 40,000 and 80,000 students, respectively. Facilities for Masters and doctoral programmes in engineering and technology have also been created in 140 institutions with an intake of about 10,000 per year. The vast network of institutions includes IITs, RECs, technical universities, deemed universities,

university departments of engineering and technology, state and private engineering colleges recognised by the All India Council of Technical Education (AICTE), specialised institutions in the field of mining, architecture, industrial engineering, foundry and forge technology, etc. One of the most significant achievements in the sector of technical education has been that the AICTE was conferred a statutory status under the AICTE Act in 1987. Some other noteworthy developments in the field of technical education are:

- a scheme of industry-institute interaction;
- restructuring curriculum development centres;
- World Bank assisted project to upgrade polytechnics in capacity, quality and efficiency (1992-98);
- World Bank/IDA assisted programme of modernisation and restructuring of the National Vocational Training Scheme (NVTs) (1989-96);
- establishment and strengthening of community polytechnics.

THE CHANGING VOCATIONAL SCENARIO: NATIONAL AND INTERNATIONAL PERSPECTIVES

Technical and Vocational Education is going through a period of intensive change and reorientation. A multiplicity of national models, forms and structures have emerged in an effort to cope with the rapid technological advances and the changing needs of the labour market (UNESCO 1993).

Rapid strides in the sphere of technology and maintenance of a high pace of economic growth require a qualitative transformation in the work force towards a manpower equipped with a high degree of skills in widely diversified vocational fields.

Whereas a trend towards more widespread vocational education is common to a good many

countries, vocational education has followed different paths of development depending upon each country's environmental and historical factors. Considerable rethinking has been going on in almost all the countries to either redesign or evolve the most appropriate type of vocational education suited to contemporary economic and technological changes. Although several issues in this area have been the subject of much debate, to date a consensus seems to be emerging regarding certain essential features of a sound and progressive educational system having vocational education as an important component. It is being increasingly recognised that the scope and variety of vocational courses should be further extended to cover much larger and varied target groups than at present; besides the course content offered should neither be too specialised nor too narrowly conceived. These have led to the growing realisation that vocational education programmes should not be treated independently of the general education system; rather, these should be closely allied to it.

The growth of vocational education in India is basically a post-Independence phenomenon. Vocational courses at the +2 stage have been designed to impart intensive knowledge and practical experience of specific avocations in order to develop desired competencies for entry into various occupations in the world of work. However, preliminary initiation to work ethics, good work habits and creating a distinct work culture at the earlier stages have been considered crucial. Therefore, the concept of 'Work Experience' in the form of socially useful and productive work in the pre-secondary classes, rightly emphasised by the Education Commission Report (1964-66) and NPE 1986, is of basic significance in this context.

Another fact, that the researchers in this field should take cognisance of, is that the vocational world is undergoing rapid and profound changes. The factors behind these changes are varied. Some of the factors of significance in the present context are: (a) the economy becoming global and competitive,

(b) the changing profile of the learner, (c) technology becoming all pervasive, (d) changing expectations of employers, (e) expansion in the service sector; (f) harnessing of renewable and non-conventional sources of energy. These change factors obviously have far-reaching educational implications while preparing the youth for tomorrow's work force.

Similar vibrations of varying intensity are being felt all over the globe. *America 2000: An Educational Strategy* declares that 'education is the key to America's international competitiveness'. The British Government has also resolved that people of all ages must acquire the skill necessary to maintain Britain's position as a leading industrial and trading nation. Australia also acknowledges the need to build an enterprise culture in order to find a respectable place in an extremely competitive world. The neighbouring major country, China, is also converting itself into a greater global exporter. In Japan as well the National Council of Educational Reform (1986) suggested that vocational courses should be flexibly organised to cope with the progress of society and the changes in the times. Technical-Vocational Education and Industrial Training, again, is one of the fastest growing areas in Malaysia which is experiencing a need for a broad-based approach in vocational and industrial training.

Oxenham, J. (1984) drawing on research in certain developing countries found that there is no neat universal explanation of what employers want from school. Noah, H.J. and Eckstein, M.A. (1988) on the basis of a study of Britain, France and Germany reached a similar conclusion. The demand from employers is not exactly for pre-vocational courses relating to specific occupations or families of occupations. Rather, the emphasis is on better teaching of basic communication and computation skills. Psacharopoulos, G.'s research (1988), in Colombia and Tanzania showed no labour advantage of graduates from vocationalised courses—neither in terms of success in finding employment nor pay levels when employed. Tracer study findings on this issue are rare.

Chin-Aleong, M. (1988) while studying vocational secondary education in Trinidad and Tobago concluded that in the context of a booming economy 'specialised craft students' found jobs more quickly and earned better salaries than did 'academic students' but it is not known whether such school-based training in depth is a general asset for access to jobs in a depressed economy.

Much evidence now seems to point to the direction that while cognitive knowledge and skills are indeed important for economic development and employment, yet it is a bundle of characteristics which includes much of the traits from the affective domain (Bowles, S. and Gintis, H. 1976; Blaug, M., 1984). Another important observation in this context is that as societies grow more advanced, there is an increased need for technology and a flexible labour force. Fagerlind, J. and Saha, L. (1983) and Blaug, M. (1984) observed that the actual skills imparted in schools may be less important than the creation of attitudes and cognitive abilities which enable individuals to adjust to frequently changing job situations. Wilms, W.W. (1988) reviewed empirical researches carried out in the United States from 1970 to 1985. He concludes that the outcomes of vocational education in schools do not accord with the lofty aims, notably that this education fails to improve the student's chance of success in the labour market.

Haddad, W.D. (1981) has observed that "General education has been found in many countries to increase the productivity of workers, making them more self-reliant, more adaptive to new situations and above all more trainable." Psacharopoulos, G. (1973, 1981) on the basis of a review of various studies conducted on the rate of return had observed that the rate of return of general education was found to be higher than that of vocational/technical/scientific education in less developed countries (LDCs). Again, if the level of development in a country or region is low, vocational or diversified education may have little relevance to development. Foster, P. (1987) had observed that " ... in the initial stage technical or vocational instruction is the cart

rather than the horse in economic growth and its development depends upon real and perceived opportunities in the economy." The observation of Foster has been further corroborated by Psacharopoulos, G. and Loxley, W. (1985): "Paradoxically it may seem that lower the overall level of development weaker the case for introducing a diversified curriculum. The more developed the country the more it may be able to afford diversification." Tilak, J.B.G. (1988) had found that in low-income countries vocational education contributes negatively to economic growth. These studies suggest the necessity of a threshold level of development for vocational education to contribute significantly to development. These findings have far-reaching policy implications for LDCs. The uniform type of educational advancement cannot offer solutions to the diversified developmental needs of various societies/states/regions. The level of development of a particular region/state/society would decide what type and content of education would be relevant to its process of development.

Kairamo, K. (1989) maintains that in Europe, particularly in Belgium, France, Italy, the Netherlands and Sweden, a trend towards vocationalisation of secondary education is pretty clear. "The share of school-based technical and/or vocational streams in total enrolments has been increasing gradually over the past 20 years." In countries like France, Italy and the Netherlands apprenticeship has been revitalised. It has become the dominant mode of training for 16-19 year olds in West Germany. More recently "alternance training" combining school and work-based learning have developed in continental Europe.

In India, the programme of vocationalisation of education draws its inspiration from the recommendations of the UNESCO (1974) which defined it as a "comprehensive term embracing those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to

occupations in the various sectors of economic and social life. Such an education would be an integral part of general education and a means of preparing for an occupational field and an aspect of continuing education. Technical and vocational education should further contribute to the achievement of society's goals of greater democratisation and social, cultural and economic development, while at the same time developing the potential of the individual for active participation in the establishment and implementation of these goals. It should lead to an understanding of the scientific and technological aspects of contemporary civilisation in such a way that men comprehend their environment and are capable of acting upon it, while taking a critical view of the social, political and environmental implications of scientific and technological change. Given the necessity for a new relationship between education, the working life and the community as a whole, technical and vocational education should exist as a part of a system of lifelong education adapted to the needs of each particular country."

Research and Development in Vo-Tech Education—A Review

As regards research for improving the educational process in the system the Programme of Action (POA 1992) stipulates that "selected technical and management institutions including IITs, IIMs, RECs and TTTIs, etc., will undertake research and studies on systemic issues concerning educational planning and management, teachers, students, cost-effectiveness, research mobilisation, instructional system-design, curriculum development, examination reforms, etc., and disseminate the findings to all institutions for information and suitable improvements."

There are several agencies and departments of the government such as Council of Scientific and Industrial Research (CSIR), Department of Bio-technology (DBT), Indian Council of Agricultural Research (ICAR), Indian Council of

Medical Research (ICMR), Department of Electronics (DOE), Department of Science and Technology (DST), etc., dealing with science and technology. The Indian Council of Social Science Research (ICSSR) and the Educational Research and Innovations Committee (ERIC) of the National Council of Educational Research and Training (NCERT) support researches in social sciences and humanities which include research in the area of vocational education. The NCERT also functions as the apex-level R&D institution in all aspects of school and vocational education through its constituents, namely, the National Institute of Education (NIE) and the Central Institute of Vocational Education (CIVE), respectively. At the state-level, the State Councils of Educational Research and Training (SCERTs) are required to provide R&D support to the programmes. The total investment in R&D during the 7th Five Year Plan was around Rs.5,000 crore (including non-plan expenditure).

Along with the expansion of the science and technology system in the country, the education system also has expanded. Today there are over 150 universities and a number of institutions of technology, including the five Indian Institutes of Technology (IITs) and the Indian Institute of Science (IISc) in Bangalore. A large number of these institutions are engaged in higher education and carry out research. However, the actual investment in R&D in the education sector is very small compared to that in the national laboratories. The link between institutions as well as between industry and educational institutions is also extremely weak. A clear effort is called for to develop R&D manpower in order to match in number and quality of training the need of the country. There is also a need for a determined effort to attract some of the best amongst the students to take to research as a career.

There are not many educational institutions in the country with R&D facilities and infrastructure comparable to those available in similar institutions in advanced countries. The overall quality of research from the educational sector needs to be improved. It is necessary to

orient R&D efforts in educational institutions to national needs and this effort can be made only when adequate support is provided. All the support for higher education comes from the government. Industry is yet to contribute its mite in this direction.

Research in technical and vocational education is by and large confined to traditional areas; inter-disciplinarity is yet to take roots. The choice of research problems is often dictated by considerations of easy publication in journals.

Progress of Research in Vo-Tech Education

The Fourth Survey of Research in Education observes that "research in vocational and technical education was undertaken only from 1960 onwards. It gathered momentum after 1970 and stabilised after 1980." The report presented the decadal progress of research in technical and vocational education as shown in Table 1.

Table 1
Research in Vocational and Technical Education
(No. of Studies)

1959 and before	1960-69	1970-79	1980-86
Nil	9	41	45

Source: Trend Report on Research in Vocational and Technical Education. *Fourth Survey of Research in Education*.

The said trend report further identified three types of shortcomings in research in vocational and technical education in India. These were: (a) grossly inadequate volume of research; (b) imbalance in coverage of areas, (c) lack of theoretical perspective. The same shortcomings are perceived even today. The present trend report covers the period from 1988 to 1992. The review that follows is based on 63 research abstracts. The year-wise distribution of the abstracts in hand is given in Table 2.

Table 2
Number of Studies — Year-wise

1988	1989	1990	1991	1992
18	6	19	9	9

Note: One study of 1982 and another of 1987 have also been included in this survey.

The 63 studies reviewed originated from various agencies which have been broadly categorised below.

Table 3
Number of Studies—Agency-wise

Type of Organisation/ Institution	Number of studies
University Departments	23
R&D institutions (national-level)	18
R&D Institutions (state-level)	02
Teacher Training Colleges	17
Professional Institutes	02
Directorate of Education	01
Total	63

It may be observed from Table 3 that most of the studies under educational research have been done in university departments, national level Research and Development institutions and teacher training colleges.

Most of the studies reported were independent studies followed by Ph.D. theses and M.Phil. dissertations in that order as can be seen in Table 4.

Table 4
Types of Studies

Type of Study	Number of Studies
Independent Study	40
Ph.D. Thesis	13
M.Phil. Dissertation	10
Total	63

Researches in vocational and technical education cut across several disciplines/areas. The majority of the studies (38) were undertaken by researchers belonging to education/vocational education faculty. Eight studies came from those working in the area of educational psychology. While 14 of the studies were related to technician/technical education, one each was from the areas of home science, commerce and teacher education.

As regards the nature of study, these may be broadly categorised as follows. However, there may be unavoidable overlaps in certain cases.

Table 5
Nature of Studies

<i>Nature of Study</i>	<i>Number of Studies</i>
Descriptive (Survey)	36
Explorative and Evaluative	14
Analytical	07
Experimental	02
Case Study	02
Pilot Study	01
Review	01
Total	63

Thirty-five of the 63 studies have been written in English, followed by seven in Hindi and one in Marathi. Twenty abstracts do not indicate the language.

A review of all these studies is presented in the following pages mainly highlighting the most significant findings.

Programme Evaluation in Vocational and Technical Education

Ever since the present programme of vocationalisation of education at the +2 stage was introduced by the states as per the framework provided by the National Document (NCERT 1976) there has been a spurt in undertaking evaluative studies of its implementation with a view to identifying the shortcomings and suggesting remedial

measures. These studies figured more prominently after the Centrally Sponsored Scheme of Vocationalisation of Secondary Education was launched in 1988. Being a scheme of national priority which raised high hopes and aspirations among parents and students alike, these studies played a crucial role in improving the efficiency and effectiveness of the programmes by applying timely correctives based on the feedback. Out of the 15 studies reported four have been termed as 'Evaluative studies of vocationalisation at the +2 stage', four 'on-the-spot studies of implementation of the vocationalisation of education programme', six 'Quick appraisal studies', and only one that concerns the technician education system in the states.

Singh, C. (1988) made an evaluative study of vocationalisation of education in Indian schools. It was a descriptive study based on an analysis of the recommendations of the various Commissions and Committees right from 1854, followed by a critical study of attempts made towards vocationalising school education in India since then.

Gupta, V. (1990) investigated the implementation of the programme in the schools of the Union Territory of Delhi. The researcher also identified the problems associated with it. It was found that vocational students came from all sections of society. Most of these students joined the courses as they could not get admission elsewhere. The study concluded that the management of vocational schools was weak, the courses were not need-based and linkages were yet to be established.

Emmanuel, M.A.K.J. (1990) studied some major problems of implementing the programme of vocationalisation of education in the state of Andhra Pradesh. It was found that although there is a felt need for vocational courses in the state there was neither a proper management structure to implement the scheme nor regular teaching personnel and necessary infra-structural facilities in the vocational institutions.

Undertaking an evaluative study in the State of Himachal Pradesh, Biswal, P. (1992) found

an increasing trend of enrolment in the vocational stream from 1988-89 to 1990-91. The scheme as implemented in the state was found to be deficient in terms of infrastructure, teaching and non-teaching staff, finances, proper management system, supervision, development of need-based curriculum, publicity, linkage between Socially Useful Productive Work (SUPW) activities and vocational courses, coordination and cooperation among various departments, adequate collaboration between school and employment market, on-the-job training, placement and proper textbooks. There was lack of adequate knowledge and understanding of the scheme at various levels. There were no training facilities for vocational teachers.

All the quick appraisal and on-the-spot studies were undertaken by the erstwhile Department of Vocationalisation of Education of the NCERT in collaboration with the state governments basically to obtain feedback from the operating system to help in policy formulation and to assist the government in better implementation.

Sen Gupta, M. and Dhote, A.K. (1990) made a quick appraisal of the implementation of the Centrally Sponsored Scheme (CSS) on vocationalisation of secondary education in the state of Himachal Pradesh. The study very clearly and candidly listed the shortcomings in implementation like non-release of funds in time, no effective collaborative arrangements, absence of instructional materials and textbooks, no on-the-job training facilities, non-availability of raw materials, apprenticeship training and placement or guidance services, etc. Specific recommendations were made in the study to improve the situation as per the CSS.

Vaid, D.K. and Sen Gupta, M. (1990) undertook a quick appraisal study of the implementation of CSS in Goa. The study found that about 11.2% of all the higher secondary students had been diverted to the vocational stream. No systematic vocational survey was conducted. About 62% of the heads of institutions felt that the practical training given

to students was inadequate. About 74% students and teachers reported inadequate instructional materials and equipment. Seventy-six per cent teachers had not undergone any specialised training in vocational education. Fifty-six per cent of the students who joined vocational courses had obtained the second division and another 11%, first division in their high school examination. No vocational guidance was provided to students.

Verma, B. (1990) undertook a similar quick appraisal study in Delhi. The study found that in 107 schools, 21 courses were introduced with 5,200 students (40% boys and 60% girls). 26.12% of the students included in the study obtained the first division, 53.30%, the second division, and 20.38%, the third division in the last qualifying public examination. The majority of the students (86.75%) were from other-castes while 12% belonged to SC/ST. Weak points in the implementation included employment of only part-time teachers, no vocational survey, inadequate vocational guidance, and dearth of instructional materials, on-the-job training and collaborative arrangements. Sponsored courses were in greater demand.

Another quick appraisal study for the state of Uttar Pradesh was done by Misra, C.K. and Verma, A.P. (1990). It was found that the management system as suggested in the CSS had not been fully implemented at various levels. The district vocational surveys for identification of courses and institutions were not completed. There was dearth of textbooks, teacher's guides, practical manuals and other instructional material in almost all the vocational courses. No full-time teachers were appointed. The in-service teacher training programmes organised were grossly inadequate. While workshops were constructed in 197 out of 200 institutions, the majority of them had a shortage of furniture and library books. No provision was made for raw materials and other contingencies.

Raizada, P. and Sacheti, A.K. (1990) made a quick appraisal of the implementation of the

Centrally Sponsored Scheme of vocationalisation of secondary education in Gujarat. The study highlighted certain inadequacies and drawbacks in the implementation of the scheme. These related to selection of institutions, management structure, district surveys, selection of courses, curriculum design, instructional materials, collaborative arrangement, students' future and utilisation of available funds. The study also made recommendations for applying timely correctives by the state.

Sacheti, A.K. and Raizada, P. (1990) made yet another quick appraisal of the implementation of Centrally Sponsored Scheme (CSS) in the state of Rajasthan. The study covered about 11% of the higher secondary schools offering vocational courses. These courses have been mostly introduced in government run schools. The posts of vice-principals had been filled through promotion based on seniority from the staff in the general stream. Most of the teachers were post-graduates or graduates in the concerned vocational areas. About 68% of the sample students reported non-availability of workshops, laboratories and libraries for vocational courses. Of the vocational entrants, 6.42% obtained the first division, 41.79%, the second division, and remaining, the third division or pass class in the qualifying public examination. Of the percents of students 36.39% were government servants, 27.22% were engaged in agriculture and related occupations, and 20.14% were doing business. As regards caste affiliation, the majority (88.17%) belonged to the general category. With regard to employment after the course only isolated cases of gainful employment were reported by teachers. The majority of the first-batch students had joined general first degree courses.

Dhote, A.K. (1991) made an on-the-spot study in the state of Maharashtra. The sample included 25 institutions, 19 heads of institutions, 113 teachers and 759 students. The study found that the programme implementation in terms of the administrative set-up, teachers, and infrastructural facilities was going on well.

The major lacunae identified were lack of suitable instructional materials, inadequacy of on-the-job training and non-recognition of vocational courses for employment.

Sen Gupta, M. and Raizada, P. (1991) made another on-the-spot study in the state of Karnataka. The study succinctly brought out the strengths and weaknesses of implementation in the state. Based on these the study made specific recommendations for applying timely correctives by the state.

Guru, G., Dhote, A.K. and Ray, S. (1992) made an on-the-spot study of the implementation of the vocationalisation of education programme in the state of Andhra Pradesh. The findings of the study indicated that although the programme received a boost with the introduction of the Centrally Sponsored Scheme, it suffered from many deficiencies at the state-level, viz., delay in creation of the management structure at different levels, lack of monitoring, and inadequate linkages, infrastructure and on-the-job training. No modification in the recruitment rules, non-recognition of vocational courses for employment and absence of follow-up of vocational graduates were other major lacunae adversely affecting the programme. The study identified the presence of some committed teachers, innovative practices and dynamic heads of institutions as the silver linings in the process of implementation.

Sacheti, A.K.; Raizada, P. and Verma, A.P. (1992) made an on-the-spot study of the implementation of vocationalisation of education programme in the state of Kerala. Data were collected by administering questionnaires to state-level functionaries, heads of schools (19), teachers (65) and students (728). The study revealed that the management structure was created as per CSS. The course design was bifocal, enabling students to either take up a vocation or pursue higher academic or professional education. The majority of the vocational teachers were fresh graduates or post-graduates having no practical experience. Out of the vocational entrants, 16.4% had obtained the first division; 28.9%, the second division;

and the remaining, the third division or pass class in the qualifying public examination. 27.9% of the parents of these students were engaged in agriculture or farming related occupations while 25.2% were government servants. 53.8% parents had a monthly income of Rs. 500/- or less, 22.3% earned between Rs.501/- to Rs.1000/-; 17.8% between Rs.1001/- to Rs.2000/-; 4.8% between Rs. 2001/- to Rs.4000/-; and only 1.3% earned Rs. 4001/- or more. It was found that 11.7% of the vocational students belonged to the SC category; 1.3%, ST; 36%, BC; and 51% came from the general category. More practical training, better qualified and trained teachers and reduction in non-vocational subjects were some important suggestions from students. It is significant to note that in the final examination a vast majority of the vocational students failed in English, mathematics, physics and chemistry. Thus, the course design was found to be the most important bottleneck in the overall implementation of the scheme.

The lone study on technician education system was done by Raina, K.B.; Adithan, M.; Puri, V.P. and Gill, H.K. (1988). The major findings of the case studies undertaken in the northern region pertained to output-input, process monitoring, evaluation and feedback. It was found that the states had realised the need and importance of professionalising the state directorates instead of their remaining mere administrative bodies.

Evaluative Studies of Work Experience Programmes

The programme of work education took different names and forms in different states. Work Experience, Socially Useful Productive Work and Earn While You Learn Programme are some such names which have got reflected in the studies reported.

Balasankar, P. (1988) studied the different types of Work Experience programmes available in the schools of Kerala with a view to formulating guidelines for strengthening the

programme. Three hundred students drawn from 10 schools and 200 teachers formed the sample. The status situation of the programme in terms of aims, organisation, implementation, financing and evaluation was assessed through questionnaires. The interest and attitude of learners, teachers and public were also assessed. The study did not find any 'Earn While You Learn' programmes being offered. There was practically no evaluation of Work Experience in spite of the fact that the majority of instructors were in its favour. The time allocation was unsatisfactory; the physical facilities were inadequate; and the attitude of teachers, parents and the public towards the programme was not favourable.

Joshi, D. (1990) did an economic evaluation of the Earn While You Learn Scheme as implemented in Madhya Pradesh. Substantiating his findings with facts and figures the investigator concluded that the production done by students was praiseworthy, both quantitatively as well as qualitatively. The scheme benefited pupils coming from the low-income group and has served as an incentive to parents thereby improving retention of students. It was found that these students did well in their examinations as well.

Patel, S.P. (1991) studied the Work Experience Programme in secondary teacher's colleges. It was found that in more than half the sample institutions, Work Experience was neither a compulsory subject of study nor of evaluation, resulting in absence of seriousness in its implementation. The facilities provided in terms of equipment, tools, workshops, trained teachers and funds were grossly inadequate. The time devoted to teaching its content and methodology too was inadequate.

Swain, B.C. (1992) conducted an evaluative study of the Socially Useful Productive Work (SUPW) programme at the secondary stage in Himachal Pradesh. It identified certain weaknesses in programme implementation like untrained teachers, no provision of in-service training, unavailability of instructional material, etc.

Educational and Vocational Aspirations

The educational and vocational aspirations of students are shaped and influenced by various socio-economic and personality factors. A number of studies have been directed to identify these factors and to study how these influence the occupational and academic choices of students.

Arora, P.N. (1988) developed an interview schedule as part of a pilot study to assess the educational and vocational aspirations of students of Class XII. The interview schedule was used by many researchers, particularly at the postgraduation level, and found it useful.

Sungoh, S. (1988) made a survey of educational and vocational aspirations of Doordarshan-viewing pre-university students in Shillong. Taking 300 students—both male and female—the study found that female students were rare viewers of TV and commerce students showed significantly higher educational aspirations; male viewers and science students had significantly higher vocational aspirations. SES was found to be positively related to the educational aspirations of students. There was high negative correlation between the educational and vocational aspirations of students.

Choudhury, K. (1990) conducted a study to find out the vocational aspirations, occupational choices and academic choices of students. The sample consisted of 196 Class IX students in the city of Pune. Using the descriptive survey method it was found that 40% of the total sample wanted to become doctors or engineers. The majority of the students preferred the science stream for continuing their studies and future career. The study did not find any relationship between the occupation of the fathers and the occupational choices of the students.

Kaur, D. (1990) studied the educational and vocational aspirations of students belonging to different socio-economic locales of Jammu Division. It was found that both educational and vocational aspirations are influenced by sex, SES, and locality when taken independently.

Urban students differed significantly from their rural counterparts in their educational preferences and vocational aspirations. While rural students were found to aspire for high academic degree/a degree in arts, the urban students aspired for high professional degrees/a degree in science.

Sharma, K. and Dhundup, T. (1990) studied the sex difference in educational and vocational aspirations of Tibetan students. The study found no significant sex differences in the educational aspirations of the students. However, sex differences became prominent in case of their vocational aspirations. Tibetan boys had a greater range of vocational choice and were more ambitious vocationally as compared to girls. The boys preferred challenging, prestigious, well-paid, creative and adventurous jobs whereas girls preferred clean jobs characterised by routine work, security, quiet, and non-competitive type of vocations.

ATTITUDES AND BEHAVIOUR

A positive attitude towards work and workers is a prerequisite for better personal adjustment and vocational success. It is an area which requires a more thorough probe. The studies should come out with clear guidelines for teachers and educational administrators. This is required all the more because of the appalling neglect of the Work Experience programme and the near absence of proper guidance and counselling. The studies reported seem to be mere academic exercises rather than having practical significance.

Bhatnagar, A. and Gulati, S. (1989) proposed a framework for research related to the vocational behaviour of creative adolescents. They reported lack of sufficient empirical evidence to support the finding that "creative students were vocationally more mature than less creatives".

Subramanian, P. (1990) studied the socio-economic status of students of polytechnics and their attitude towards manual jobs. The study found a significant relationship between lack of education and manual jobs. Students who hail

from the higher and the lower income groups have a negative attitude towards manual work. The same was true about girls also. However, no significant relationship was found between personal development and manual jobs.

Sungoh, S.M. (1991) made a study of the vocational education programme in the East Khasi Hills. The study found no significant difference in the attitude towards vocationalisation of education between pre-university male and female, rural and urban, commerce and science students but the difference was significant between tribal and non-tribal, commerce and arts and arts and science students. It concluded that the students in general appeared to be in favour of vocationalisation of education.

Mohan, S. and Gupta, N. (1990) studied vocational students' career behaviour and their adjustment in courses at the +2 stage. Covering a total sample of 198 boys and 208 girls from the vocational stream and 166 boys and girls from the academic stream, the study's findings did not by and large differentiate between academic and vocational groups on personal characteristics. Girls in the vocational stream showed a greater sense of satisfaction with availability of vocational curricula in comparison to girls in the academic stream. While girls in the vocational stream showed a rise in career maturity, boys showed a decline. Girls also developed more positive attitude towards these courses. Low-SES boys identified more with their vocational courses than middle-SES vocational boys. Low-SES in the vocational stream girls found a sense of security while middle-SES girls looked for 'adventure' in these courses. A significant finding of the study related to the recommendation of the boys for introducing vocational courses at the secondary stage rather than the senior secondary stage.

ROLE OF INDUSTRIES IN PROMOTION OF VOCATIONAL AND TECHNICAL EDUCATION

Vocational and Technical Education cannot remain isolated from the needs and realities of

business and industry. A close collaboration between the school/polytechnic and industry is considered essential not only for supplementing the physical and human resources but also to make education and training more practical and need-based. Only two studies have been reported in this category.

The first study is by Pillai, S.S. and Srinivasan, R. (1989) who studied the feasibility of polytechnic-industry collaboration through a survey in which 42 principals from polytechnics in the southern region participated. The principals unanimously expressed the need for industry-institute ties. It was found that inadequate cooperation and low rapport between industries and institutes were mainly due to: (a) lack of initiative from either side; (b) reluctance on the part of staff to make extra efforts; (c) non-availability of appointed liaison officers in polytechnics. One of the blocks/constraints in such ties as expressed by principals was 'industries not allowing students to operate machines'. In this context it was suggested that the curriculum needs to be updated with the help of the industries.

The second was a feasibility study in the state of Haryana by Bhatnagar, K.M. (1991). He investigated the role of industries in the promotion of vocational education among rural women. The study also addressed the problem of inequalities (male-female differentials) which the rural women face, particularly in resource allocation for education, lower labour participation, lower occupational levels and lower income coupled with higher rates of unemployment and longer period of wait for getting employment. Information was collected from 116 students, teachers and parents by administering questionnaires and also interviewing them. It was found that more and more girls were keen to learn about modern trades. Some of the major hurdles in the way of developing vocational and employment opportunities for women in rural areas were identified as: lack of adequate and systematic training facilities, textbooks and scholarships, and the human resource development policy in

the state of Haryana. The study also suggested solutions to the identified problems.

Entrepreneurs and Entrepreneurship

Entrepreneurship is the field that studies entrepreneurs. It is mainly concerned with their activities, their characteristics and with the economic and social effects of their behaviour. To date there is some evidence to show that entrepreneurship behavioural characteristics could be developed. In the context of developing countries like India entrepreneurship education has come to be realised as the ideal solution to both the problems of employment and productivity in the society.

With this realisation, entrepreneurship education and training have been integrated within the curriculum of vocational and technical education. This has obviously led to a lot of research and developmental activities in this relatively new field.

Rathore, B.S. and Saini, J.S. (1988) conducted a study to draw a profile of technical entrepreneurs with specific reference to Chandigarh. The desire for independence, a feeling of underutilisation of one's potential, the desire for rapid growth and specialised knowledge of trade/business were the major motives behind starting entrepreneurial ventures. The majority of the technical entrepreneurs started their ventures between 20-30 years of age and had some prior work experience. These entrepreneurs emerged from families having service and agriculture background. Twenty-five per cent of the technical entrepreneurs started enterprises with their own money; 27% managed a loan; and the rest had to bring in more than 20% as their contribution. Credit sales, nonavailability of sheds and hurdles in obtaining finance were the major problems faced by technical entrepreneurs.

Rathore, B.S.; Saini, J.S. and Sharma, D.D. (1991) investigated the problems and prospects of entrepreneurship promotion in polytechnics. Collecting data by interviewing polytechnic

teachers, students and diploma holder entrepreneurs, the study found that majority of the teachers (58%) perceived that not more than 5% students opt for an entrepreneurial career. Such students, by and large, belonged to traditional engineering disciplines. The majority of the teachers wanted to undergo training in entrepreneurship and expected financial incentives to teach it. The teachers were of the view that poor financial background, lack of entrepreneurial information, lack of entrepreneurial attitude, lack of trained faculty and inadequate policy support were the main problems in promoting entrepreneurship amongst polytechnic students. Diploma-holder entrepreneurs indicated that industrial visits, project work assignments and guidance and counselling by teachers motivated them to opt for an entrepreneurial career.

Rathore, B.S.; Saini, J.S.; Sharma, D.D. and Dhameja, S.K. (1992) studied the impact of various assistance schemes on technical entrepreneurs with specific reference to Haryana State. The study revealed that technical entrepreneurs faced a number of problems like cumbersome procedural formalities, rampant corruption, non-cooperative attitude, red-tapism and wastage of time. The entrepreneurs were not aware of the schemes launched for their benefit. The support agencies generally reported that if the project was hi-tech, export-oriented, import-substitute or environment-friendly, assistance is provided on priority basis. Support agencies emphasise formal training for the loanees. Some agencies are involved in conduct of EDPs also.

Saini, J.S. (1992) studied the impact of entrepreneurship training on business performance of entrepreneurs. The findings of the study revealed that trained entrepreneurs in comparison to untrained ones had a significantly higher rate of growth in employment generation and sales turnover.

Students' Performance

Development of desired skills and competencies

amongst vocational and technical products is one of the prime concerns of these courses which are basically performance based. What are the general and specific competencies for a vocation? What methodology would be most suitable for developing these competencies? How to obtain effective collaboration from industries, business organisations, hospitals and other service organisations so that the performance of students may be brought to a desired level for both self- and wage-employment? Apart from these questions there are other issues related to on-the-job training, enterprise-based training, apprenticeship, etc. All these require systematic and sustained research efforts on the part of individual researchers as well as research by concerned organisations to orient the whole programme on scientific lines.

Nakatana, L. and Srinivasan, R. (1988) made a correlative analysis of the performance of students of monotechnic institutions. The sample consisted of 101 students (30, 32 and 39) who had passed the diploma level examination from institutions of commercial practice, chemical technology and printing technology, respectively. The study found the mean scores of the three groups in diploma examination as 60.34, 76.87 and 63.98, whereas their mean scores in the secondary school final examination were 64, 77.81 and 69.38, respectively. The combined mean for the entire sample indicated that their performance in the school final examination was better than that of diploma examination. The values of the correlation coefficient between their total scores in school final and diploma examination, seen separately, as also the overall correlation were found to be significant.

Natarajan, A.V. and Mukhopadhyay, B. (1988) conducted a study with a view to identifying the factors influencing the performance of Diploma in Commercial Practice (DCP) students in women's polytechnics in Kerala. The study revealed that while more than 90% of the students felt that the curriculum was difficult, half the teachers in the sample

maintained that the available time was inadequate to complete the syllabus. The lecture method of teaching was predominantly followed. The practical sessions were few, and availability of textbooks and other instructional materials was inadequate. Nearly 60% of the students were disinterested in the course mainly because of meagre employment opportunities.

Pillai, S.S. and Srinivasan, R. (1990b) analysed the students' achievement in technical institutions. Fifty-seven polytechnics (11 from Andhra Pradesh, 17 from Karnataka, 8 from Kerala and 21 from Tamil Nadu) formed the sample. The study revealed that on an average about 1/4th of the total number of technicians turned out could secure the first division in the final examination while another 1/4th showed poor performance and were placed in the third division. It was noticed that five polytechnics in Karnataka and three in Kerala occupied the first five ranks throughout the period from 1986 to 1989. One women's polytechnic in Tamil Nadu distinguished itself by securing 100% pass percentage in electronics for two consecutive years. It was also observed that most of the polytechnics did not have any liaison with their past students.

Vocational Interest and Occupational Choices

Vocational interest and its relationship with occupational choices has been a favourable area of research since as many as ten studies have been reported which investigated the educational and vocational interests of students at the terminal stages of Classes VIII, X and XII.

In a study concerning the vocational interest of higher secondary school students, Jayapoorani, N. (1982) found that a majority of students (84%) preferred natural sciences, mathematics and English. While boys showed interest in engineering jobs, girls preferred to work as doctors. Both boys and girls developed their vocational interests between 13-15 years of age.

Gautam, V. (1988) investigated the educa-

tional and vocational interests of students at the delta stages—Classes VIII and X. Significant correlation was found in the preference orders of boys of Classes VIII and X in both educational and vocational interest areas; no significant correlation was found in the case of girls, especially in the educational interest area, while in vocational interest area significant correlation was noted. Significant differences were found between the scores of boys and girls in all the areas of educational and vocational interests. However, significant correlation was noted in the preference orders of urban and rural students of Class VIII in both the areas of interest which shows that their interest preferences were similar.

A study of risk-taking, self-esteem and family status in relation to vocational interests was done by Makhiza, L. (1988) who found that risk-taking and vocational interests were significantly related. Risk-taking was found to be significantly and positively related to literary interests, scientific interest, executive interest and outside interest but negatively related to agriculture, constructive, commercial, persuasive, social and household interests. Self-esteem was positively related to social jobs and negatively related to constructive and agricultural jobs. Further, a study of vocational interests of males showed that they were high in executive, social and scientific jobs; there was moderate interest in persuasive, artistic and literary jobs and low interest in commercial, agricultural, household and constructive jobs. Family status was found to be a significant determinant of artistic and agricultural interests.

Robert (1988) conducted a study to find out if the vocational choices of higher secondary students depended upon their socio-economic status. For this study the Socio-Economic Status Scale, the Vocational Interest Record and the Parental Aspiration on Children's Vocations Questionnaire were used. The study found that vocational choices of higher secondary students were independent of their socio-economic status and also the vocational aspiration of their parents. Both boys and girls had similar

vocational choices towards agriculture, arts, literature, executive, commerce, science and social work. However, more girls preferred the vocation 'household work' than boys.

Sodhi, T.S. (1988) made a study of the vocational interests and occupational choices of adolescent girls. Taking a stratified random sample of 1,015 adolescent girls of Class X, the study found that very few adolescent girls were able to make correct occupational choices in accordance with their vocational interests. It was also observed that occupational choices and vocational interests were comparatively more congruent for girls of urban background and those belonging to the high-income group as against their counterparts from semi-urban areas and the low-income group. Studying the economic parameters and interests of vocational-stream students, Pattinsthr, P. (1989) found that the parents of the vocational-stream students marginally differed in their level of income and expenditure. The study also concluded that occupation, income and expenditure are the determining factors of a student's vocational interest.

Javed, A.K. (1990) made a critical study of the vocational interests of the students of arts, science and commerce. It was found that the rural students were disinterested in vocations based on agriculture. They showed more interest in science-based vocations. While students of arts and commerce expressed high interest in persuasive and executive vocations, students of all the three faculties showed low and little interest in social vocations. They preferred and were highly interested in white-collar jobs as against vocations requiring physical labour in which they were the least interested.

Mohan, S. and Gupta, N. (1990) studied factors related to the choice of vocational courses. Some of the significant factors identified were: interest, motivation, personal concerns, values, level of self-concept, attitudinal aspects, career maturity and future prospects.

Bhargava, R. (1991) studied the interests of the students studying in the vocational

education stream in Rajasthan and identified the difficulties faced by them. Questionnaires were administered to principals, vice-principals and subject teachers of the schools having vocational stream, students studying vocational education and the concerned parents. The study found that the majority of the students were interested in vocational education mainly because of its employment-preparatory nature. Lack of physical facilities, non-availability of trained teachers, non-release of funds in time are some major shortcomings identified.

Das, R.S. (1991) made an analytical study of vocational interest of primary teachers. It was found that the vocational interest of urban primary teachers (male and female) differed from that of rural teachers. The female primary teachers had higher vocational interest than the male primary teachers. Both male and female primary teachers had the same level of interest in science but female teachers were found to have more interest in literature. The rural primary teachers—both male and female—showed more interest in the teaching profession than the urban teachers.

Saraswathi, L. (1992) undertook a study to investigate the problem: "Are the various dimensions of the personality of school students related to their vocational interests?" Taking a sample of 400 students, the study concluded that personality dimensions and vocational interests of Tenth Standard students were not related. Vocational interests were also not related to their academic achievement.

STUDENTS' FUTURE—PROBLEMS AND PRIORITIES

Vocational courses are popularly referred to as job-oriented courses. Consequently, students joining vocational courses expect to get a gainful employment immediately after completion of the course. But in actual practice the experience has been otherwise since in many of the states a large number of vocational products had to join higher academic courses as they failed to obtain a job—either self-job or wage-job. There is a

dearth of systematic studies probing: (a) into the reasons for such a situation, (b) the occupational status of vocational products, (c) the specific need for vertical mobility and its nature, (d) the kind of support system required for self-employment, (e) the employers' perception of occupational requirements, (f) the need for training and retraining of vocational products, and so on.

One of the studies reported is by Pillai, S.S. and Srinivasan, R. (1988b) who surveyed the students' priorities in technical education. Three hundred and fifty-four polytechnic students from nine polytechnics in the four southern states formed the sample. The study revealed that nearly 2/3rds of the male students joined the courses to get a job and start earning early for supporting their families. However, respondents gave the least preference to getting self-employed. Getting employed nearer to their towns was the reason for preferring polytechnic courses given by 74% of the women respondents. Priorities rated by those opting for engineering subjects were: (a) easiness in getting a job (54%); (b) for getting a job nearer to their native places (58%); (c) acquiring proficiency in skill (55%); (d) demand only the minimum years of study (53%); (e) opportunities for earning extra money (52%). Priorities rated by students opting for non-engineering courses were: (a) possibility of getting a job without waiting for long (56%); (b) getting a job nearer to their places of residence (55%); (c) involving the minimum years of study (51%).

Joshi, L.N. (1992) conducted the other study on vocational achievement and problems faced by students after passing the +2 vocational examination. The study, which included 72 vocational products of Rajasthan, found that only 12.8% of them were self-employed. The percentage of students obtaining wage employment was also similar. 7.2% were in vocations other than those they had studied. 15.4% were unemployed and 51.6% had opted for higher education. No student could get loans from any agency. A large number of students found the theory portions of the vocational

curriculum very difficult. Their practical training was inadequate due to lack of tools, equipment and materials. Even those students getting jobs remained dissatisfied because of inadequate salaries, lack of desired competencies and insecurity of jobs.

Miscellaneous Studies

In addition to the studies reviewed above a number of miscellaneous studies on topics related to vocational development, women technicians, vocational courses for the disabled, self-perception of technical teachers, occupational information, teaching-learning systems, etc., have also been reported which are reviewed below.

Sharma, A.N. (1987) studied the effectiveness of the vocational exploration programme at secondary school level for vocationalisation of education. The study indicated that vocational exploration programme was highly significant in attaining its objective. It was also found that both the high and low intelligence groups gained significantly.

Srivastava, L. (1988) studied the influence of some variables—academic achievement, personality, socio-economic status—on vocational development. The study concluded that vocational development was related to academic achievement and socio-economic status but was not related to sex and different levels of education.

Saxena, S. (1988) studied the pattern of vocational development in students and also the relationship between grade level and vocational maturity. It was found that XII graders were more mature vocationally than XI graders and similarly XI graders were vocationally more mature than X graders. XI graders were also found to be having more self-knowledge, goal-selection skill and problem-solving insight in the career decision-making process than XII graders.

Pillai, S.S. and Srinivasan, R. (1988a) studied the occupational experiences of women technicians. Analysing the responses from 52 respondents, it was indicated that women

technicians working at the faculty in polytechnics found their work interesting. Above 50% of the respondents did not face any difficulties in carrying out their duties. All the respondents had a friendly and normal relationship with their peers and superiors. While positive aspects of their job centered around the relevance of polytechnic education to on-the-job performance, ability to adapt easily to job expectations, service security and quest for fresh and new knowledge, the distressing factors included 'salary not commensurate with the strain involved', 'no time for other matters' and negligible incentives.

Pillai, S.S. and Srinivasan, R. (1989) made a comparative analysis of occupational experiences of technical and non-technical women employees. Thirty-one women employees from two states of Kerala and Tamil Nadu responded to the questionnaire. Of these 55% were employed as faculty in schools and polytechnics whereas the remaining 45% worked as typists, clerks and in similar positions. The study revealed that 74 % of the non-technical personnel had very little interest in their jobs. The respondents expressed having smooth relationship with their male colleagues. A striking difference observed in their perceptions was that while the technically qualified women expressed having a quest for more knowledge and expertise no one in the other group endorsed the view.

Sinha, M.P. (1988) undertook a survey of cultivation of edible mushrooms of Orissa as a project. He came out with a systematic account of 107 species belonging to 13 families of *Agricales*.

Srinivasan, R. (1988) studied the self-perception of technical teachers. The study revealed that none of the variables—age, experience and position—showed a significant relationship with self-perception.

Muthiah, P.N. (1989) surveyed the vocational education system for the disabled in Tamil Nadu. The study found that the facility of free boarding and lodging is enjoyed mostly by orthopaedically handicapped students. Medical

attention is given to all mentally retarded children. Disabled students found it difficult to cope up with the school programme resulting in disciplinary problems. The vocational training imparted was not in accordance with the interests and aspirations of the children. These instead reflected the needs and requirements of the institutions.

Pal, M. (1990) studied the effect of supervisory style and locus of control on the job satisfaction and performance of industrial workers. The study concluded that those operators were higher on job satisfaction and had more positive attitude toward supervisors, who perceived their supervisors to be democratic, high on consideration or initiating structure or high on both. While the job satisfaction of the operators was highest under the supervisors who rated themselves as democratic and were also rated by their operators to be so, it was lowest under the supervisors who rated themselves to be democratic but were rated by their operators to be autocratic. The study also found internally controlled operators showing more positive attitude towards their supervisors than externally controlled operators.

Mehta, P.H. and Gupta, N. (1990) probed into the question: "Vocationally who is better informed?" Among other things the study found that the majority of students lacked adequate and correct information about the occupations they expected to enter. The study also indicated that girls required information and encouragement to take up new avenues and non-traditional fields.

Sastry, L.S. and Pillai, S.S. (1989) developed an action plan to improve the standards of workshop training in polytechnics. For this purpose they systematically analysed the content and process of workshop training being followed. It was found that the students could not complete the required number of jobs in the workshop for which they gave many reasons like non-availability of material, equipment or specific guidance and non-familiarity with the

measuring devices. While workshop superintendents were in favour of standardizing the jobs, the staff opined that students can be motivated by giving them jobs on utility articles.

Pillai, S.S. and Srinivasan, R. (1990a) made a survey of problems of technical students. It was found that 52% of the students had difficulty in completing all laboratory/workshop exercises in time. The students also expressed that they were neither fluent in oral nor written communication.

Bhattacharya, S.K. (1992) investigated the problem of preparing students to meet the challenge of the rapidly changing technological milieu. The study aimed at developing and experimenting with work-bench-oriented and also classroom based interactive teaching-learning models. Two hundred and seventy-five students and 27 polytechnic teachers, along with 66 small, medium and large scale industries selected through the stratified random sampling procedure, formed the sample. On the basis of an analysis of requirements and benefit zones of the four interactive teaching-learning models using cybernetic modelling, it was concluded that an eclectic approach to the design and development of an interactive teaching-learning model using combinations of items under the four models leads to the development of all such abilities as are required by the world of work. Experimentation led to the increase in performance of students, both in the State Board examination and in solving open-ended problems.

UNRESOLVED ISSUES AND PROBLEMS

In the context of technical and vocational education, research is not only what one does to obtain a Ph.D. degree, but it has also to be viewed as an innovative way of accomplishing things, of doing things better, of discovering new relationships among facts. It is exploration of the unknown through observation, experimentation and other forms of systematic enquiry followed by an objective and penetrating analysis and formulation of conclusions. The following are

some of the major issues for research in the area of vocational and technical education.

ISSUES RELATED TO POLICY, MANAGEMENT AND PLANNING

While technical education has a time tested management structure, the CSS on vocational education at the +2 level envisages an elaborate management structure at the national, regional, state, district and institutional levels. Although the setting up of the management structure is an essential requirement for the successful implementation of the programme, many states/UTs have not yet set it up as envisaged in the scheme. Various issues related to management structure are:

- identification of the critical weaknesses in the existing system and actions needed to address those weaknesses;
- difficulties in setting up of the given management structure and ways to overcome those difficulties;
- Should the central assistance be linked with the setting up of the management structure by the state/UTs?

While planning the programme of vocationalisation of education it was thought of as a continuum right from Class I and not as an isolated and sudden phenomenon at the end of Class X. As per the policy documents there will be creative and self-expressional activities at the primary stage, exploratory activities at the upper primary stage, pre-vocational courses at the secondary stage and vocational courses and a Generic Vocational Course at the higher secondary stage. But unfortunately, the programme of Work Experience which should in fact provide a base for later vocationalisation has remained neglected and disjointed, because of which the programme of vocationalisation has not received the desired attention from the student community. How can the programme of Work Experience be strengthened? Can there be a core curriculum common to all schools in the country? How to maintain a balance among different types of activities so that due emphasis

is laid on productive, repair and maintenance and community service activities? What should be the strategies to implement pre-vocational courses and how to link them with later vocationalisation?

There are issues related to equivalence and recognition of vocational education courses. The problems become complex when efforts are made to eliminate overlaps and duplication between the programmes run by the Ministry of Labour and Ministry of Human Resource Development and working out their spheres of operation. How to establish equivalences between the certificates issued by the various Boards for the +2 vocational stream and those by the Industrial Training Institutes (ITIs). Inter-state equivalence of certificates to vocational pass-outs at the +2 stage, recognition of the +2 vocational stream students for employment and also for admission to suitable university courses, amendment of recruitment rules both at the central and state levels are other relevant issues in this context.

The present model of technical education is institutional whereas that of vocational education is a collaborative one. Further, polytechnics and ITIs are run in separate self-contained institutions while vocational courses have been introduced in the existing general education +2 institutions. There is a need to study the relative effectiveness of each in terms of quality of training, cost and viability. What type of vocational institution is suitable for remote, hilly and rural areas where the number of students per course may be very small? Do we require separate residential vocational schools to attract more girls to the vocational stream? Is there a possibility of levying educational cess or giving rebate in taxes to industrial houses to obtain positive support from them in terms of expertise and facilities for practical training/on-the-job training?

A computerised Management Information System (MIS) has been developed for the vocational education programme at the +2 stage. The technical education system, too, is feeling a strong need to initiate such a monitoring

system. Establishing comprehensive MIS, software development, training of functionaries and review of the system periodically are other issues which need deeper insight.

The needs of vocational training for out-of-school youth, destitute women, special groups like Scheduled Castes, Scheduled Tribes and working learners' require to be comprehensively studied not only to develop an effective non-formal system of vocational education but also the role of voluntary organisations in undertaking such innovative projects which are need based and locale specific.

ISSUES RELATED TO CURRICULUM AND INSTRUCTIONAL MATERIAL

Most of the implementing states and Union Territories have generally followed the nationally recommended curriculum design with certain modifications as per their local or regional requirements. The selection of the components of the course structure and their respective weightages in terms of time are neither based on empirical findings in the Indian context nor any worthwhile researches have so far been conducted, except a few routine appraisals to establish their appropriateness and effectiveness in terms of developing the desired level of competencies and its implementability within the present organisational set-up.

Mishra, A.K. (1991) reviewing the studies done to identify problems in implementation of vocationalisation of higher secondary education states that "... only eight states have developed any instructional materials at all and that too in a much smaller number of areas than needed. The studies conducted on implementation in the states recently have brought out a general paucity of print materials and the difficulty experienced by students on this account. The national programme of instructional materials development has its own tears to shed. A modest programme since 1984 yielded about eighty titles of instructional materials which would partly meet the requirements of fourteen vocational courses in the form of reference books, teacher

guides, practical manuals, etc."

Therefore, there are a large number of issues and concerns which cry for systematic research efforts both at the national, state and institutional levels. These include the extent of variation in curriculum design and its rationale and effectiveness in developing the desired terminal competencies; the methodology of developing competency-based curriculum and its proper implementation. There are questions like: Should there be common instructional materials for all the vocational courses throughout the country or should separate materials be developed by individual states? How to ensure a time frame, adequate coverage, comparable standard and quality? What type of format(s) will be most suitable in keeping with the nature of technical and vocational education content? These questions need to be suitably answered through systematic investigations. In-depth studies need to be undertaken to arrive at the threshold institutional infrastructural facilities required for each vocational course keeping in view the cost-effectiveness aspect.

Issues Related to School-Industry Linkage

The application of new technologies by the world of work is a major challenge for the whole education system, and for technical and vocational education in particular. Curricula now emphasise multiskilling, interfacing education and productive enterprises, entrepreneurship and continuing education. Further, courses need to be adjusted frequently to cater for innovations and changes in work requirements. Effective liaison with industry, agriculture and business enterprises need to be further developed. Therefore, the school-industry linkage is yet another area which requires investigation to suggest ways and means of establishing functional and effective collaboration with industry, business, health and other service organisations and utilising optimally the available facilities. The modalities of collaboration in terms of teacher training facilities; library; extent of collaboration—with

institutions/with industry; identification of sites for on-the-job training and apprenticeship; problems of commuting by students and teachers; supervision of collaboration and training; and evaluation are some of the issues to be tackled. Mishra, A.K. and Sen Gupta, M. (1991) have found "the development of the school-industry linkage in respect of various phases of programme implementation as the most vital aspect for greater internal and external efficiency of the school based vocational education programme." To date, although there are excellent examples of such linkages in nearly all the states, in most of them such linkages exist more as an exception rather than the rule.

Issues Related to Vertical Mobility

The National Policy on Education, 1986, stipulates that "graduates of vocational courses will be given opportunities, under predetermined conditions for professional growth, career improvement and lateral entry into courses of general, technical and professional education through appropriate bridge courses." But suitable vertical and horizontal linkages on a long-term basis have not yet been established although there have been *ad-hoc* arrangements to circumvent the problem. Experimentation and research are urgently required to redefine criteria of admission to existing professional/para-professional/technical courses; design and develop suitable higher level diploma or degree courses; design bridge courses to facilitate student's entry into science, engineering, medicine or agricultural streams, coupled with specially designed guidance and counselling services.

ISSUES RELATED TO TEACHERS

The CSS envisages that "vocational courses will be conducted with the help of full-time as well as part-time teachers". Shortage of competent vocational teachers is a phenomenon common to every implementing state which is posing a serious hurdle in the way of imparting quality vocational education. A variety of useful research

studies can be designed to study: (a) the status of vocational teachers, (b) the changing vocational teacher competencies, (c) profile of full-time and part-time teachers, (d) career advancement for vocational teachers, (e) training of vocational teachers including pre-service and in-service training models, training curriculum, training institutions, training duration and mode and methodology of training, (f) training of teacher educators.

Students and Their Future

Sen Gupta, M. (1981) found that students from middle and lower middle level social status in general today want to settle early in life and are inclined to join vocational courses if these are predominantly practice-oriented such that they may obtain a job at the end of the course. The studies conducted by the NCERT also found that the majority of the students in the vocational stream were not first-generation learners, did not belong to the weaker section of the society, came from middle-income groups and were middle-level academic achievers. While, on the one hand, it is true that there is a general craze for university degrees, collection of data on a macro level is likely to reveal that there are millions of young people desirous of early entry into the job market. Studies are required to identify the most vulnerable student population who are disgusted with the general irrelevance of higher education which pushes them into the employment market with hardly any preparation for it.

The recent studies conducted by the NCERT have brought to light the fact that a large number of students, who have opted for vocational courses have great expectations from these courses as being economically rewarding. These students have also expressed their dissatisfaction with the poor practical training and lack of effective interaction with the industrial sector. As regards the academic and socio-economic background of the students, the findings brought out the fact that students from the middle academic group dominate the

vocational stream. Another finding contrary to popular belief was that the students from the SC/ST and backward castes were fewer than those belonging to the 'other' castes. Also, those from the middle-income groups had greater representation than the lower-income groups. This goes to support the fact that vocational preferences are making inroads into the class of society which might have been thought of as being less inclined to undergo such courses. However, there is need to replicate or take up more in-depth studies on a much larger scale in each implementing state to clearly bring out the student profile and actual population which is presently being benefited by the vocational courses. The studies should also clearly bring out whether the outreach of vocational courses has been adequately extended to girls, SC/ST, OBC, handicapped and other deprived and weaker sections of the society, and if not, what remedial steps are required in this direction.

Ever since the inception of vocational programmes, doubts have been raised about the capabilities of higher secondary schools/junior colleges to impart meaningful training, about the mental and physical maturity of students to step into the world of work after completion of the vocational programmes, and also about the so-called democratic right of every student to join college or a university which is affected due to the terminal nature of the vocational courses in some states. Doubts have also been raised about the vocational competencies and employability of the students and so on (Dhote, A.K. 1984). Studies are required to clear these doubts and popular beliefs. These may attempt to answer question like: (a) how is the overall picture of the vocational programmes in states? (b) what is the vocational area-wise position? (c) which are the promising vocational courses? who aspires more for higher education? (d) do identical courses have similar performance in different states? (e) does one and the same vocational course fare equally well in all institutions offering it? (f) what is the course-

wise position of vocational products who are getting absorbed? (g) what is the position as regards self-employment by vocational products? (h) how useful have the guidance services been in the placement of students? and so on.

Quality of Training

The acid test of the success of vocational and technical education lies in the quality of the training imparted. NCERT studies (Sen Gupta, M. and Dhote, A.K. 1990; Chopra, R. 1990; Misra, C.K. and Verma, A.P. 1990; Sacheti, A.K. and Raizada, P. 1990; Raizada, P. and Sacheti, A.K. 1990; Vaid, D.K. and Sen Gupta, M. 1990; Verma, B. 1990) in many states have brought out the fact that while a few institutions have organised effective training in each of the states, in a number of states the quality of practical training has left much to be desired in the majority of institutions. Issues like provision of entrepreneurship and self-employment support, availability of suitable instructional material and teacher training, employer's assessment of quality of training, performance of vocational and technical products, on-the-job training and apprenticeship, etc. if studied in-depth and feedback is given to the system highlighting the weak points, qualitative improvement can be brought about by undertaking suitable definite actions.

Other issues

Apart from the above broad areas of interest to researchers there are many more miscellaneous issues which can form useful research topics. These will include the funding and monitoring of vocational and technical education, district-level manpower planning, methodology of skill development, use of educational technology, preparation of multimedia packages, acceptability and community response, financial resources, selection of students, sponsored or job-linked courses, enterprise-based training, continuous evaluation, competency-based curriculum and teacher training and many others.

BROAD IMPLICATIONS

Since the adoption of the revised recommendations concerning technical and vocational education in 1974, many member countries of UNESCO undertook reforms of their educational systems. In the late 1970s most countries instituted new legislation and embarked on wide-ranging structural changes in their educational systems to give a large place to technical and vocational education and training at all levels. These reforms were designed not only to meet developmental or manpower needs, but also to democratise education in such a way as to broaden opportunities for all to develop their capacities to the full, both in individual terms and in terms of their role in society and the working world.

In India the programme got implemented from 1976-77. Consequently, research efforts too picked up momentum only after 1977. By 1985-86, the programme covered only about 2.5% of the student population at the +2 level. As at present, 24 states and five Union Territories are implementing the scheme under CSS. By the end of 1991-92, 12,543 vocational sections were approved in 4,400 schools, thereby creating facilities for diversion of about 6.27 lakh students at the +2 stage. This accounted for 9.3% of students enrolled at this stage.

As far as research in technical and vocational education is concerned, the researchers must address the right and relevant questions. Researches must be organised on a continuous basis so that the results have an impact. Considering the nature and variety of unresolved issues and problems as discussed in earlier sections, and keeping in view the significance of this area of education for national development it is obvious that the volume of issue-based studies carried out in the country in this area so far is grossly inadequate. Only rarely have studies been done on what happens to people once they graduate from a technical and vocational education programme over a period of time. The answer to this question would prove invaluable in identifying what could be done to

bring about better adjustments between education, training and the world of work.

Further, an imbalance in coverage of areas is observed. No study has been reported which is philosophical, analytical and critical in nature. The sociology of vocational-technical education, comparative studies, the economics of the field, issues in and manpower planning, management aspects, curriculum analysis, and organisational and administrative issues have received little or no attention. Almost all the studies reported a lack of theoretical perspective.

A theoretical framework and foundations of vocational education for balanced development of vocational and technical education in the Indian cultural context is just not available. There is also a need to develop indigenous tools and techniques for measuring a variety of variables in this area of education. It would be desirable to constitute interdisciplinary research teams at the national and state levels who should carry out studies regarding manpower analysis, financing, psychological and sociological aspects, cost-effectiveness, non-formal approaches to reach deprived and special groups, curriculum analysis, entrepreneurship and self-employment and social rates of return for specific programmes. The findings of these studies and data collected through a Management Information System (MIS) should be continuously fed back to policy-makers, planners, employers, consumers of education and educational institutions.

Taking a more global view it is observed that four major problem areas common to most of the developing countries are: (a) attitudes of resistance to change and negative views as to the value of technical and vocational education, (b) financial restraint on development, (c) lack of coordination between education and employment, (d) problems of implementation and improvement. It will be seen that all these problems are, in fact, closely interlinked and no one problem can be solved in isolation from another.

The trends of research in technical and vocational education in twenty-three countries

indicate that, generally, structures and institutions for a coordinated research effort for the development of technical and vocational education are either non-existent or very weak. In most of the countries, research is being carried out in one or several institutions, but few report a concerted policy on research upon which to base planning and policy-making. For the most part, research in the area of manpower planning, employment trends and economic development in general is carried out separately from educational research. Further, in view of the existing centre-state relations in the field of education, although the centre frames the policy and provides guidelines it is the states which utilize the sanctioned funds according to their own policies. There exists no joint mechanism today for overseeing the process of implementation except the mechanism of consensus, persuasion and through meetings, conferences and dialogues. A close monitoring at the central level on a continual basis is essential for proper and speedier implementation of the CSS. Vocational education being a new entrant into the school system, it requires thorough pre-planning and preparation in terms of curriculum, instructional material, teacher training and required linkages. A number of studies at the state level have shown how the scheme has suffered because of poor preparation before launching. It is high time that definite steps are taken for providing pre- and in-service training for producing competent vocational teachers. It is the quality of training and performance of the vocational and technical graduates which should guide any future planning in this regard. In spite of the policy directions, the outreach of vocational courses has not yet been extended to girls, SC/ST, OBC, handicapped and other deprived groups in a planned manner. Further, it will be dangerous to neglect the rural sector in the process of development. It is necessary to involve rural youth, especially those disengaged due to mechanisation of agriculture, in self-employment after imparting training in rural-based occupations. Establishing equivalences between

the certificates issued by various Boards for the +2 vocational stream and those by the ITIs, recognition of the +2 vocational stream students for admission to universities, and operationalisation of MIS are other imperatives in this context.

Developing effective and functional linkages between the school/polytechnic and the industries is yet another area in which interventions have been suggested by many researchers. There is, therefore, need to extend policy support to the involvement of industry for greater relevance of education to the world of work. In order to inculcate among students proper work ethics and work culture, technical and vocational knowledge and skills of generic nature should constitute an integral component of general education which should commence from the early stages of education. Both full and part-time opportunities should be made available for retraining and continuing education to meet changing and emerging skill needs by using various modalities such as on-the-job, off-the-job and distance learning.

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