CHAPTER 4

INDUSTRIAL, VOCATIONAL AND TECHNICAL TRAINING INSTITUTES AT NATIONAL AND INTERNATIONAL LEVEL

4.1 VOCATIONAL EDUCATION & INDUSTRIAL TRAINING

Vocational Education & Industrial Training (VET), also called Career and Technical Education (CTE), prepares learners for careers that are based in manual or practical activities, traditionally non-academic and totally related to a specific trade, occupation or vocation, hence the term, in which the learner participates. It is sometimes referred to as technical education, as the learner directly develops expertise in a particular group of techniques or technology. Up until the end of the twentieth century, vocational education focused on specific trades such as for example, an automobile mechanic or welder, and was therefore associated with the activities of lower social classes. As a consequence, it attracted a level of stigma. Vocational education is related to the age-old apprenticeship system of learning.

However, as the labor market becomes more specialized and economies demand higher levels of skill, governments and businesses are increasingly investing in the future of industrial training through publicly funded training organizations and subsidized apprenticeship or traineeship initiatives for businesses. At the post-secondary level vocational education/industrial training is typically provided by an institute of technology, or by a local community college.

Vocational education has diversified over the 20th century and now exists in industries such as retail, tourism, information technology, funeral services and cosmetics, as well as in the traditional crafts and cottage industries.

4.1.1 Australia

In Australia, industrial training & vocational education and is mostly post-secondary and provided through the Vocational Education and Training (VET) system by Registered Training Organisations. This system encompasses both public and private providers in a national training framework consisting of the Australian Quality Training Framework, Australian Qualifications Framework and Industry Training Packages which define the assessment standards for the different vocational qualifications.
A crucial feature of the Training Package system (which accounts for about 60% of publicly-funded training and almost all apprenticeship training) is that the content of the vocational qualifications is theoretically defined by industry and not by government or training providers. A Training Package is "owned" by one of ten Industries Skills Councils which are responsible for developing and reviewing the qualifications.18

The National Centre for Vocational Education Research or NCVER is a not-for-profit company owned by the federal, state and territory ministers responsible for training. It is responsible for collecting, managing, analysing, evaluating and communicating research and statistics about vocational education and training (VET).

Technical and Further Education or TAFE institutions provide a wide range of predominantly vocational tertiary education courses in Australia. Fields covered include hospitality, tourism, construction, engineering, secretarial skills, visual arts, computer programming and community work.

Individual TAFE institutions are known as either colleges or institutes, depending on the state or territory. TAFE colleges are owned, operated and financed by the various State and Territory Governments. This is in contrast to the higher education sector, whose funding is predominantly the domain of the Commonwealth government and whose universities are predominantly owned by the state governments.

4.1.2 Finland

In Finland, the Industrial & vocational education belongs to the secondary education. After the nine-year comprehensive school, almost all students, which is an institution preparing students for tertiary education, or a vocational school. Both forms of secondary education last three years, and give a formal qualification to enter university i.e. Finnish polytechnics.

The education in Industrial Training school is free, and the students from low-income families are eligible for a state student grant. The curriculum is primarily vocational, and the academic part of the curriculum is adapted to the needs of a given course. The vocational schools are mostly maintained by municipalities.

With a completed secondary education one can enter higher Technical Institutes or Universities. Because in the Technical Institutes curriculum is work-oriented, its graduates often have difficulty in passing the entrance exams of the universities.

4.1.3 Austria, Germany and Switzerland

Technical education is an important part of the education systems in Austria, Germany, Liechtenstein and Switzerland (including the French and the Italian speaking parts of the country) and one element of the German model.

For example, in Germany a law was passed in 1969 which regulated and unified the Industrial & vocational training system and codified the shared responsibility of the state, the unions, associations and chambers of trade and industry. The system is very popular in modern Germany: in 2001, two thirds of young people aged under 22 began an apprenticeship, and 78% of them completed it, meaning that approximately 51% of all young people under 22 have completed an apprenticeship. One in three companies offered apprenticeships in 2003; in 2004 the government signed a pledge with industrial unions that all companies except very small ones must take on apprentices.19

The vocational education systems in the other German speaking countries are very similar to the German system and a vocational qualification from one country is generally also recognized in the other states within this area.

4.1.4 New Zealand

New Zealand is served by 41 Industry Training Organisations(ITO). The unique element is that ITOs purchase training as well as set standards and aggregate industry opinion about skills in the labour market. Industry Training, as organised by ITOs, has expanded from apprenticeships to a more true life long learning situation with, for example, over 10% of trainees aged 50 or over. Moreover much of the training is generic. This challenges the prevailing idea of vocational education and the standard layperson view that it focuses on apprenticeships.

The best source for information in New Zealand is through the Industry Training Federation. Polytechnics, Private Training Establishments, Wananga and others also deliver vocational training, amongst other areas.

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4.1.5 United States

In the United States, the approach varies from state to state. Roughly 70 percent of all post secondary Industrial Training and vocational education is provided by proprietary (privately owned) career schools. The remaining 30 percent is provided primarily by two-year community colleges, which also offer courses transferable to four-year universities, military technical training, and government-operated adult education centers. Several states operate their own institutes of technology which are on an equal accreditation footing with other state universities.

Historically, junior high schools and high schools have offered vocational courses such as home economics, wood and metal shop, typing, business courses, drafting and auto repair, though schools have put more emphasis on academics for all students because of standards based education reform. School to Work is a series of federal and state initiatives to link academics to work, sometimes including spending time during the day on a job site without pay.

Federal involvement is principally carried out through the Carl D. Perkins Career and Technical Education Act. Accountability requirements tied to the receipt of federal funds under this Act help provide some overall leadership. The Office of Vocational and Adult Education within the US Department of Education also supervises activities funded by the Act.

The Association for Career and Technical Education (ACTE) is the largest private association dedicated to the advancement of education that prepares youth and adults for careers. Its members include CTE teachers, administrators, and researchers.

4.1.6 United Kingdom

The system of vocational education in the UK initially developed independently of the state, with bodies such as the RSA and City & Guilds setting examinations for technical subjects. The Education Act 1944 made provision for a Tripartite System of grammar schools, secondary technical schools and secondary modern schools, but by 1975 only 0.5% of British senior pupils were in technical schools, compared to two-thirds of the equivalent German age group.
Successive recent British Governments have made attempts to promote and expand vocational education. In the 1970s, the Business & Technician Education Council was founded to confer further and higher education awards, particularly to polytechnics. In the 1980s and 1990s, the Conservative Government promoted the Youth Training Scheme, National Vocational Qualifications and General National Vocational Qualifications. However, youth training was marginalised as the proportion of young people staying on in full-time education increased.20

In 1994, publicly-funded Modern Apprenticeships were introduced to provide "quality training on a work-based (educational) route".21 Numbers of apprentices have grown in recent years and the Department for Children, Schools and Families has stated its intention to make apprenticeships a "mainstream" part of England's education system.

### 4.1.7 Education and Training System in Singapore

A vocational and technical training system aimed at meeting the needs of industry is by its very nature dynamic. The training system has to be reviewed and restructured periodically in order to remain relevant to the social and economic needs of the country. This paper identifies and discusses the recent challenges faced in vocational training development in Singapore and thereby provides an insight on the underlying philosophy, decisions and rationale which helped to shape the system of training.

Technical skills and capability are crucial to the social and economic development of a country. A vocational training system is very much an integral part of the national educational system and social fabric of the community it is designed to serve. The system is dynamic as it is subjected to the changing needs of education, society and the economy.22

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22 Seng, Law Song. “Director & Chief Executive Officer Institute of Technical EducationSINGAPORE. This paper was first presented at International Conference 'A Skills Respect Culture - A Way Forward to a Winning Nation', Johannesburg, South Africa, 10-11 October 1996.
Changing demands at the workplace, higher aspirations of young people, and an increasing competitive global market pose new challenges and opportunities in shaping the characteristics of a vocational and technical training system.

4.1.8 Dubai Industrial Academy with Industrial Specialised Training Course:

Dubai Industrial City operates the Dubai Industrial Academy (DIA), a vocational training centre, to provide industrial training solutions and serve the needs of the region's industrial sector.

The Dubai Industrial Academy commenced its operation with 199 short-term courses on offer, adopting an 'inclusive approach' and providing a mix of classroom teaching and hands-on practical skills training at its dedicated premises.

The curriculum offers courses covering industrial areas related to oil and gas engineering, Quality, Health, safety and the Environment (QHSE), electrical engineering, instrumentation, chemical process and laboratory, and technical and supervisory development.

All the courses offered are primarily designed to serve six major industrial sectors - beverage, base metal, mineral products, chemicals, transport equipment and...
machinery and mechanical equipment industries - the same six zones that Dubai Industrial City focuses on.

4.1.9 Ireland

Office of the technology transfer

The Office of Technology Transfer at Irish University is the access point and "One Stop Shop" for interaction with industry. This section provides information, how to collaborate with academics, funding information, industry-related events and available technologies.

Role of Technology Transfer Office

- To implement and manage university policies relating to Technology Transfer and Innovation
- To identify and protect the university’s increasingly valuable intellectual property arising from its research programmes, through the development of a strategically balanced IP portfolio in compliance with State and contractual objectives
- To identify, create and develop systems for the establishment of campus enterprise (Spin-Out Companies) and joint ventures (where appropriate) target high potential growth SMEs for joint ventures and enterprise development
- To provide an easy-in route to university research for industry, business, state agencies and local authorities
- To create and develop strategic alliances in Ireland, Europe and the USA to facilitate collaborative research and to facilitate technology and knowledge transfer and the commercialization of research
- To develop training and education initiatives to facilitate technical and business development of indigenous industry
- To work closely with state and regional development agencies and policy makers in respect of establishment and development of indigenous industry
- To create a climate of collaboration with indigenous industry and SMEs across academe and to develop the capability of indigenous industry through technology and knowledge transfer in support of wealth creation
• Work closely with the existing structures for technology transfer, both within university and through the state structures set up for this purpose.\textsuperscript{23}

4.1.10 Kenya: Technical and Vocational Education and Training

Technical and Vocational Education and Training according to most government national development and sessional papers is expected to play two crucial roles in the national social and economic development.

The first role is to provide training opportunities and career advancement avenues for the increased school leavers. The second role is to provide skilled manpower that is needed at all levels of the economy. The skills so developed should be able to lead to self-reliance in the absence of salaried employment and enhance Kenya’s industrialization process.

For TVET to be able to play its role effectively, it is important to ensure that there exists an enabling and TVET friendly environment nationwide. Such an enabling environment can be achieved by putting in place harmonized national TVET policies, provision of adequate funds, developing positive social attitudes towards training and enhanced management. The increased public funding will increase the subsidy among the poor households through loans and bursaries to needy trainees. The government and the private sector should above all recognize that TVET is an investment not a cost, with significant returns including the well being of workers, enhanced productivity, international competitiveness and economic growth in the long run.

Enhanced management will ensure that TVET is well coordinated. This will reduce wastage of resources; improve relevance and retention of training personnel in the country. Managing TVET under various government departments has cost the country dearly in that the sector has stagnated and there have been disparities in the training standards. The current government’s Manifesto has emphasized the development and promotion of TVET sector. This region such Tanzania, Botswana, Zambia and South Africa

4.2 APPRENTICESHIP TRAINING

Apprenticeship is a system of training a new generation of skilled crafts practitioners. Apprentices (or in early modern usage "prentices") build their careers from apprenticeships. Most of their training is done on the job while working for an employer who helps the

\textsuperscript{23} Apprenticeship Act, 1931 Government of Ireland. Oireachtas Copyright Material is reproduced with the permission of the House of the Oireachtas
apprentices learn their trade, in exchange for their continuing labour for an agreed period after they become skilled. Theoretical education may also be involved, informally via the workplace and/or by attending vocational schools while still being paid by the employer.

The system of apprenticeship first developed in the later Middle Ages and came to be supervised by craft guilds and town governments. A master craftsman was entitled to employ young people as an inexpensive form of labor in exchange for providing formal training in the craft. Most apprentices were males, but female apprentices were found in a number of crafts associated with embroidery, silk-weaving etc. Apprentices were young (usually about fourteen to twenty-one years of age), unmarried and would live in the master craftsman's household. Most apprentices aspired to becoming master craftsmen themselves on completion of their contract (usually a term of seven years), but some would spend time as a journeyman and a significant proportion would never acquire their own workshop.

Subsequently governmental regulation and the licensing of polytechnics and vocational education formalised and bureaucratised the details of apprenticeship.24

Modern analogs

The modern concept of an internship is similar to an apprenticeship. Universities still use apprenticeship schemes in their production of scholars: bachelors are promoted to masters and then produce a thesis under the oversight of a supervisor before the corporate body of the university recognises the achievement of the standard of a doctorate. Another view of this system is of graduate students in the role of apprentices, post-docs as journeymen, and professors as masters. Also similar to apprenticeships are the professional development arrangements for new graduates in the professions of accountancy and the law a British example was training contracts known as 'articles of clerkship'. The learning curve in modern professional service firms, such as law firms or accountancies, generally resembles the traditional master-apprentice model: the newcomer to the firm is assigned to one or several more experienced colleagues (ideally partners in the firm) and learns his skills on the job.

4.2.1 Australia

Australian Apprenticeships is the new name for the scheme formerly known as 'New Apprenticeships'. Under the scheme, involving 400,000 people in 500 occupations, the

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Australian Government incentives and personal benefits programme are still the same. Australian Apprenticeships still encompass all apprenticeships and traineeships. They combine time at work with training and can be full-time, part-time or school-based. You can get apprenticeships starting at age 14 if you have a willing employer.25

4.2.2 France

In France, apprenticeships also developed between the ninth and thirteenth centuries, with guilds structured around apprentices, journeymen and master craftsmen, continuing in this way until 1791, when the guilds were suppressed.

In 1851 the first law on apprenticeships came into force. From 1919, young people had to take 150 hours of theory and general lessons in their subject a year. This minimum training time rose to 360 hours a year in 1961, then 400 in 1986.

The first training centres for apprentices appeared in 1961, and in 1971 apprenticeships were legally made part of professional training. In 1986 the age limit for beginning an apprenticeship was raised from 20 to 25. From 1987 the range of qualifications achievable through an apprenticeship was widened to include the certificate of vocational aptitude, advanced technician's certificate, engineering diplomas and more.

4.2.3 Germany

Apprenticeships are part of Germany's very successful dual education system, and as such form an integral part of many people's working life. Finding a full employment without having completed an apprenticeship is almost impossible. For some particular technical university professions a completed apprenticeship is often recommended (food technology) or even mandatory (marine engineering).

Young people can learn one of 356 (2005) apprenticeship occupations, such as doctor's assistant, banker, dispensing optician, plumber or oven builder. The dual system means that apprentices spend most of their time in companies and the rest in formal education. Usually, they work for three to four days a week in the company and then spend one or two days at a vocational school (Berufsschule). These Berufsschulen have been part of the education system since the 19th century.

25 National office of the Department of Education, Employment and Workplace Relations, 16-18 Mort St CANBERRA ACT 2600, Australia
In 2001, two thirds of young people aged under 22 began an apprenticeship, and 78% of them completed it, meaning that approximately 51% of all young people under 22 have completed an apprenticeship. One in three companies offered apprenticeships in 2003; in 2004 the government signed a pledge with industrial unions that all companies except very small ones must take on apprentices.

4.2.3.1 Business Professions

The precise skills and theory taught on German apprenticeships are strictly regulated. The employer is responsible for the entire education programme. Apprentices are not allowed to be employed and have only an apprenticeship contract. The full content of the apprentice education must be provided and taught by the employer. The time taken is also regulated. Each occupation learnt takes a different time, but the average is 35 months.

Thus, everyone who has, for example, completed an apprenticeship as an Industriekaufmann (roughly an Industrial Business Manager) has learned the same skills and has attended the same courses in procurement and stocking up, controlling, staffing, accounting procedures, production planning, terms of trade and transport logistics and various other subjects. Someone who has not taken this apprenticeship or did not pass the final examinations at the Industrial Chamber of Commerce is not allowed to call himself an Industriekaufmann.

4.2.4 India

In India, the Apprentices Act was enacted in 1961. It regulates the programme of training of apprentices in the industry so as to conform to the syllabi, period of training etc. as laid down by the Central Apprenticeship Council and to utilise fully the facilities available in industry for imparting practical training with a view to meeting the requirements of skilled manpower for industry. The Apprentices Act enacted in 1961 and was implemented effectively in 1962. Initially the Act envisaged training of trade apprentices. The Act was amended in 1973 to include training of graduate and diploma engineers as "Graduate" & "Technician" Apprentices. The Act was further amended in 1986 to bring within its purview the training of the 10+2 vocational stream as "Technician (Vocational)" Apprentices.

Overall responsibility is with the Directorate General of Employment & Training (DGE&T) in the Union Ministry of Labour. DGE&T is also responsible for implementation of the Act in respect of Trade Apprentices in the Central Govt. Undertakings & Departments.
This is done through six Regional Directorates of Apprenticeship Training located at Kolkata, Mumbai, Chennai, Hyderabad, Kanpur & Faridabad.

State Apprenticeship Advisers are responsible for implementation of the Act in respect of Trade Apprentices in State Government Undertakings/ Departments and Private Establishments. Department of Education in the Ministry of HRD is responsible for implementation of the Act in respect of Graduate, Technician & Technician (Vocational) Apprentices. This is done through four Boards of Apprenticeship Training located at Kanpur, Kolkata, Mumbai & Chennai.

4.2.5 Turkey

In Turkey, apprenticeship has been part of the small business culture for centuries since the time of Seljuk Turks who claimed Anatolia as their homeland in 11th century.

There are three levels of apprenticeship. First level is the apprentice, i.e. the "cirak" in Turkish. The second level is pre-master which is called, "kalfa" in Turkish. The mastery level is called as "usta" and is the highest level of achievement. An 'usta' is eligible to take in and accept new 'ciraks' to train and bring them up. The training process usually starts when the small boy is of age 10-11 and becomes a full grown master at the age of 20-25. Many years of hard work and disciplining under the authority of the master is the key to the young apprentice's education and learning process.26

In Turkey today there are many vocational schools that train young kids to gain skills to learn a new profession. The student after graduation looks for a job at the nearest local marketplace usually under the authority of a master.

4.2.6 United Kingdom

Apprenticeships have a long tradition in the United Kingdom, dating back to around the 12th century and flourishing by the 14th century. The parents or guardians of a minor would agree with a Guild's Master craftsman the conditions for an apprenticeship which would bind the minor for 5-9 years (e.g. from age 14 to 21). They would pay a premium to the craftsman and the contract would be recorded in an indenture. In 1563, the Statute of Artificers and Apprentices was passed to regulate and protect the apprenticeship system, forbidding anyone from practising a trade or craft without first serving a 7-year period as an apprentice to a master (though in practice Freemen's sons could negotiate shorter terms).

26 http://reference.canadaspace.com/search/Apprenticeship
From 1601, 'parish' apprenticeships under the Elizabethan Poor Law came to be used as a way of providing for poor, illegitimate and orphaned children of both sexes alongside the regular system of skilled apprenticeships, which tended to provide for boys from slightly more affluent backgrounds. These parish apprenticeships, which could be created with the assent of two Justices of the Peace, supplied apprentices for occupations of lower status such as farm labouring, brickmaking and menial household service.

In the early years of the Industrial Revolution entrepreneurs began to resist the restrictions of the apprenticeship system, and a legal ruling established that the Statute of Apprentices did not apply to trades that were not in existence when it was passed in 1563, thus excluding many new 18th century industries. In 1814 compulsory apprenticeship by indenture was abolished.

Employers who offer apprenticeship places have an employment contract with their apprentices, but off-the-job training and assessment is wholly funded by the state for apprentices aged between 16 and 18. In England, Government only contributes 50% of the cost of training for apprentices aged 19 and over.

Government funding agencies (in England, the Learning and Skills Council) contract with 'learning providers' to deliver apprenticeships, and may accredit them as a Centre of Vocational Excellence or National Skills Academy. These organisations provide off-the-job tuition and manage the bureaucratic workload associated with the apprenticeships. Providers are usually private training companies but might also be Further Education colleges, voluntary sector organisations, Chambers of Commerce or employers themselves.

4.2.7 United States

Apprenticeship programs in the United States are regulated by the National Apprenticeship Act, also known as the "Fitzgerald Act".

Traditionally, American students are tracked within a wide choice of courses based on ability, with vocational courses (such as auto repair and carpentry) tending to be at the lower end of academic ability and trigonometry and pre-calculus at the upper end.

American education reformers have sought to end such tracking, which is seen as a barrier to opportunity. By contrast, the system studied, actually relies much more heavily on
tracking. Education officials in the U.S., based largely on school redesign proposals, have chosen to use criterion-referenced tests that define one high standard that must be achieved by all students to receive a uniform diploma. American education policy under the "No Child Left Behind Act" has as an official goal the elimination of the achievement gap between populations. This has often led to the need for remedial classes in college.

Many U.S. states now requiring passing a high school graduation examination to ensure that students across all ethnic, gender and income groups possess the same skills. In states such as Washington, critics have questioned whether this ensures success for all or just creates massive failure (as only half of all 10th graders have demonstrated they can meet the standards).  

4.2.8 Malaysia

The Industry Liaison Office (ILO) of “Universiti Kebangsaan, Malaysia” acts as the matchmaker in facilitating the industry engagement and partnerships with research groups, faculties, institutes and centres. ILO’s mission statement is to promote industry collaboration, technology transfer, commercialization, training, academic programmes, sponsorship. More then the academic affairs, training and sponsorship the Office facilitates the translation of new discoveries and inventions to useful products and services through partnerships between existing companies and/or new startups. At the same time, ILO facilitates the University’s collaboration with industry through industry-sponsored research and joint research and development projects.

4.2.9 Denmark

The Copenhagen Institute of Interaction Design (CIID) is a new initiative happening in Denmark. Aim is to establish a high profile design institute that will encourage a multicultural and multi-disciplinary environment – providing an international setting for new thinking in design and technology.

4.2.9.1 Industry involvement

Corporate relationships will be an intrinsic part of the institute. The last few years have seen the emergence of interaction design departments in companies including

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29 www.pkukmweb.ukm.my
Whirlpool, Sony, Hitachi, and Philips as they recognized the need for the field in the innovation of their product and service offerings.

CIID aims to bridge the gap between academia and industry by encouraging a mutual exchange of people, knowledge and ideas. Our corporate relationships can be categorised in several ways – collaboration, consultation and Corporate Angel sponsorship. We encourage companies to engage in more than one of these categories.\(^\text{30}\)

### 4.3 VOCATIONAL TRAINING (GERMAN MODEL)

The system of vocational training is perhaps the most important component of the German model, and is still very prevalent in the German educational system. In Germany, there is a much heavier emphasis on apprenticeships for skilled positions, taught by expert worker/instructors. As such, there is a lower percentage of university students in Germany when compared to other Western countries, but there is a much lower percentage of persons entering the German workforce with no qualifications. Vocational training is required for a large number of occupations. At the end of vocational training, a highly-regarded certification qualification is awarded that is valid for a range of over 400 occupations. See also Berufsschule (vocational school) section within Education in Germany article.\(^\text{31}\)

### 4.4 KARACHI INSTITUTE OF ECONOMICS & TECHNOLOGY (KIET) PAKISTAN AIR FORCE (PAF)

To provide professional education and to contribute to the development of the industry and economy, PAF-KIET has launched several programs for strengthening of industry-academic interactions. The goal of these programs is to channel the feedback from the industry into curriculum development, faculty development, research & development etc.

#### 4.4.1 Industry Projects

As part of the curriculum, students undertake a major industry project that fulfills the requirements of a selected organization. The project provides the students with the experience of applying concepts, tools and methodologies learned during the course of their academic program. It allows them to personally experience pressures generated by deadlines under constraints of time and resources.

\(^\text{30}\) [http://ciid.dk/education](http://ciid.dk/education)

\(^\text{31}\) [en.wikipedia.org/wiki/German_model](en.wikipedia.org/wiki/German_model)
4.4.2 Guest speaker sessions and seminars

Guest speaker sessions and seminars provide an opportunity to the students and faculty to benefit from the experience of prominent corporate executives and technology professionals. Distinguished speakers are invited from the industry and education sector each week to highlight current issues, trends and concerns of the industry. Students are given the opportunity to interact with these experts and gain their viewpoint on academic concepts that are actually practiced in the industry. These opportunities provide an overall perspective to the students for evaluating theoretical concepts and transforming them into realistic plans.

The internship program offers students a real-life experience of a professional industry environment. Internship is made an integral part of the academic curriculum to expose the student to the working environment of local and multinational work environment during studies. It provides an opportunity to establish professional relationships in the industry that later help the students in promptly getting jobs on graduation. In view of the high expectations of the industry regarding English communication skills on the interns, students must pass an English proficiency test to become eligible for internship placement.

4.5 EUROPEAN SOFTWARE INSTITUTE BIZKAIA-SPAIN

The European Software Institute (ESI) Bizkaia-Spain has now established itself as one of the world's major centres for software process improvement. Its strength lies in close partnership with industry. ESI's business-driven approach focuses on issues that result in a genuine commercial impact, such as reduction of costs and improving productivity. European Software Institute's technical work is driven by the philosophy of bringing measurable business improvements in the management and development of software intensive systems for both individual companies and the software-related industry as a whole. In partnership with its patrons, ESI identifies relevant emerging process improvement technologies. These are matured by methodologies through research, trials and close collaboration with business. Finally, we help companies to adapt the methodologies to their own organisation or industry.

Within this overall framework, ESI's work is divided into four key technology areas; Software Process Improvement, Measurement, System Engineering and Product-Line Based Reuse where COTS Research is allocated.
4.6 NATIONAL RESEARCH COUNCIL CANADA

The National Research Council (NRC), Canada's premier science and technology research organization, is a leader in scientific and technical research, the diffusion of technology, and the dissemination of scientific and technical information. Working in partnership with innovative companies, universities and research organizations worldwide, NRC enhances Canada's social and economic well-being and creates new opportunities for Canadians. Through knowledge, research and innovation, NRC and its partners are expanding the frontiers of science and technology. The Institute for Information Technology is one of the National Research Council's research institutes. Its mission is to assist industry through collaborative research and development projects.

4.7 NATIONAL INSTITUTE FOR PHARMACEUTICAL TECHNOLOGY AND EDUCATION (NIPTE)

The National Institute for Pharmaceutical Technology and Education (NIPTE) is a not-for-profit organization hosted by Purdue University with participation of several leading universities, pharmaceutical companies, which foster collaboration, and undertake research projects, which will bring about the long-term change in how pharmaceuticals are developed and manufactured. Normally, it is not possible to conduct such research in one industry or by a single institution with limited resources. NIPTE, with the support of the pharmaceutical industry, can sponsor such projects of real long-term significance. The National Institute will be a unique place where scientists from the academia, the pharmaceutical industry collaborate to pool their scientific expertise and institutional perspectives to address the technology and educational challenges now facing the pharmaceutical industry.

A team of professional managers and a governing board manages NIPTE with members from the major participating academic institutions and industrial partners. The multi-university, multi-industry governance of the institute will be seek out expertise among the leading universities, the pharmaceutical industry in this country to execute projects that the members of the institute will deem of highest priority.

4.8 THE COLLEGE OF ENGINEERING OF THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Engineering centers, labs and industry affiliate programs operates many unique research centers and laboratories. These centers have been established to address special
interdisciplinary needs in nationally important technological areas. Most of the centers were initiated with federal funds, but presume a significant and growing affiliation with industry.

These centers and laboratories share the common goals of providing superior research capabilities in the fundamental engineering sciences in collaboration with industrial and governmental laboratories. They support graduate student education and enhance rapid technology transfer from the University to industry and the classroom.

4.8.1 Industry and Public Service Project Opportunities

This quarter there are several industry-sponsored projects available, and several public service projects as well. The advantages of selecting these projects are that you get to interact with some interesting people, and you will work on a real problem that needs to be solved.

4.9 CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH (CGIAR), WASHINGTON DC, USA

Despite the many types of public-private interaction research collaborations, technology transfers, research networks, there is limited information on the topic available in the public domain and what information does exist is often difficult to access or of limited analytical use. This is particularly true with respect to public-private partnerships in the CGIAR, where centers may be reluctant to disclose their partnerships because of continued ambiguity over intellectual property rights policy in the CGIAR; the competitive, confidential nature of agricultural biotechnology research; and the persistence of public controversy over biotechnology.

4.10 INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE (IFPRI) WASHINGTON DC, USA

The International Food Policy Research Institute (IFPRI) is conducting research on the challenges to creating and sustaining research partnerships between the private sector and the Consultative Group on International Agricultural Research (CGIAR). In the first phase of this research, we are conducting interviews with individuals such as yourself to learn about your experiences with public-private partnerships. In this context, public-private partnerships are defined as a sustained, collaborative effort between the public and private sectors in which each contributes to the planning and resources needed to accomplish a mutual objective.
4.11 WORLD NUCLEAR UNIVERSITY PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT

4.11.1 Summary of the Partnership's Goals and Objectives

Through a worldwide network that coordinates supports and draws on the strengths of established institutions of nuclear learning, the WNU promotes academic rigour and high professional ethics in all phases of nuclear activity, from fuel and isotope supply to decommissioning and waste management.

While looking to the future, the WNU will strengthen capabilities to manage, and responsibly dispose of, the waste legacy of early weapons and power programmes in compliance with rigorous standards of custodianship and environmental protection.

4.11.2 WNU Activities Underway or in Preparation Include

Leadership development institutes for young and senior professionals. Policy forums for nuclear policy-makers and leaders scientific seminars involving world-class experts on policy-relevant topics specialized training in key professional skills

4.12 INSTITUTES FOR TECHNICAL AND VOCATIONAL EDUCATION AND ENTERPRISES, UGANDA

The objective is to promote cooperation links between institutes for technical and vocational education and industries/enterprise through:

- Exchange of knowledge and know-how and the joint undertaking of research and development projects.
- Acquisition by students and teachers of the experience of life in an enterprise.
- Renewal and adaptation of teaching and training programmes to suit productive work.
- Cooperation between institutes for technical and vocational education and enterprises in Uganda sponsored by UNESCO Regional Office for Education in Africa (BREDA) sought to review and analyze.
- Place and role of technical and vocational education in the education and training system and its linkages with general education.
- Relations between institutes for technical and vocational education and in particular industrial firms, and the official policies governing any existing relation.
• Cooperation links through case-studies highlighting training periods spent by teachers and students in enterprises; the participation of staff from enterprises in teaching and training in technical institutions, and the joint design of projects.

4.13 INDUSTRY INSTITUTE INTERACTION IN ENGINEERING COLLEGES, TECHNICAL INSTITUTES, UNIVERSITIES IN INDIA

4.13.1 Punjab Technical University Jalandhar

The quality-trained manpower attracts enterprises

Under the globalisation and the future growth of economy, the expectation is that, this would usher an era of unprecedented growth of secondary sector in Punjab would have to begin, especially the high-tech industry using state of the art technology. The world over it has been noticed that the cost of trained man power is the most important factor in the technologically advanced world, so now the industries move to the places where trained manpower is available that too at competitive rates. Thus the production of quality manpower with the latest technology will definitely attract the high-tech industries, which are dependant on high technology manpower. Currently it has been noticed that the west world is facing a crisis in this regard of manpower availability at competitive rates. Thus there is an opportunity to be availed now out of this globalisation.

4.13.2 Jadavpur University, Kolkata

With the rapidly changing scenario in industry and academia, the need for these two sectors to work in tandem is necessity for the present and more so for the future. IIPC was formed under the aegis of the AICTE, in 1995, to provide a platform for interaction between Industry and University. On the one hand, Industry will utilize the high-quality knowledge and research of the University community to improve the quality of its product or service, to face the challenges of global competition. On the other hand, University will be benefited in the form of greater financial sustainability, awareness of real-life problems of Industry, improved quality of research and human resources as well as better infrastructure development. IIPC, from the day of its inception to date, has continued to grow steadily and has developed close ties with a large number of industries in private as well as public sectors.

The fundamental and applied research projects unless made usable and viable to the industry would not make much sense. Collaboration is the growing needs of an ever-expanding industrial circuit and researches conducted in the contours of the laboratory,
Industry-Institute Partnership Cell was set up. The Cell bridges the gap between academic research and industry requirements, it streamlines both of them for successful cohabitation and symbiosis. Jadavpur University is one of the foremost Indian Universities that has tried to accomplish this. Established in January 1996 IIPC presently is functioning extremely well and its need is expanding fast.

4.13.3 Shri Govindram Seksaria Institute of Technology and Science, Indore

In the changing scenario of globalization and emerging new technologies, symbolic relationship between Industry and Institute has become indispensable. The premier institute in the region with this extra ordinary facilities and expertise has been interacting with industries for testing, consultancy and project development works. The institute now has come up with a platform/facility as Industry-Institute Partnership Cell (IIPC) sanctioned by the All India Council for Technical Education (AICTE) to act as an interface between the industries and various departments of the Institute to take up collaborative activities for mutual benefit.

4.13.4 Birla Institute of Technology & Science (Bits), Pilani

The Birla Institute of Technology & Science (BITS), Pilani is an all-India Institute for higher education. The primary motive of BITS is to "train young men and women able and eager to create and put into action such ideas, methods, techniques and information". BITS symbolize the maturing of Indian technical ability and "can-do" entrepreneurial spirit, especially as derived from the private sector.

4.13.4.1 Industry-institute interactions

BIT has always been alive towards building up relationship with the industry and over the last 5 decades has fostered effective tie-ups with several leading industries.

The areas in which industry interaction is sought are:

1. Industry participation in Technology Development
2. Academic intervention in specific industry problems
3. Laboratory utilization by the Industry
4. Conducting academic programme in collaboration with the Industry
BIT was also the pioneer in setting up Small Industries Research Development Organization (SIRDO) for providing support to Entrepreneurs for setting up their industry and also has an arrangement with the effective Small Industries Development Bank of India (SIDBI) for establishment of a mechanism for wholesome technology development through setting up Technology Incubation Centre.

BIT has signed Memorandum of Understanding (MOU) with organizations like Larsen & Toubro Limited, Mumbai, Tata Consultancy Services Ltd, Kolkata, Infosys Technology Ltd, Bangalore covering several areas of Industry-Institute Interaction.

4.13.4.2 A professions-oriented gathering over educational experiences (APOGEE)

APOGEE organised by the COSTT an body is the academic festival of BITS. BITS have been organizing this festival for the past 20 years and are rated among the best academic festivals in India.

4.13.4.3 Student aids

The Institute has an EARN WHILE YOU LEARN (EWYLP) scheme for the students of the Institute. Selected students are provided part-time jobs such as tutorial work, office assistance, work in BITS Coop etc.

4.13.4.4 Placements

A separate Unit (Admissions and Placement division and Practice School Division) deals with this important activity. Further, the needs of placement efforts have been formalized, over the years, through large scale campus interviews, whereby about 90 industries send their experts to interview students who are about to graduate. BITS has a remarkable placement record and most students have their careers charted out well before they complete graduation. Around more than 100 companies all over India visit the campus for recruitments.

4.13.5 Sharda Group of Institutions (SGI), Greater Noida

SGI has established close links with several industries, research organizations and institutes of higher learning. The group has signed Memorandum of Understanding (MOUs) with 3SL a leading Delhi based software company to provide industrial training on Live Projects to the students of Computer Engineering and Information Technology, with Prolific Systems & Technologies Pvt. Ltd., Mumbai based company to train faculty and students on Programmable Logic Controls (PLCs) and its industrial automation applications. The MOUs
envisage, among other things, training of SGI staff, guest lectures and projects for the final-year students, placement etc. Several other MOUs with industries and organization to start R&D, consultancy and industrial exposure to the students and faculty are under finalization.

4.13.5.1 Industry linkage

The guiding philosophy of the Group is that the education provided by its constituent institutions should be current and relevant to the needs of the employing organizations. In order to give a practical shape to this philosophy, the individual institutes maintain an effective interface with external world of business, industry and the government to continuously monitor their specific needs and to provide value added courses to meet such needs. The interface also extends to exchange of personnel, practical training of students, consulting and sponsored projects and training and management development programs of in-service personnel. One of the primary concerns of the faculty is to help industry and business to become globally competitive through application of knowledge to the problems of productivity and organizational effectiveness.

Full fledged Placement department operating from corporate office in New Delhi who on a day to day basis interfaces with stalwarts of the industry for arranging guest lectures as well as co-ordinates with various companies for arranging campus interviews. Thus despite downturns in the industrial segment and a dull job market, this institute have been able to place most of our students.

4.13.6 G. B. Pant Engineering College, Pauri-Garhwal

IIP cell, established in 2003 with financial support from AICTE aims at effective, frequent and mutually beneficial interactions with Industry and establishing and exploring proper links with agencies and industries for the development of the Institute.

4.13.6.1 IIP cell-objectives

- To promote, coordinate and maintain Consultancy Services, and to establish and explore proper links with departments, agencies and industries.
- To encourage Industry to collaborate in Industry Study Tour Programme (ISTP) / Intern-ship Programme.
- To encourage industry and organizations for placement and training of students in Industries.
• To support R&D programmes, sponsored and joint R&D projects from industries, in the Institute.

• To conduct Industrial Training and Industrial Visits for the students and faculty. To conduct industrial exhibitions to highlight research facilities and expertise available with the Institute.

• To Maintain and distribute funds obtained from Consultancy Services for strengthening the Institute.

• To encourage training of Industrial personnel in the Institute, exchange of personnel between the Industries and Institute by organizing guest lectures by Industrial experts, evaluation of project work and development of curriculum as per industry needs and other academic work in the Institute.

• To generate funds from industry/other agencies for maintenance and development of the cell.

4.13.7 Kongu Engineering College, Erode

Concept of globalization and liberalization has opened up Indian economy to outside world. There is a global competition among industries towards quality products at a very competitive rate. Hence there is an urgent need for the industries to adopt the latest technologies/developments. It is equally important to keep the employees abreast of the latest technologies with adequate training at regular intervals, in order to improve their knowledge and skills. Similarly there is an urgent need to prepare science and technology students by exposing them to newer technologies and engineering methodologies. These objectives can only be achieved by bridging the gap between industries and the academic institutions.

4.13.8 National Institute of Technology, Durgapur, West Bengal

Because of its convenient location in the midst of a large industrial complex, the NIT Durgapur maintains a regular and worthwhile interaction with the industry. The engineering departments render testing and consultancy services to the neighboring industries. The faculty members along with the R&D cells of the industries take up joint projects on industrial problems. An Industry-Institute Cell has been set up in the institute to look after such activities. As faculty members of various departments visit industries and discuss on industrial problems, the experts from the industries also move to the college to deliver
lectures to the students and to share experiences with the teachers. Industrial visits by the students are a common feature of the NIT.

4.13.9 Bapuji Institute of Engineering and Technology, Davanagere

Bapuji institute of engineering and technology has been striving hard to establish itself as a source of technical know-how for the industries in and around Davanagere. It has been successful to a considerable extent in its endeavor. Many of the industries like M/s Mysore Kirloskar Ltd, Harihar, M/s Shantala gray iron foundry, Shimoga, M/s Associated vacuum engineer Mysore, CMTI, BFW, HMT, ACE designers etc. are having an excellent interaction with BIET. Institute has full-fledged product development center which is undertaking development of products and transfer the technology to the entrepreneurs who are in need.

4.13.9.1 Product Development Centre

Many of the student projects completed had a commercial value. It was felt that at least some of the projects could be taken up further and convert them as commercial products. With this in view and to effectively utilize the talents available with the faculty, a full-fledged “product development center” has been functioning in the institute since ten years. Product development center (PDC) has been very active right from its inception and has clear-cut objectives.

4.13.10 Hardcourt Butler Technology Institute, Kanpur

The IIPC cell has generated revenue of Rs. 28.5 Lakhs by way of consultancy and testing services, Rs. 8.00Lakhs by conducting short-term training programmes. The IIPC cell has organized invited talks of experts from leading industry more than 10 speakers delivered the institute talks. Industries were invited to organize campus interviews for placements of students more than 30 companies have visited so far. The industrial tour programmes were conducted for the students of all the branches in Final year in which student and faculty visited the industries. More than 10-sponsored research project from local industries were attracted by IIPC cell. The IIPC has taken the initiative to create the website of IIPC in which core competencies of institute were highlighted to attract industry for mutual interaction. Facility for LCD multimedia projector, Computer System etc were created out of IIPC Scheme.
4.13.11 Regional Institute of Engineering and Technology

RIMT Mandi Gobingarh, Punjab

RIMT-IET, has set up a comprehensive Training & Placement Department

4.13.11.1 Role and responsibilities

- To provide a vital link between the students and prospective employers.
- To plan and organize career talks & personality development programmes.
- To develop & maintain close liaison with industry / organizations to facilitate placement of students.

4.13.12 Malaviya National Institute of Technology (MNIT), Jaipur

Industries and Technical Institution have a strong mutuality of interest which forms the basis of a partnership between them. This institute has set up an Industry-Institute Partnership Cell. The activities of IIP cell include:

- Developing close links between Industry-Institute by interaction programs. High priority is given to activities designed to bring about improvement in the performance of industries.
- Mobilizing industrial Personnel. A partnership approach.
- Identifying of the present day requirements for professionals (engineers/technologists/managers) and meeting the future human resource needs.

4.13.13 Shri Vaishnav Institute of Technology and Science, Indore

The Industry participation is also evident in a number of Seminars and Conferences organized on regular basis by the Departments of the Institute and Guest Lectures are also organized by leaders from the Industry for the benefit of the Faculty and the students of the Institute

4.13.14 University Institute of Chemical Technology, Mumbai

The UICT stands for a high standard of education, research culture and ethos that have been nurtured over the years and it is fondly hoped that, if admitted you will be part of this rich tradition.
4.13.14.1 Technical education quality improvement programme (TEQIP)

MUICT has been selected as a lead institution under the TEQIP of the Ministry of Human Resource Development, Government of India. The program aims to upscale and support the efforts to improve the quality of Technical Education and enhance the existing facilities of the Institution to be responsive to rapid economic and technological developments occurring both at National and International levels. The Government of Maharashtra, special scheme has released total Rs.100 Millions. Development of Five areas of Excellence, under the activity of research and educational excellence in the five key areas, namely, Process Intensification, Herbal Technology, Biotechnology, Food Technology & Engineering and Polymers & Composites, a large number of sophisticated instruments have been procured. This activity is implemented through a doctoral research programme.

4.13.15 International University for Human Transformation, Raipur (C.G.)

4.13.15.1 Industry orientation

IUHT ensures an effective academic-cum-professional interaction between the institution and industry, which emphasizes on practical orientation. The institutes at IUHT frequently organize visits of students to reputed companies and their plants to facilitate:

- Familiarity with the functioning of organizations as an update of their course content.
- Interaction of students with industry through in-course projects (Practical Industrial Programme-PIP) and summer projects. Structuring to match the changing needs of industry.

4.13.16 Sant Longowal Institute of Engineering & Technology, Longowal, Sangrur, Punjab

The classroom training provides the necessary conceptual background to the students. In order to bridge theory - practice gap, it is important that the students get exposed to day-to-day corporate realities. The objectives of the Institute-Industry-Linkage Project Training are to expose students not merely to corporate corridors but to the corporate action and work culture to satisfying the techno industrial needs of the industries. n a short time, the learning is very fast. They learn new manufacturing processes and also become familiar to industrial procedures and working.32

32 www.sliet.org
4.13.17 Govt. Polytechnics at Dehradun, Kashipur & Nanital

To achieve the objective of IIPC scheme of AICTE following Technical Institutions of Uttarakhand State have established/proposed for IIP Cell:

4.13.17.1 Partnership cell

The main objective of this scheme is to establish Industry Institute Partnership Cell in AICTE approved technical Institutions / technical departments of Universities which will act as liaison centers between industries and various departments of the institutes for activities which are mutually beneficial. AICTE provides grant-in-aid for the creation of cells in selected AICTE approved Technical Institutions.

4.14 INDUSTRY INSTITUTE INTERACTION IN IITS/NITS IN INDIA

4.14.1 IIT Roorkee

Institute Industry Interaction The Institute encourages its faculty, scientists, technicians and students to interact with industry in all possible ways with the spirit of deriving mutual benefit. The major modes of interaction are listed below:

- Professional consultancy by the faculty to industries.
- Industrial testing by faculty & technicians at site or in laboratory.
- Joint research programmes and field studies by faculty and people from industries.
- Visits of faculty to industry for study and discussions or delivering lectures on subjects of mutual interest.
- Visits of industry executives and practising engineers to the Institute for seeing research work and laboratories, discussions and delivering lectures on industrial practices, trends and experiences.
- Memoranda of Understanding between the Institute and industries to bring the two sides emotionally and strategically closer.
- Human resource development programmes by the faculty for practising engineers.

4.14.2 National Institute of Technology, Rourkela

Data shows that following items from local small scale and medium scale industries for active and meaningful interaction:

a) Product range of the industry
b) Plan of problems the industries to go any process/ product development

c) The type of problems the industries face in technologies/ operation

d) The subject/field in which they want a very specific training of their executives/non-
executives

In consultation with National Metallurgical Laboratory, Jamshedpur and Indian
Institute of Technology, Kharagpur, board guidelines have been framed for outside resource
generation through various Industrial testing and Industrial Consultancy Projects. The
guidelines framed by the IIP Cell have received the approval of the Board of Governors of
the Institute.

4.14.3 IIT Kanpur

The Indian Institute of Technology in Kanpur engages in carrying out original
research of significance and development of cutting edge technology. It imparts training to
students so that they become competent and motivated engineers and scientists. The
Institute celebrates freedom of thought, cultivates vision and encourages growth, but also
inculcates human values and concern for the environment and society.

4.14.4 IIT Bombay

IIT Bombay being recognized as one of the centers of academic excellence in the
country. There has been dynamic progress in all academic and research activities, and a parallel
improvement in facilities and infrastructure and is one of the best institutions of the world.

Also besides professional courses it also emphasizes studies in Humanities that help
the students to interact more positively with the society in which he/she lives. The Institute
also contributes to the industrial development and economic growth of the country by
preparing a cadre of engineers and scientists, who provide both man power and support R&D
work for industries in addition to providing facilities for higher education, training and
research in various fields of engineering and technology.

4.14.4.1 School of Information Technology, Indian Institute of Technology Bombay, Powai

The School focuses on technology, applications, and development processes. This
focus makes it mandatory for the School to form a very close relationship with IT companies
and the IT user community. This enables the School to constantly keep itself abreast with
developments and changing industry needs. The relationship also helps it to understand and
adopt new tools, emerging hardware and software platforms, and new areas of applications. The School can evolve several different strategies for creating and sustaining the relationships. Some of these are already proven through the existing relationships between IIT and the Industry.

4.14.5 IIT Madras/Chennai

4.14.5.1 Industrial consultancy

Apart from teaching and research, faculty and technical staff of the Institute take up many assignments of direct relevance to the Industry. This activity is known as Industrial Consultancy and many include one or more of the following.

- Testing and certification of Industrial products.
- Development of prototypes and their testing.
- Exploring new approaches to Design and Manufacturing.
- Help design new products.
- Investigate/correct problems, manufacturing of equipment.
- Offer specialized programs to the Industry to keep them abreast of latest developments
- Takes steps in arranging Training and Continuing Education program
- IITM developed a Center for Industrial Consultancy and Sponsored Research (IC & SR) in the early seventies to promote interaction between the Industry and the Institute.

4.14.5.2 Industry-Institute Interaction in Indian Institute of Technology (IIT), Chennai & Tata Consultancy Services (TCS)

In a concrete step towards promoting industry-institute interaction, Tata Consultancy Services (TCS) and the Indian Institute of Technology (IIT), Chennai, today launched an Academic Centre of Excellence and a user-oriented M. Tech. programme in Computational Engineering. Initially meant for the TCS staff, the new programme seeks to prepare the ground in the country for the future that lies in the realm of 'computation engineering' - combining the latest in computation technology with the needs of mechanical, civil or structural engineering for instance.
4.14.6 IIT Kharagpur

The institute has a separate cell known as the SRIC (Sponsored Research and Industrial Consultancy) cell since 1982 which handles sponsored research projects and industrial consultancy assignments. Also the cell has the infrastructure to simultaneously administer 600 R&D projects.

4.14.6.1 Placement statistics

Table 4.1: The placement statistics for the year 2001-2005

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Tech</td>
<td>96.38%</td>
<td>66.83%</td>
<td>80.48%</td>
<td>93.6%</td>
<td>96.97%</td>
</tr>
<tr>
<td>M. Sc.</td>
<td>61.67%</td>
<td>30.2%</td>
<td>55.56%</td>
<td>71.21%</td>
<td>74.24%</td>
</tr>
<tr>
<td>M. Tech</td>
<td>73.29%</td>
<td>38.86%</td>
<td>39.46%</td>
<td>46.6%</td>
<td>68.58%</td>
</tr>
<tr>
<td>Dual MT</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>88.04%</td>
<td>96.94%</td>
</tr>
</tbody>
</table>

As seen the placement percentage is increasing year by year and at present it provides 100% placement for the students in this institute.

4.14.6.2 Research and development

‘Cryomachining’ is one such technology, which is close to moving to factories from the IIT’s laboratories. This technology, involves the use of liquid nitrogen in industrial metal cutting as a coolant, avoiding the generation of toxic coolant waste. Researchers in the past have tried and failed, to use liquid nitrogen as a coolant whereas IIT- Kharagpur has found a way to do this. This process does not leave behind any polluted residue, as liquid nitrogen evaporates.

- Another important contribution made by the institute is in the field of ‘Microzonation’, using which the safety corridor for a seismic hazard can be ascertained.
- The Institute has also set up a Laser Processing Laboratory to develop industrial application for lasers.
4.14.7 IIT Delhi

The Foundation for Innovation and Technology Transfer (FITT) was established the Indian Institute of Technology Delhi (IIT Delhi).

Mission: To be an effective interface with the industry to foster, promote and sustain commercialisation of Science & Technology in the Institute for mutual benefits. The primary objective of FITT is to market the intellectual ware of IIT to industry on competitive terms and at the same time inject industrial relevance to IIT’s teaching and research activities.

4.14.8 IIT Guwahati

IIT Guwahati has been able to build up the necessary infrastructure for carrying out advanced research and has been equipped with scientific and engineering instruments with a short period of time.

4.14.8.1 Research

IIT Guwahati being a technological institution of national importance has been catering to the modern research needed through its teaching as well as research programs. The research programs are undertaken in terms of consultancy, sponsored projects or in the form of collaborative venture with reputed organization all over the world.

The Institute aims to march forward in the areas of basic and applied research, to generate new knowledge and create knowledge bank, both at the national and international levels.

4.14.9 NIT Trichy

4.14.9.1 Training and placement

The department of Training and Placement has the following functions and responsibilities:

- Organizes and coordinates frequent industrial visits, inplant training and projects with industrial relevance for the students, with the aim of nurturing Industry Institute interaction thus zeroing down the hiatus between the industry and the academia.

- Receives and forwards the feedback pertinent to curriculum improvement from visiting companies to the faculty, to ensure that the curriculum follows the latest industrial trends. Helps every student define his/her career interest through individual expert counseling.
• Makes available updated database and job profile of the companies and thus helps each student analyze and choose company of his interest. The department has in its active file a database of nearly 1500 companies.

• Organizes and coordinates Campus Placement Program, to fulfill its commitment of a job to every aspirant.

• Works towards continuing education for the college employees. Over the years, the department has maintained symbiotic, vibrant and purposeful relationship with Industries across the country. About 125 - 150 companies visit the campus every year.

The overall UG placement from 2001 to 2007 is found to be-

<table>
<thead>
<tr>
<th>Table 4.2: Percentage of placed students-UG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall-UG%</td>
</tr>
</tbody>
</table>

4.14.9.2 Facilities & curriculum activities

Establishing Industry-Institute Partnership/interaction Cell, Organizing Workshops, conferences and symposia with joint participation of the faculty and the industries, arranging for guest lectures, MOU’s between the Institute and industries to bring the two sides emotionally and strategically closer, etc.

4.14.10 IIT Kanpur

4.14.10.1 Academia-industry interaction: hopes and promises

As institutes committed primarily to creation and growth of technological knowledge, the IITs have an important role to play in the industrial sector of the country's economy. It is nearly 25 years since IIT Kanpur began taking cognizance of this fact by way of encouraging mechanisms to foster interaction between the academia and industry. How meaningful has this interaction been over the years and where do we go from here? We consider these questions against the backdrop of the specific needs and expectations of the industry and aspirations of the academia.
Industry's has the resources to invest in new technology development initiatives, but it often tends to rely on bought out technologies, generally from the overseas. This industry segment may also need academic intervention in reverse engineering where the product exists and what is sought to be developed is a process to yield it.

4.14.10.2 Academia aspirations

For academicians, the primary focus of interest is invariably a problem that throws up an intellectual challenge. Technology development initiatives which involve understanding/exploration of a concept/phenomenon and alternative methodologies, etc., related to process and design improvement could be of considerable interest. Such activity consumes both time and effort and the result may often be inimical to what the industry would regard as a wholesome solution.

4.14.10.3 The mismatch

The gap between industry's needs and the academic community's aspirations appears to be considerably large. There exists a strong feeling, at least in the academic circles, that unless technology driven initiatives find a surer place in the industrial sector in this country, the academia-industry interaction is likely to remain confined to developmental activities with limited exploratory or research-based content. Moreover, there appears to be a critical mismatch in relative perceptions of the two on the issue of how technology development is to be achieved.

4.14.10.4 Avenues for future

With technology driven entrepreneurship coming up in the country in a big way, the academia is bound to be more amenable to a closer interaction with industry. Such efforts at the individual level across the IITs have indeed yielded positive results.

4.14.11 National Institute of Technology, Tiruchirapalli

Better interaction between Technical institutions and industry is the need of the hour. This will have great bearing on the Engineering Curriculum, exposure of industrial atmosphere to engineering students and subsequent placement of young graduating engineers in industries across the country. With the advent of globalization and opening up of Indian economy to outside world, competition among industries have become stiff. These objectives can only be achieved well by bridging the gap between industry and the academic institute.

33 Sachchidanand, Department of Electrical Engineering, Indian Institute of Technology, November 1999, Kanpur-208016.
4.15 ROLE OF INDIAN INDUSTRIES ASSOCIATION IN INDUSTRY INSTITUTE INTERACTION IN INDIA

4.15.1 An Association of Small & Medium Industries

Better interaction between institutions and industry is the need of the hour. This will have great bearing on the exposure of industrial atmosphere to the students and subsequent placement. With the advent of globalization and opening up of Indian economy to outside world, industries have to strive continuously to remain competitive. Industry not only draws manpower from institutions but there are other inputs which industry can get from institutions.

We are talking about Industry Institute Interaction (3i) for many years now but the progress is limited to organizing Seminar's, Workshops and setting up of 3i Cells in Universities and Colleges. These cells are generally manned by the faculty/staff whose main job is something else. In my opinion, though Industry as well as Institutions wants to interact but do not have time to do so. The reason is obvious i.e. industries as well as institutions are busy in attending to urgent and routine activities. These are production for industry and fixed curriculums for institutions. Though in the curriculums, students are required to work in industries, popularly known as "Summer Training" yet in majority of the cases this is being done as a formality from both sides. There is therefore the need for more formal mechanism that would strengthen industry-institute interaction.

Business Schools not only should produce the Business Managers but Business Leaders and Entrepreneurs also. It is observed that the focus of the curriculum in business schools is to prepare the students for getting a job and same is the goal of majority of the students.

In the background of above facts and good intensions from both sides, there are some factors, which hinders industry-institute interaction. In my opinion the factors could be: -

- Absence of a full time/exclusive industry-institute interaction cells at both the places, i.e. institutions as well as industry associations.
- Curriculums are rigid and in some cases out dated.
- Serious involvement of industry in curriculum design is lacking.
• More than 95% of the industrial units are in MSME Sector. The involvement of this Sector in the process of industry-institute interaction is negligible.

• There is a problem of Mismatch. The gap between industry needs and the academic community's aspirations appears to be considerably large.

The factors which hinder the industry institute interaction can be tackled provided we ensure the following:

• Full time 3i cells are established by the institutes, industry associations and big industries. These cells should clearly define and publish the goals and key performance areas of interaction. These cells should operate in Single Window concept.

• Curriculums are required & be more flexible so that a student could if required, work in industry for considerable period of time instead of doing some courses in college only but still gain the required credits. I am ware that such initiative will be supported by AICTE also. Industry involvement in curriculum designs review will be helpful in this process.

• Interaction between academic and industry associations can be improved through sharing of expertise at a common platform on specific areas/topics periodically.

• Institutes may take up consultancy services in industry through industry associations for solving specific problems of the industry. All departments of B-school if involved in industrial oriented activities on a continuous basis either in the form of consultancy or sponsored research or for curriculum development, will give better results.

• Industry Association my provide support for basic studies/research undertaken by B-Schools. Institutes faculty may take up projects in industry and students should be involved to execute these projects.

• Industry owners/experts may be invited for lectures/interaction with the students in institutions.

• Access to libraries in institutions if provided to industry, will help both the industry and institutions. Institutions may fix certain fee for such access. Similarly, institutions may have access to the resources available in industry, such as SIISC at IIA.
• Apart from Industry Associations, the Institutions should also establish linkages with Govt. agencies, which are engaged in Industrial development activities.

• Ideally the exchange of industry and institute experts is required i.e. the academia should work in industry for a fixed term intermittently and industry experts should work in institutions.

Indian Industries Association (IIA) an apex body of MSME’s has been trying to have an effective industry-institute interaction for quite sometime now. At IIA we have the following to offer in industry institute interaction:

1) We have established 3i cell which is headed by an expert who have worked for 11 years in institutions, 7 years in industry and 15 years in industry service & consultancy organizations. An MOU has been finalized with IED UP by this cell.

2) IIA have set up a Small Industry Information Service Centre in collaboration with SIDBI at IIA Bhawan Lucknow. The centre is equipped to meet all information needs of prospective & existing entrepreneurs under one roof. Institutes Academia and students can use this centre.

3) IIA can provide experts on curriculum design & development to institutions.

4) IIA is ready to provide a platform for interaction between Academia and Industry through all its chapters.

5) IIA will provide all kinds of support and help to institutes for taking up studies, consultancies and projects in Industry.

6) IIA is helping the institute & students for placements in industry.

4.15.2 LSE Ties Up with PU for Capital Market Course

The Ludhiana Stock Exchange (LSE) has become the first institute in the region to provide training in capital market. The exchange, in association with the Centre for Industry Institute Partnership (CIIPP), Panjab University, has launched a certification programme in capital market with a view to fill the gap for skilled professionals in capital markets in the region.
“With the launch of this programme, LSE has become the first institution in the region and the second in the country to offer such training programme,” said Mr. H.S. Sidhu, Executive Director, LSE.34

The exchange plans to launch a diploma programme in capital market soon. “Besides, PU would soon launch a degree course in capital markets and those who have done this course would get exemption in terms of fee or lectures as we have a tie-up with the university.”

Mr. Sidhu said though such type of training programmes are being offered by the national Stock Exchange (NSE) and the Bombay Stock Exchange (BSE), but those are either offered through online mode or through classroom sessions that are conducted in Mumbai.

The training programmes started by the LSE would include theory and practical lessons in topics ranging from Indian capital market, primary markets, secondary markets, depository system, derivatives market, stock exchanges, risk management in stock exchanges and investor protection.

4.15.3 College-Industry Partnerships Division (CIPD) of the American Society for Engineering Education (ASEE)

The name of this organization shall be the College-Industry Partnerships Division (CIPD) of the American Society for Engineering Education (ASEE).

The purposes of the CIPD are:

a) To assess, recommend and establish policies, which reflect technical interests of CIPD’s College and Industrial members.

b) To provide forums for discussion and information exchange on matters pertaining to the educational preparation of engineers and technicians for practice in industry and subsequent professional development.

c) To initiate special projects which will assist educators and practitioners in implementing special student programs.

d) To stimulate broader industrial representation and participation in ASEE.
e) To work with other segments of ASEE to enhance mutual benefits from education-
industry cooperation.

f) To maintain college-industry alertness to, and understanding of, changing
professional climates in academic and industrial areas.

4.15.4 Message from CEO, Tata Consultancy Services Ltd.

“Since its inception, Tata Consultancy Services Ltd. has been a pioneer and ardent
supporter of industry academia interaction globally. As our country consolidates its position
as a global player in a knowledge-based economy, innovation will be the dominant, driving
factor for economic growth. At TCS, we strongly believe that the culture of innovation can be
fostered through close collaboration between industry and academia. TCS has championed
this movement by establishing an Academic Interface Programme, which has, over the years,
provided sustained support to institutions, faculty and students. I am happy to learn that
Jadavpur University, with whom we have launched a joint higher education programme, has
realized the potential gains of Industry Institute partnership, by forming an Industry Institute
Partnership Cell”.

4.15.5 Industry Institute Interaction with CII, FICCI, ASSOCHAM

Industry, science institutions and other users of the higher education holders be
encouraged and invited to participate in partnering the institutions and university and
vocational training centres.

Identify the specific needs of the industry and Involve Industry in curriculum
development, particularly in courses, which have integral relationship with industrial
process.

Design of research plans, field study, training, curriculum development and other
academic activities should be in partnership with the industry.

Industry should be encouraged to contribute to the academic funds, offer industry
short-term space for practical updates to the professors and vice versa.

With the opening up of the sector or growth and development of the economy in
general, there has to be an enabling environment where the industry along with academia
come forward to contribute towards development of the skilled manpower.
Industries to be provided incentives for making substantial contribution towards education and training. These types of linkages to be developed in all higher education.

Industry Associations like CII, FICCI, ASSOCHAM should encourage and promote industry to mark their projects, after testing quality aspects, to the academia which can deliver quality at low cost. It can be suggested that Companies of 400 – 600 rupees crores turnover should appoint One Academic Quality Assessor, 600 – 1500 crores turnover should have a team of two, and more than 1500 crores turnover should have a team of four professionals in their organization, which should also interact with the academia and provide inputs to both academia and company.

There should be an industry expert nominated in the Independent Accreditation Body.

### 4.15.6 Institute Industry Interaction– Consultancies

The faculty members be engaged in offering consulting services to Industry & Business with a view to developing & nurturing an active interface. Technical consultancy services offered by the faculty members to Industries and businesses, whereas “Management Development Programmes” discusses Faculty of Management Initiatives in this regard. Additionally these interactive consultancies enhance the capacity & motivation of newer faculties and students also get to have better industrial exposures. However, it is an assessment that further strengthening of these interactions with more industry sponsored projects and wider range of problem solving consultancies is the key to acquire and retain better faculty capabilities and would be possible only when we, as a Deemed University, introduce Industry Oriented P.G. Programmes and avail of the services of more and more expert faculties which besides conducting the P.G. Course Curriculum can strengthen the service offerings of the Academy to Industries & Businesses and attract & encourage better responses. This therefore happens to be the major reasons for seeking the Deemed-to-be-University status, so that Industry related curriculum could be encouraged at P.G. Levels.\(^{35}\)

### 4.15.7 Maharashtra Economic Development Council

#### 4.15.7.1 Industry education partnership cell

In India, it is observed that both Industry and Academics are moving on parallel tracks, thereby failing to meet each other’s needs as well as needs of growing economy. As a result, today when Indian Economy is moving towards high growth trajectory, there is an

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\(^{35}\) Education Promotion Society of India, 2006
urgent need for an active and fruitful interaction between Industry & Education. To initiate the process for better Industry-Institute networking in Maharashtra, the President of Maharashtra Economic Development Council (MEDC) mooted the idea of forming a Permanent Cell called, “Industry-Education Partnership Cell (IEPC)”, within MEDC. Maharashtra State Board of Technical Education (MSBTE) has decided to extend their active support & full co-operation to Industry-Education Partnership Cell. As a result, both MEDC and MSBTE have jointly launched IEPC, which has been receiving overwhelming response from Industry, Technical Institutions and Engineering Colleges.

4.15.8 Future Institute of Engineering and Management, Kolkata (FIEM)

Academic Council of the Institute consisting of industry captains closely monitors the development of students for industry orientation and imbibing corporate culture.

FIEM holds institutional memberships of CII, FICCI for closer and continuous interaction with the industry and building effective industry-institute partnerships. The Industry Institute Partnership cell organizes visits to different industrial establishments, extension lectures by industry experts, short-term winter/vocational professional training programmes, seminars, conferences, workshops etc. on a regular basis.

4.15.8.1 "Industry education partnership cell (IEPC)" genesis of IEPC

4.15.8.2 Pre-placement talks (PPT)

The placement programme starts when B. Tech students enter 6th Semester. Several industries are invited to give placement talk. These entail a presentation by the Company to appraise students about their organization.

4.15.8.3 What students look for?

1) Information regarding company profile, growth and performance
2) Industry culture
3) Career opportunities
4) Compensation details
5) Opportunity with the organization presenting their company
These enable the students to evaluate their own interest in the organization and identify an appropriate position for themselves through aptitude, technical and HR test in the particular company.

Placement is just one of the meeting points between FIEM and industry and we strongly believe that a far stronger win relationship should be built between the two. There are several activities where the corporate and FIEM can work together at different point of time – Summer Training, Summer Internships, Life Projects etc.