Chapter 3

Review of Literature

Industry Institute Interaction has been reviewed on different aspects, considering their impact on these collaborations. These reviews cover following topics:

3.1 Sharing of Technology Between Industry & Institute

CII (2003) - “Case study with focus on development of ITIs and ATIs” Sectoral growth and employment in the 11th plan period by Confederation of Indian Industry.

The ITIs and ATIs should focus much more on the area of “Megatronics”, which is the integration of mechanical equipment with electronics e.g. robotics. There is a need for training a large number of personnel in Megatronics which is fast becoming the critical need of the automotive industry. The usual trades like welding, turning, machining, milling should be strengthened with the following additional skill sets:

a) Focus on CNC controlled operations

b) Shop floor productivity techniques, lean manufacturing, six sigma etc.

c) Environmentally sustainable manufacturing techniques

d) Waste disposal techniques

A strong focus is also required on training of the faculty. Relevant industries can run short-term and medium-term courses for the faculty in the industry. Also need to promote multi-skilling concepts to ensure flexibility of manufacturing. ITIs and ATIs can also run award programmes in consultation with the industry in their region for trainees as well as faculty at different levels.

There is also a need to bring in a sense of competition between ITIs, ATIs, engineering colleges and universities to ensure quality & excellence in education & training. Additionally, there should be an increase in the intake of students in related branches and trades. This is a very important issue, but a more longer-term one. It needs to be determined whether the existing ITI and ATI infrastructure can be improved with public-private partnership or whether industry should set up a new and independent manpower training infrastructure. For industry participation in ITIs/ATIs a new model would need to be evolved.
that would allow for adequate role for the industry in terms of setting the curriculum, participating in the management of the ITI/ATI. The following model is recommended:- Establish an “Institute Managing Committee” for each selected ITIs/REC/engineering college/polytechnic under the “Technical Education Quality Improvement Project of Government of India” for effective Industry institute partnership.

Chakravarty (2006), “R&D and training activity need industry–academic institute Interaction”. To achieve development it is essential to implement latest technology, advanced knowledge and skill besides giving due consideration to basic policies and appropriate planning. Sustained multidisciplinary R&D work only can produce results, which have been the plus point for industrially developed countries to have a lead over developing ones. Further, the work can be shared and divided depending on the nature of equipment and possibilities available with one or the other laboratory. The guide must visit related industry repeatedly to understand industry functioning and the problems encountered by them. This will create better understanding between the industry and academic institutes.


Need to bridge the gap: Collaborative efforts include Curriculum design, Customized programmers, visiting faculty from industry, Learning program from industry, Internship etc. stakeholders – the government, industry academia can collectively combine the skill and technology needed to bridge gaps in capacity, resource and expertise.

Industry’s identified need: To enabler higher education to direct plan of study consist with the skills identified by industry –Academia instruction. The goal of this program is to channel the feed-back form the industry into curriculum development, faculty development, R&D.

Technology transfer is the fourth Industry institute relationship component and like knowledge transfer also involves a number of highly interactive activities. Joint ventures usually represent large-scale commitments by both the firm and university to transfer technologies and are often based on successful prior relationships between the firm and the university research center. To summarize, we have presented four distinct yet highly related
Dierdonck Debackere & Engelen (1990), “University–Industry Relationships, how does the Belgian academic community feel about it”. Cooperative research and technology transfer relationships are especially appropriate for helping small firms advance core technologies since both these relationships involve targeted activities useful for addressing immediate issues in specific areas of opportunity. Since small firms primarily focus on advancing core-technologies they usually have less time and resources available for pursuing technologies outside their core domain. Consequently, small firms are less likely to engage in research support and knowledge transfer relationships since these relationships are better suited for pursuing non-core technologies.

Venkateswaran (2003), “Studied the Technology Innovation Center (TIC) of BITS” and found that it has created a different type of internal interface. Technology Innovation Center has been conceived to be a complementary activity where the problem of industry can be investigated on the campus through the involvement of people form industry, BITS faculty and BITS students. The function of TIC is to provide space for scientists from industry to investigate a specific problem on the BITS campus through an involvement with BITS faculty and students. The TIC scheme is essentially devoted to facilitate the mobility of scientific staff from industry to the academic campus of BITS and to create a supplementary occasion to students and staff to collaborate with industry on a specific work-related problem.

Plonski (2003), “Case study of enterprise support and development at University of Sao Paulo, Brazil”. Traditionally the SME (Small and Medium Enterprises) sector has not been of great interest to higher education personnel, since the SMEs do not have any R&D capacity comparable to the universities, and their developmental needs are generally not of particular interest to academic staff. Given the fact that SMEs are increasingly considered as the most important engine for economic growth and employment, they have also moved higher on the agenda as partners of higher education institute. New focal points such as the SME sector and higher-tech enterprise development have been developed and are described in the case study.

Vigdor (2003), “Case study on commercialization of industry relations at the Hebrew University of Jerusalem, Israel”. Main mode of operation for co-operation between the
Hebrew University of Jerusalem and industry is still ‘research and licensing agreements’ where research results (whether patented or not) are licensed to interested parties in industry. In return, the industry finances continuing research in this field at the university. Mode of operation is to form a new joint venture with industry or with entrepreneurs or venture capital funds. The Hebrew University has developed a unique and very effective tool by creating a wholly owned subsidiary to foster the relation between researches and industry.

Natarajan (2003), "Case study on industry academia synergy: mapping the road ahead". Focus on the collaborative efforts in the area of research as well as development of skilled manpower, brainstorming on subjects such as updation of existing curricula, Sandwich Training, student projects, reducing learning curve of students etc. It is observed that in the new era of competition, for future evolving requirements, it is very important for industry to work with institutes for a competitive advantage. So that economic development of the country is technology driven. Hence, to compete in the global market quality technical education is the need of the hour. The importance of decentralization and noted that in Maharashtra, various universities enjoy this to some extend. It is sought for a role for industry in making finance available for higher education.

3.2 RESOURCE GENERATION AND ITS EFFICIENT UTILIZATION

Tibarimbasa (2003), “Case study for resource generation at the Uganda Gatsby Trust initiative at the University of Makerere, Uganda” A very interesting initiative of providing support to small and medium-sized enterprises has been reported from the University of Makerere, Uganda. The UGT (Uganda Gatsby Trust) through the faculty of Engineering of the University of Makerere, offers an integrated set of services to the SME (Small and Medium Enterprises) sector of loans and advisory services by staff and students, partially through student and staff placements.

IIPP (1997), “Resource Generation & its utilization by center of Industry Institute Partnership Programme (IIPP) of Panjab University, Chandigarh”. There has been a continuous evolution of ideas about the Centre for Industry institute Partnership Programme for a long time. The purpose is to bring together at a common forum, academicians, industrialists, practicing managers and administrators to participate in discussion and help in evolving consensus on various emerging issues besides identification of Thrust Areas for joint programmes of Research and Development between Industries and University. The consultancy Service rules developed by this center are categorized into three classes:
a) Advisory consultancy in which University facilities are not used.

b) Service Consultancy in which University equipment is used but consumables or other materials are not required.

c) Service Consultancy in which University equipment is used and material and consumables are provided by the University.

In case Advisory Consultancy above, 50% of the amount received (cost of consultants, time, including intellectual fee) will be paid to the consultants and 50% will accrue to the University. Similarly, in case of Service Consultancy, 50% of the amount received above will be paid to the consultant(s) involved and 50% will accrue to the University.

The apportioning of consultancy amount will be as under:

Out of the total share of the University, 10% will be paid to the University as administrative charges, 40% will be paid to the corpus Fund ‘Foundation for Higher Education & Research’ established by the University, and 50% will be available to the Department concerned for the purchase of equipment and/or material or for any academic activity and promotion of industry participation. The amount to be distributed to the staff will be as per recommendations of the principal approved by the vice-Chancellor or any other person so authorized by him.

Vigdor (2003), “The case study of the Herbrew University of Jerusalem (HUJ) on resource Generation”. Revenues generated through collaboration with the productive sector can be quite substantial. Several types of revenues can be distinguished: first, there are revenues generated through the delivery of products and services, which are usually a function of income minus expenditure. Second, there is more and more revenue gained indirectly from royalties and licenses through an active policy of marketing intellectual property rights (IPR).

Venkateswaran (2003), “Case study on Costing and pricing policy at BITS, Pilani”. Indirect costs and direct salary and other salary-related staff costs. Institutions should prepare schedule of labour rates for the various categories of staff. Enterprise development can be geared either to the development of existing SME’s or to the creation of start-up firms, usually set up by an academic staff member or a graduate student to commercialize a university invention. The Practice School: This activity is essentially initiated by the
university for the benefit of practical training of its students and becomes part of the academic programme of the student. Hence its costing becomes part of the on-campus educational cost & entire education will be conducted at the workstation by integrating work and learning. In case the industries have to pay the prevailing tuition fees of the institute for each of the employees to be trained. Further, the industries should provide, at their cost, classroom/laboratory/computer facilities and also nominate senior officers of the industries to act as mentors for the students.

Kaynak (2003), “Case study of Bogazici University, Turkish”. This has also been able to generate quite considerable amounts of income. Since 1992, the direct government contribution has declined. All other sources of income have increased, in particular the income generated through continuous professional development and further education. Income gained from CPD (Continue Professional Development), research and technology transfer, consultancies, so-called miscellaneous income, the revolving fund and the foundation BUVAK represents 14 percent of the total university budget. Such income exceeds the income generated through tuition fees, which makes up only 9.4 percent. Most of the case institutions report that they have been able to considerably increase their revenues collected from collaboration with the private sector.

Plonski (2003), “Case study for generation of resource by the University of Sao Paulo, Brazil”. There numerous foundations help not only to supplement the government core funding of the institution, but where collaboration with industry helps to generate material resources such as laboratories, buildings, equipment and other materials.

Turowski (2003), “Case study of Technology University of Lodz, Poland”. Case study shows that there are three main reasons for commercialization of institutes. First, the growth in relations between universities and industries is due to external requests, mostly made by governmental authorities, for increased relevance and impact on economic development. Second, the same governments have established a wide range of incentive measures at the national level, such as matching grants and tax alleviation.

3.3 HUMAN ROLE IN INDUSTRY INSTITUTE INTERACTION

Narin, Hamilton & Olivastro (1997), “The Increasing Linkage Between U.S. Technology and Public Science”. Innovation requires agencies competent and able to assess the possibilities contained in a given situation and aware of the fact that the assessment can always be made more knowledge-intensive. Systematic research can add potentially counter-
intuitive information to the routines, which have guided behavior hitherto. Only on the basis of such reports and discussions will organizations be able to learn.

**Lado A., Wilson M. (1994),** “Human resource systems and sustained competitive advantage: a competency-based perspective”. Much research in organization theory has clearly demonstrated that organization structure is closely linked to firm size and plays a role in a firm’s ability to adapt to the environment, create and assimilate knowledge, and be innovative. Organizational structure is also a consequential factor that directly impacts dynamic firm capabilities.

**SRI International (1997),** “The Impact on Industry of Interaction with Engineering Research Centers”. There are three dimensions to characterize an organization’s structure as either mechanistic or organic: (1) the number of hierarchical levels, (2) the extent to which knowledge and control are concentrated at the top of the organization (centralization), and (3) the degree of adherence to rules and policies (formalization). It is argued that new technologies or technical innovations follow a bottom up process originating in the technical core percolating up into higher levels of the organization. In contrast, administrative innovations originate in the administrative core, i.e. at higher levels of the organization, and flow down to lower levels of the organization through a top–down process.

**Gittelman M. (2000),** “From Technology Transfer to Knowledge Acquisition: Effective Strategies for University–Firm Linkage”. The ability to transfer technology by working on targeted initiatives depends on the firm’s ability to accurately understand, interpret, evaluate, and absorb specific knowledge and technologies. This is better accomplished when the engineers and technical personnel who fully understand the language and concepts used by university scientists and researchers are able to interact freely. Free and flexible interactions often require that the firm has a more decentralized, informal, and flatter, i.e. a more organic, structure. Thus, organic structures better facilitate technology transfer and cooperative research activities.

**Itami H., Numagami T. (1992),** “Dynamic interaction between strategy and technology”. We believe that knowledge transfer relationships and research support relationships are more closely aligned with the properties of administrative innovations. That is, knowledge transfer and research support entail broader, more visionary and strategic issues of how to manage and how to develop and use the knowledge and new technologies that serve marketplace needs. Moreover, both knowledge transfer and research support
relationships tend to revolve around more amorphous and unspecific constructs having longer-term implications.

Gerwin D., Kumar V., Pal S. (1992), “Transfer of advanced manufacturing technology from Canadian universities to industry”. Industrial firms with more organic structures have higher intensity technology transfer and cooperative research Industry institute relationships while firms with more mechanistic structures have higher intensity knowledge transfer and research support Industry institute relationships. Consequently, knowledge transfer and research support relationships require greater top management involvement as top managers provide initial approval and convey their directives to organizational personnel in a top-down manner.

Niranjan (2006), “Industry academy partnership”– Education Promotion Society for India Modalities to fulfill the industry academia partnership: Refreshing training programs for faculty in the identified factors. Keeping in view of the above modalities NASSCOM started a workforce development initiates with four objectives: Identifying needs of the industry in term of persons skills-sets needed quality etc. in various discipline at different levels (graduates, post graduates, doctors) in different time frame Strengthening Indian professional education (through curricula, faculty, infrastructure) catalyzing the interface between industry and academia through organization specific workshop/summit/programmes/focuses research etc. Exploring alliance and programs for specific initiatives with corporate, academic associations and consultancy companies with special emphasis on what the IT industry can do.

Mohammed (2006), “Institution-industry partnership NASSCOM–HR Summit”. It is projected that by 2008, India will need two million IT professionals against the present one million working in IT and ITES organisations. Today 0.35 million Engineering graduates are coming out of Indian universities annually, but only about 40 per cent of them are employable, that is to say, the industry will not be able to meet even 50 per cent of its manpower requirement in three years from now if the quality of output from the universities does not improve drastically and fast. This scenario, which is frightening, must have prompted NASSCOM to offer complementary participation to academia.

Reasons for poor quality of graduates leaving the portals of institutions are not hard to find. Academia and industry are aware that acute shortage of qualified and trained faculty in
about all the institutions in the country is responsible for such a gross waste of human resource.

**Nowak Michael & Charles (2000),** “The virtual incubator: Managing human capital in the software industry”. The Indian IT industry is concentrating on high volume low value business. They are chasing available manpower with lucrative offers. Talented and enthusiastic fresh engineers of all disciplines are made to slog on mundane jobs which do not help them to move up the value chain. They do not complain because the pay packet is heavy. Companies are happy because their share value is galloping. It is a win-win situation for both.

**Venkateswaran (2003),** “Human Resource development at BITS”. The BITS ‘practice school’ method of education is an attempt to institutionalize the process of bridging the gap between theory and practice. Just as a medico undergoes internship in hospital during his educational years. All students of BITS are required to provide their professions by working on real life problems at industrial setups during educational years.

**Michaela (2000),** “Case study on Management of university relations by UNESCO”. This case study states that within the context of increased financial stringency and in response to the demand for relevant training and research programmes, higher education institutions are more and more inclined to strengthen their relations with the productive sector. The study demonstrates that while relations with enterprises increase, institutions tend to adopt more proactive and better co-ordinated management approaches. They are also devising necessary rules and procedures to protect the traditional activities of higher education institutions from undue outside interference in order to make the most of university-industry linkages.

**Esteva (1997),** “Case study on Promotion criteria for technology transfer at UNAM, Mexico”. New procedures and instruments of an administrative charter were designed and established which were aimed mainly at the creation of a new organizational culture within the University to foster technological development. A proposed entitled ‘Criteria for the evaluation of academic work’ was drawn up and presented for discussion in the academic community. The proposal was formulated in response to the unrest shown by some researches with respect to the award of merits accruing from technological work, in contrast with the traditional criteria of peer evaluation and the publication of articles subjected to review by referees in specialized journals in assessing scientific work.
Kaynak (2003), “Case study of incentives for staff engaged in Industry Institute Interaction at Bogazici University, Turkey”. It is often difficult to attempt to change staff statues, in particular if they are part of civil-servant status, which need change at national level. In many cases, it is easier and more immediately applicable to grant those staff members active in collaborative projects, access to a favourable working environment. Case study indicates that those faculties members who do not feel financial need, will have little incentive to develop links with industry. Although a faculty member can earn up to 65 % of income personally in this way. Where as bringing more funds to the university leads certain unwritten privileges, like in maintenance of the premises of active departments and in allocation of staff or assistant support.

Bedi & Chatley (2002), “Interfacing with Industry for Technology Education”, shows that over the past few years, several programmes have been initiated to forge collaboration between academic, industry and government. The institutes have reoriented their programmes and goals in tune with the industry, whereas industry is joining hands with institutes to have an access to creative people, fundamental knowledge and exploratory research. Since we have limited resources, there is always a need for collaborative efforts, which share people, facilities and funds; CILTT (center of industrial liaison & technology transfer) is proposed to be set up in this context. The government must extend helping hand to both the institute and the industry in making it a success.

Thomas (1985), “Transfer of learning-Improving Efficiency of Institutes” paper states that in teaching –learning model & analysis of the results shows there are large numbers of benefits as also requirements. Some of the benefits are: curriculum meeting the needs of industry and experiential learning by students under the expert guidance and in real life situations. Industries considering student interns as additional human resources and utilizing industries resources for student training thereby, reducing financial burden of the institutes, and better quality of student output. The main requirements are: development of functional aspects, establishing linkages with industries for students’ learning, evaluating students against short-term and long-term educational objectives and providing feedback.

Venkatesh (2002), “Industry–Institute Interaction & Its Role in Enterpreneurship Development” study states that to make an effective impact on the rural economy through development of economic activities i.e. entrepreneurial development the training institute must have a good support in the target area. Training institutions have normally to be
situated in an urban locality because there are many infrastructure needs for EDP, which cannot be easily arranged in the rural areas. It is therefore, important that the linkage organization should also have the development of entrepreneurs or development of economic activities as one of its objectives. This will help them in keeping close and cordial relation with training institute.

Bhattacharya & Mandke (1991), “Designing Interactive Teaching-Learning System for Technical Education” states that with the rapid growth of science and technology the central task of educational institutes is to prepare students to face the problem-solving situations of tomorrow. Efforts in making qualitative improvements in the traditional teacher-centered teaching-learning systems have had only marginal effects, resulting in continued criticism from employers and the dissatisfaction of students as well as teachers. This paper presents four conceptual models of teaching learning designed to provide opportunities to the learner to develop real-life problem-solving abilities through an interactive process. The study reported here, which extended over a period of 2 years has been conducted in four polytechnics in India in collaboration with 62 large-and medium-scale industries.

Jain & Gautam (1985), on subject “Managing Barriers to Technology Development and Technology Transfer to SMEs” reveals that the small and medium enterprises, which have grown in the past with the governmental support and initiatives, need to stand on their own now. Training is an important process for doing this, as has been recognized by the corporate sector as well as the enlightened entrepreneurs. Closer links between institute and industry can be established if the former reorients itself with a clear intent and initiatives are taken for institute-industry linkage through: (a) technology and training needs identification of the SMEs, (b) developing appropriate technologies and overcoming technological bottlenecks, (c) designing the requisite training modules, (d) conducting training and consultancy, initially at nominal price so as to build and develop industry confidence in the institute and later at penetration price for some time still the institute credentials are proved. The institute-industry partnership can successfully go a long way. For this, the institute should modify its priorities and develop commitment to serve the industry and the industry should develop trust in the institute.

Gahlot (1994), published paper on “Continuing Engineering Education” An Essential Role of Technical Institution for qualitative improvement states that for the success of any project/programme, the most important aspect is that it should be mutually beneficial to the
concerned parties (industry and technical institutions in this case). Until now technical institutions were catering to manpower needs of industries but due to tough competition in world market, and setting up of very few large industries, there is large-scale unemployment of technical manpower. Here technical institutions can play a significant role by starting Entrepreneurship Development Programmes giving integrated knowledge of all aspects of industry/enterprise development. Technical institution should organise/conduct need based continuing Education Programmes for working professional and owners. This HRD scheme of continuing Education will benefit both the workers and the owners in enhancing their capabilities and competencies ultimately leading to improvement in quality, efficiency and economy in their output. Thus continuing Education can play a vital role in making industry – Institute Interaction successful.

Beckman & Lawrence (1994), “Industry University Collaboration: Different perspectives heighten opportunities”. It shows that collaboration is made successful with shared goals, planning, mutual trust, effective communication and large doses of patience and hard work. Collaboration offers a structure/dialogue/action format for addressing dynamic education and training needs of software engineers.

EDCIL & TTTI (1999), “Tracer Study on Employment Status of Polytechnic Pass Outs” finds out that the interaction of the polytechnics with industry has improved considerably resulting in more systematic organization of industrial training for students and teachers, involvement of industrial experts in instructional processes and evaluation of students performance, conduct of more number of campus interviews and building confidence among the learners to interact with the world of work. To provide career counseling to students, the polytechnic have now started collection and dissemination of information related to job opportunities, organizing career exhibitions, providing individual/group counseling and organizing entrepreneurship related programmes. This study was restricted to polytechnics situated in the northern states of this country.

Wani Garg Sharma (2004), paper on “Effective industry/institute interaction for developing entrepreneurial vision amongst engineers for the sustainable development of SMEs in India” states that effective industry/institute interaction for developing entrepreneurial vision amongst engineers for the sustainable development of SMEs in India states that the development of entrepreneurship amongst engineers will be an effective
mechanism of luminous renaissance in technology innovations, helpful in the removal of regional imbalance and sustainable growth of SMEs. An engineer, through self-employment as a career, can bring about a technical revolution that can meet the challenges of the emerging scenarios of globalisation and liberalisation, with a key element of competition rather than protection.

Bijlani & Munjal (2002), “CII-AICTE Technical Education Summit” New Delhi” S.K. Bijlani, Chairman, Industry-Interaction and Technical Education & raining Subcommittee, CII Northern Region highlighted that the National Technical Manpower Information System (NTMIS) needs to be adequately streamlined and its projections to be viewed very seriously in order to develop an appropriate technical manpower planning system. It should be able to identify variations in the job market and define the market niches as well as give a fairly correct picture of demand and supply of technical manpower in various disciplines. He also stressed that the role of industry, academic institutions vis-a-vis AICTE and CII needs to be redefined in today's context of globalisation and competitive pressure of ensuring quality assurance, CII intends to introduce its own system of rating the technical institutions based on quality.

Mahesh Munjal, Managing Director, Majestic Auto Ltd. stressed that a system of periodic upgradation and review of infrastructure of technical institutions according to the changing demands needs to be introduced. It was highlighted that the Industry and the academic institutions should work together to develop a technical education system which would give more emphasis on the aspects of developing high degree of practical design capability and skills for building sophisticated machines and equipment.

3.4 INDUSTRY & INSTITUTE ROLE IN COLLABORATION

Champandard (2007), “A Tale of Two Tunnels: Industry and Academia Trying to Connect”. Ever wonders why two small Channel tunnels run in parallel? There's a simple reason; the French and the English miscalculated the meeting point in the middle (due to differences in Metric vs. Imperial measurements) and ended digging both tunnels separately next to each other. Or at least, that's a version of the story we often joked about while they were building it! Many collaborations efforts between industry and academia feel very much like that to me. The meeting point in the middle isn’t supposed to be a reference point; it just helps both sides dig in the right direction.
Caroline Montori & Bromberg (2007), “Academia-industry collaboration as an emerging model of design research”. Although the field of design research could potentially gain from collaboration between academia and industry this approach to research has not received much experimentation or scholarly attention. Design outcomes research, the primary objective of which is to examine the outcomes of designed artifacts when implemented, is one of many potential foci of design research that could benefit from such collaboration. However few models of successful collaboration exist and there is little knowledge about how such collaboration can work, what could go wrong and what safeguards might be implemented to increase the chances of success. This is a case study of a design outcomes research collaboration between an academic unit, the Mayo Clinic, and a corporation, Steelcase Inc. The study traces the evolution and describes important details of the collaboration process.

Geisler E. (1995), “A theory of Inter-organizational Relationships, Technology Analysis”. Strengthen skills, knowledge, and gain access to university facilities for ancillary, non-core technologies. The dynamic capabilities and resource dependency in the area of non-core technologies also embodied two-dimensions. The first dimension contained two items related to the firm’s needs. The importance of strengthening critical skills and knowledge for advancing ancillary, non-core technologies and the importance of gaining access to physical tools, equipment, and systems necessary for advancing ancillary, non-core technologies. The second dimension contained two items related to the firm’s perception of the university research center’s ability to satisfy the firm’s needs.

Kirti Vasudeva, Giridhar Abhishek & Mishra (June 2008), A case study on “Security: Bridging the Academia-Industry Gap”.

Security is one of the major concerns of modern software development, but there is a wide gap between the industry practice and the academic instruction. Security issues are usually not addressed in academic setup and those attempt to make it as part of their software engineering curriculum realize quickly that it is difficult to make learning happen in a conventional lecture based approach. We explored a case study centered non-conventional approach and found it to be instrumental in bridging this gap between the industry and the academia. We give a detailed methodology for using the case study and our experience, observations and result of the approach. Whole case exercise aims at creating software professionals who realize the importance of security and are well versed with the related
concepts, skills and dispositions and thus handle security related challenges in a structured manner.

Natarajan (2003), "Case Study on Industry Academia Synergy: Mapping The Road Ahead". Technical Education has several stakeholders among whom Industry is one of the most significant. The technical Institutions and Industry have several complementary strengths as well as requirements. Industry and Technical Institutions depend on each other and derive benefit from mutual interaction; this is 'symbiosis'. In partnership with each other, Industry and Technical Institutions, by promoting activities, which are in phase and in resonance, much more can be achieved than individually; this is 'synergy'. What we require are win-win partnerships, and champions on either side to catalyze as well as sustain the partnership.

Kumar Chairman–BOIII (Bureau of Research and Institutional Development (2003), "Case Study on Industry Academia Synergy: Mapping The Road Ahead", Chairman of the Board of Industry, Institute Interaction that AICTE is bringing out a compendium of the industry, institute partnership presently going on. In a global world, when India is expected to become a developed country, Industry-Institute partnership is a key advantage. This type of database shows, to both the industry and institute, what type of work is being done and how future partnerships can be envisaged so that industry and institute can work together for the nation’s progress.

Singhvi & Bhutange—“Indo Rama Adopts I.T.I., Nagpur” Directorate of Vocational Education and Training, Maharashtra Speaking on the occasion, Mr. R S Singhvi, President - Corporate, Indo Rama said, “We at Indo Rama believe that skill development and industry-specific training is essential for today’s youth to succeed in the professional environment. I.T.I’s play a vital role in technical skill development in India. However, it’s imperative to constantly upgrade and revise the process so as to meet the changing industry requirements. Through this association we aim to upgrade the academic standards and teaching methods at I.T.I Nagpur and introduce additional courses relevant to the current demand. We would also be facilitating the student in securing employment.

Elaborating on the MoU, Mr. J. D. Bhutange, added “It has always been Maharashtra Government’s endeavour to create better employment opportunities for the youth”. This initiative will not only ensure better quality training & industry experience but will also ensure higher employment rate for the state. Indo Rama is the first to take up land in
MSIDC Butibori to set up their manufacturing complex and have contributed for the life and welfare for the people of Maharashtra. They are one of the first movers in the Vidarbha region to adopt an ITI and we are confident they will impart professionalism in management of the institute, bring in new perspective for the career and life of the students of ITI. Our efforts to enter to similar agreement for Hingna and Wardha ITI’s are likely to fructify in the near future.

**Anandakrishnan M. (2006),** The All India Council for Technical Education will provide support including funding for any structured effort at improving industry-institute interaction so that graduates become more employable, the AICTE southern regional council Chairman, M. Anandakrishnan, said today. The AICTE was redrawing the undergraduate curriculum, which had for too long remained frozen in structure and content. "Happily this is changing and academic institutions are now looking for new dimensions and industry sees the need to make interaction with institutions more meaningful," he said inaugurating a conference organised by the Confederation of Indian Industry-southern region (CII-SR). Finally, the curriculum should be made more flexible so that a student could, if required, work in an industry, instead of doing some courses in college, but still gain the required credits. "If this happens, the AICTE will be able to support not only financially but also provide moral support in getting accreditation or due recognition for allowing this flexibility." It requires more formal mechanisms that would strengthen industry-institute interaction.

**Pillai (2006),** “Case Study to Boost Industry–Institute Interaction” National Management Convention, G. C. Gopala Pillai, CMD, FACT, in his inaugural address in a two-day national management convention, PANORAMA 2006, organised at Cochin said that Encouraging more industry-institute interaction for mutual benefits. Business schools in our country should be able to create a new generation of business leaders, and not just business managers, who could provide leadership to make our country an economic super power in another couple of decades.

**Michaela (2000),** “Managing University– Industry Relations” this paper states that within the context of increased financial stringency and in response to the demand for relevant training and research programmes, higher education institutions are more and more inclined to strengthen their relations with the productive sector. Professional management of such linkages is crucial to the success of developing sustainable and mutually beneficial
relations. This book is the synthesis of a research project which explored innovative management practices in the domain of university-industry linkages. Managers from 12 higher education institutions in Europe, Africa, Asia, and Latin America were invited to document their experience on the management of interfaces, financial and personnel management, and the management of intellectual property. The case studies demonstrate that while relations with enterprises increase, institutions tend to adopt more proactive and better co-ordinated management approaches. They are also devising necessary rules and procedures to protect the traditional activities of higher education institutions from undue outside interference in order to make the most of university-industry linkages.

Alam Balakrishan & Jayakumar (2003), “Management of University Industry Science Partnership (UNISPAR)” a paper on IIT Madras says that University Industry linkage is becoming an important aspect of higher education both at the national and international level. The Government also has been encouraging the educational institutions to work closely with industries not only for training but also for technology development and up gradation. UNESCO introduced a scheme under University-Industry linkage programme in 1993 and supported studies on these programmes. This report is prepared on an assignment to India Institute of Technology (IIT), Madras by United Nations Educational Scientific and Cultural Organization (UNESCO) New Delhi.

Ratnalikar (1994), states in his paper “II Partnership: Not Merely Interaction”. Industry institute interaction is an urgent need to improve the quality and relevance of technical education to keep our industries at par with industries in advanced countries. In order to give greater impetus to the commercialization of R&D, there is a need for greater interaction between the two. Our future and our survival depends on the quality, efficiency and effectiveness of industry which in turn depends on quality and excellence of our technical institutions and their interaction with industries.

Malhotra Rathore, Anad Saini, Gill & Tulsi (1999), “A Case Study on Memorandum of Understanding (MOU)”, which was signed by director of Technical Education and Industrial Training Punjab, Confederation of Indian Industry (CII), Industrial Training Institute (ITI Rajpura), and MOI Engineering Limited Mohali signed MOU on 14 June 1991. The objective of this MOU was to identify the process of admission of the students by involving the industry. To introduce the flexibility in course offering with the needs of the employment & also to review the availability of print instructional resources.
like text books, laboratory manuals, charts, data books etc. & to promote innovation.

Although the implementation of MOU has resulted in certain benefits to the institution, DTE & it have not taken initiative for networking with industry and other organizations. MOU had provided limited functional autonomy to it and DTE & it has not delegated additional power to principal. So ultimately the experiment of MOU was failed miserably.

Sureka (2008), “Realtors to adopt women’s industrial training institute”. The real estate sector in the state has decided to take a host of new initiatives to observe corporate social responsibility. The Confederation of Real Estate Developers Association (CREDAI), Bengal has decided to adopt the Women’s Industrial Training Institute at Gariahat and revamp it with an improved training programme and better infrastructure. The government will provide soft loans to partly fund the proposal and CREDAI will find funds from industry sources as well. Among its other initiatives, individual members of CREDAI are also being encouraged to take up a few pavements in the city and beautify them. Three pavements on Loudon Street, Elgin Road and Ironside Road have already been beautified. CREDAI is also helping the state fire services department to acquire modern fire-fighting equipment.

Speaking at the inauguration, Chief Minister Buddhadeb Bhattacharjee said that the real estate industry in Bengal should focus on developing houses for the low income and economically weaker sections. “It is true that the position of construction workers in Bengal is very weak. The real estate industry should share some of its wealth with the people. Presently, there is Rs 15 crore in the construction fund.”

### 3.5 GOVERNMENT ROLE IN COLLABORATION

Mohanty (2007), “Government Needs to Diversify Vocational Education”. Government has cleared the World Bank funding of Rs 1,581 crore for upgradation of the training programmes in all 400 Industrial Training Institutes (ITIs). But as per the current curriculum of the training institutes such as including some new courses and programmes, the need of the hour is to diversify the whole vocational education and training (VET) programme targeting specialized...
labour market and different industries including tourism, IT, retailing, electronics, automobiles, film, TV as well as our traditional agriculture, crafts and cottage industry. India now constitutes more than 16% of world population with very less skilled manpower in stock. Establishment of good number of vocational training institutions with up-to-mark quality will certainly create a large number of skilled manpower that could later assist in increasing over all productivity, GDP, amount of export, per capita income in the end leading to a better human development index in future. Hence the government needs to establish more and more new ITIs along with structural changes in the present one to enroll more and more students.

Singh (2005), “Rs. 166 Lakhs Central aid for ITI Mohali” Tribune News Service, Chandigarh. The Industrial Training Institute (ITI) for women here has been chosen as a Centre of Excellence to be funded with Rs.166 lakhs by the Government of India. This was announced by the Kharar MLA, Mr. Bir Devinder Singh, during an interface of the local industries and senior officials of the Directorate of Technical Education and Industrial Training, Punjab, held at the institute here today. Aimed to bridge the gap between the needs of the industries and the vocational training courses being imparted by the institute, participants discussed the courses. It was felt that the courses should be job specific so that the students get immediate placement or be self employed. Mr Bir Devinder Singh, stressed that high quality training should be provided by the ITI. He said job oriented courses like English speaking, listening and writing module should be introduced in the existing curriculum that would help students to get jobs in the multinational companies that were coming to Mohali. “Mohali is fast becoming the most sought after destination for investment by global companies and has tremendous job scope, hence we need to revamp the existing curricula to cope with the requirements of the industry, “said Mr. Bir Devinder. He further said training institutes were also required to keep pace with the development taking place in the IT sector in Mohali. It was also decided that the following courses should be started in ITI for women, packaging course, quality inspector, designing of packaging material, software development and usage courses, call centre, desk top publishing, spoken English, taxation course, courses relating to IT Industry, bio-tech industry, textile industry, enterprenurship development, agro and food processing course, journalism, computer course for the blind, event management, real estate, home management, house keeping course for hospitals, corporate offices and industry. It was also suggested that short-term courses specifically catering to the industry be started at the ITI.
Allan Pagtakhan, Golden & Brzustowski (2002), “University-Industry Partnerships Driving Innovation”, “Partnerships between universities and the private sector are certainly good for students and good for Canada,” said Allan Rock, Minister of Industry and Minister responsible for NSERC. “They will help Canada to reach its goal of rising to fifth place among R & D-performing nations.” “Successful partnerships between universities and industry are essential to innovation. Collaboration between universities and the private sector is the main factor that will allow Canada to reach its R&D goals,” said Dr. Rey Pagtakhan, Minister of Veterans Affairs and Secretary of State (Science, Research and Development). “These partnerships draw together those who produce new knowledge with those who know how to use it productively in the Canadian economy.”


The globalization of the configuration of university-industry-government relations can be considered as a result of various developments that have coincided. The interconnection between the laboratory of knowledge-production and users of research—at various levels—exemplified by the rapid growth of industry-university centers in which firms and academic researchers jointly set priorities; technology transfer agencies within both universities and firms that negotiate with each other and move technologies in both directions.

Nowotny (2001), “Case study on Innovation as University-Industry-Government Transformation”. Innovation is different from invention in terms of the requirement that ideas be put to use through reflection in an interactive practice. Knowledge production can be considered as a necessary, but not a sufficient step to innovation. It creates a potential which can be actualized by bringing together users, producers, entrepreneurs, and policy-makers in a “transaction space” where problems and possibilities can be argued and traded-off.

Guston David J. (2000), Between Politics and Science: Assuring the Integrity and Productivity of Research. Cambridge, etc.: Cambridge University Press. A transaction space representing the different spheres, the likely result would have been a traditional academic program to supply engineers for existing industry rather than an innovative project to renew old and create new industrial development. Ireland is a prime example of the creative use of European programs to renew a country’s political economy and social structure, even attracting emigrants to return home. Dublin’s Trinity College, for example, has become a force for indigenous innovation by developing a network of science parks and incubators tied
to academic research. These initiatives complement an earlier strategy based upon attracting foreign direct investment, building upon an infrastructure enhanced with EU funds.

Arrow Kenneth J. (1962), “The Economic Implications of Learning by doing”. Review of Economic Studies, 29: 155-173. While the sciences traditionally produce sediment in the form of scientific literature, innovation can be defined only as an operation at an interface. For example, new ideas from the laboratories have to be brought together with market perspectives before innovation can take place. Firms based on academic research usually take off only after a researcher joins with a business partner. Traditionally, these different perspectives were brought together in the “technostructure” of knowledge-based corporations

Helga Scott & Gibbons (2001), “Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty”. Industrial economists have typically argued that if one looks at innovation one always sees entrepreneurship and industry, and that is true. But in the case of a system of innovation, one can also see a knowledge infrastructure derived from universities. The university assumes this role not only as a supplier of knowledge and human capital, but as another “industrial actor” creating intellectual property and co-shaping new firms.

Cutcliffe Stephen (2000), “Ideas, Machines and Values: An Introduction to Science, Technology and Society Studies”. It has described how laboratory management of digital research units may block innovation when it is based on traditional concepts of laboratory research. The notion of an incubator, for example, previously associated with a specific locale, can now be extended to the idea of “a virtual incubator” which can be entertained at a global level. These concepts can be redefined swiftly, and without loss of quality, because they are codified in a theoretical reflection.

Gulbrandsen & Levitt (2001), “Public Venture Capital: Sources of Government Funding for Technology Entrepreneurs”. When an academic institution founds a science park or incubator facility, the university provides infrastructure, real estate, technical capacities, etc. to attract the research units of large firms and encourage faculty members and alumni to start-up small enterprises on the basis of advanced ideas from their research. A new university-industry dynamic may be set in motion. The city government hosting this university may perceive the foundation of the science park as a change in the position of the traditional university and assess this change from the perspective of its responsibility for
regional development. For example, the expectations of traffic densities may have to be adjusted and new facilities may be needed.

**Working Group on Skill Building (2002),** Tenth Five Year Plan 2002-07, Ministry of Labour Welfare & Social Security. Evolution of vocational training system in the labour and employment sector: The Second and the Third Five-Year Plans, which were designed to create a strong industrial base, emphasised the need for expansion of training facilities. Vocational training in Institutes became the principal means of turning out skilled workers. The sharing of the cost of administration of training institutions continued till March 1969 and thereafter was entrusted to the State Governments. Starting from 54 in 1953, the number ITIs have now gone up to 4,274 with the seating capacity progressively increasing from 10,000 to 6,28,000 over the same period. Out of 4,274 ITIs, 1,654 are in government sector and the remaining 2,620 in the private sector. The Craftsmen Training Scheme was complemented by introducing the Apprenticeship Training Scheme with the enactment of Apprentices Act, 1961. Each State Government has a Directorate of Technical Training or a Directorate of Employment & Training, which is responsible for the implementation of training programmes run by the ITI, and for implementation of the provision of Apprentices Act in respect of State Government and private establishments. The Apprentices Act essentially serves a dual purpose. – One, to regulate the programme of training apprentices in industry so as to conform to the syllabi, period of training, etc. prescribed by the Central Apprenticeship Council, and secondly, to utilise fully the facilities available in industry for imparting practical training to meet the requirement for skilled workers. As on 31 March 2001, the number of seats in over 17800 public/private sector establishments covered under the Act, were 2,20,000, out of which 1,58,000 seats were utilised. Many occupations in the emerging high-tech areas, services sector and informal sector are outside the scope of the present system of Apprenticeship Training. Although the Craftsmen Training Scheme and the Apprenticeship Training Scheme are the two important schemes, the DGET runs several other schemes like Craft Instructors Training Scheme, Advanced Vocational Training, Supervisory Training Scheme, Women Training Scheme, Executive Training, Research and Development in Vocational Training, Development of Instructional Material etc. Most of them are in the form of support to the core schemes (Craftsmen Training Scheme and Apprenticeship Training Scheme) or in the form of continuing education/ training to the already employed people.

What does it mean for an economy to become knowledge-based? In our opinion, it means that knowledge and information increasingly provide a structural mechanism, that is, a medium of social coordination in addition to economic exchange relations and political and/or managerial control.

Barras Richard (1990), “Interactive Innovation in Financial and Business Services: The Vanguard of the Service Revolution”. Research Policy, 19: 215-237. Industries no longer produce only physical artifacts and systems, but also knowledge artifacts such as software, new business models, and intellectual capital. Schumpeter (1943) analyzed the dynamics of capitalism as more complex, that is, involving technological developments. Technological innovation tends to upset the market relations among existing products and firms. The accumulation of innovations can reshape industrial relations periodically. New products and firms induce a mechanism of “creative destruction.”

Jones-Evans, Dylan & Magnus Klofsten (1998), “The Role of the University in the Technology Transfer Process: A European View”, Science & Public Policy 25 (6): 373-380. The Public/Private Divide In addition to transaction costs, there can also be transaction benefits by having an intermediary system of translations. For example, a university-industry transfer office generates royalties from licenses of knowledge that might otherwise be given away freely in publications although without the added value of inventor involvement in further development.

Fujigaki Yuko & Leydesdorff (2000), “Quality Control and Validation Boundaries in a Triple Helix of University-Industry-Government Relations: ‘Mode 2’ and the Future of University Research”. The observable configurations inform us about the selections that may have taken place, but the provisional inferences can be expected to raise further research questions. Innovation systems were largely coming to a halt. More recently, political leaders are moving away from that position and bringing government back into the picture to take advantage of the R & D resources left behind from the previous era. These models allow for the systematic study of interactions among more than two sub dynamics, for example, by using simulations. A Triple Helix system can be expected to exhibit all kinds of chaotic behaviour, such as unintended consequences, crises, niche formation, and self-organization.
Jacobs Merle & Hellström (2000), “The Future of Knowledge Production in the Academy, Buckingham/Philadelphia” Open University Press. As the university takes on a new role as a knowledge-industry, both in its internal development and in stimulating innovation in the larger society, it can engage in translating research into practices, and problems in society into new research agendas. Accordingly, the university as an isolated “ivory tower” tends to collapse. Stanford and MIT have become the role models for universities attempting to become progenitors of regional knowledge-based economies. The further development of the relations between academia and governance, that is, government at various levels, transforms the public sphere into a more complex system.

Etzkowitz Henry, Magnus Gulbrandsen & Janet Levitt (2001), “Public Venture Capital: Sources of Government Funding for Technology Entrepreneurs”, New York: Aspen/Kluwer, 2nd edition. NGOs, for example, need continuous support and feedback from academic expertise in order to be able to balance prevailing perspectives in political discussions about alternative options. For example, in Denmark, the traditional professorial ownership of intellectual property rights emanating from research was recently re-assigned by law to the university in order to enhance the likelihood of utilization.

Lissenburgh Stephen & Rebecca Harding (2000), “Knowledge Links: Innovation in university/business partnerships”, London: IPPR. A new mode of innovation is emerging, transforming and redesigning national and institutional boundaries. Boundary crossing and hybridization among institutional spheres provides an inspiration to innovation, at the levels of organizations, technologies, and knowledge. This system needs both functional differentiation and structural integration. The different subdynamics are interwoven. The Triple Helix of university-industry-and government involves internal transformations in the institutional spheres as well as expanded relations among different levels, such as start-up and established firms, regional and multi-national governance, local colleges and research universities. Understanding the dynamics of these relationships can be considered as the very purpose of innovation studies.

Joshi Manish (Feb 08, 2008), "Industry-Institute-Interaction" our Caliber and Marketing, a Seminar at Shri Vaishnav Institute of Technology and Science, Indore.

Interdisciplinary research, plus a systems level approach, plus close ties with industry, all working together to yield relevant and timely research is the formula for success in ECE. Ranked among the best electrical and computer engineering departments in the country, the
research programs have always been at the forefront of the technologies that have changed the world we live in. Interaction with industry through individual faculty sponsors, through research center industrial liaison programs, and through departmental advisory boards, has proved invaluable in helping us anticipate the future technological needs of society.

Cornelia Pieper, “Vocational Education: Germany and South Africa”. Member of the German Parliament Vice Chairperson of the Committee on Education, Research and Technology Assessment Deputy Federal Chairperson of the FDP Proceedings of the 7th Q-Africa Conference (2007). It is the classic vocational training models of Germany’s dual system, followed by the imparting of so-called soft skills, which are seen as presenting the most promising opportunities: in other words, social and cultural competence. The most rapidly expanding areas include technical, commercial and social vocations. One in two initial and continuing vocational training companies intend setting up foreign offices by 2010. Nearly one in three providers wants to franchise its services.

Khanna Krishan (2006), “Why? Industry Institute Artnership”, Action plan for the upliftment of rural & urban India, Swot Analysis. To facilitate Exchange of services between industry & institution as well as Government of India and other outside parties for betterment of society in large scale. To facilitate the transfer of technology to improve the well-being and productivity of society and offer research opportunities through which the faculty member can make a contribution to knowledge. To promote Creation of new and innovative educational curricula, pedagogical methods, technologies, and methods of assessment. To enhance Participation of industry representatives on campus and University wide advisory groups & Activate Cooperative Extension & Faculty consulting. To create and demonstrate technologies that can produce revolutionary IT-enabled teaching models (virtual Learning & teaching, seminar & conference) and improved educational tools. Technology deployment, development, Innovation & Accelerations.

Leydesdorff & Etzkowitz (1993), has given his idea in paper on “The Transformation of University – Industry-Government Relations”. Transformation in the functions of university, industry, and government, the “triple helix,” is taking place as each institution can increasingly assume the role of the other. The triple helix, thesis states that the knowledge infrastructure can be explained in terms of these changing relationships. Arrangements and networks among the three institutional spheres provide input and sustenance to science-based innovation processes. In this new configuration, academia can
play a role as a source of firm-formation, technological and regional development, in addition to its traditional role as a provider of trained persons and basic knowledge.

**Straydom & Holtzhausen (2001),** in paper “Improving the managerial effectiveness of higher education institutions”, as part of the political transformation in South Africa, Universities have been confronted with manifold changes in their environment. Among these are a strong drive for state coordination, overall systems planning and quality management geared towards the establishment of common standards and accountability. As per changes at national level, higher education institutions in South Africa have more recently been obliged to commit themselves to the development of quality management procedures at institutional level. Within this context, the case study focuses on changing underlying assumptions and procedures.

**Administrative Report (2003),** “Administrative Report (2002-2003)”, Department of Industrial Training (Punjab With the changing needs for the Industry skills developed by the trainee in the Industrial Training Institutes were not sufficient and necessity for on the job training was greatly felt. As such, the training Program in the Industry was made statutory by the enactment of the Apprentices Act, 1961. The Act provides for the regulation and control of training of Apprentices in Industry and matters connected there with and has the objectives to regulate the program of the training of apprentices in the Industry so as to conform to the prescribed syllabus, Period of training etc. to utilize fully the facilities available in the industry for imparting practical training with a view to meet the requirement of skilled workers in the Industries. The Act makes it obligatory on the part of the employers both in Public and Private sector Industries to engage the apprentices according to the ratio of apprentices to workers other than unskilled in designated trades prescribed under the rules.

**Mittal (1990),** in a paper on “Organisation of Training & Placement Services in Polytechnics” states that while implementing various industry –institute interaction projects and conducting status study on industry-institute interaction in various states, some major steps are required to promote Industry institute interaction. Separate funds are to be earmarked for interaction and a strategy should be developed for promotion of interaction with industry and institutions. Existing vacancies should be filled up and a provision for leave and training reserve be made. Structured industrial training, say once in a period of five years, is desirable for teachers. Academic and administrative autonomy may be granted to institutions on selective basis. It is necessary to prepare brochures highlighting research and
development facilities, educational and training capabilities etc. and make them available to industries in the region/country. Institutions need to be provided with adequate transport facility, infrastructure and secretarial support for carrying out these activities.

3.6 ROLE OF INDUSTRY INSTITUTE INTERACTION IN IMPROVEMENT OF PLACEMENT

**PACT (2001)**, “Case study by DGE&T on IMC”, A study report published in PACT (Partnership for Action in Training) by DGE&T (Director General of Employment & Training) Govt. of India, states that assessment indicated was improvement in the infrastructure facilities, which had led to improvement in training. The employability of passed outs from ITIs having IMC is better than that of without IMC. The statistics state that in ITI Ludhiana there is improvement in Placement /employment rate from 33% in 1996-97 (without IMC) to 58% in 1999-2000 (After the formation of IMC).

**Venkateswaran (2003)**, “Case study of Birla Institute of Technology, Pilani”, it states that with regard to a traditional type of linkage, placement schemes for student internships are still a predominant mechanism. The dean of the Educational Development Division at BITS is the overall in charge of the center. A team of faculty members drawn from the disciplines to which the project area belongs assists him. The team invites the industry, chooses the projects, selects students, monitor the progress, and evaluate, the students and keeps time-to-time interaction with experts from the industry. This enhances the placement chances of students those shows interest in specific projects.

**Masslout (2003)**, “Case study of support service for Ecole Superiure de Technologie (ESTC) of Casablanca” A small and young tertiary education called *Ecole Superiure de Technologie (ESTC)* of Casablanca in Morocco, has created within its central administration, a new service, staffed with two persons in charge of developing relations with enterprises. The main functions of this office are to identify internship placements for students, to perform a clearing-house function for job seekers and job offers and to follow-up on graduates.

**Srisa-an Umal & Pinyonatthagarn (2003)**, “Case study of Student Placement in Cooperative education at Suranare University of Technology, Thailand”. Students select jobs, which interest them. Cover letter and resumes are then forwarded to employers to choose appropriate applicants. If the employers require, job interviews may take place on university premises about two months before the work term begins. Upon completion of
the selection process, employers rank the students they would be prepared to accept and students also submit their order of preference for positions. The co-operative coordinators then negotiate the best possible match of jobs with students, attempting to satisfy the requirements of both groups.

Sangha (2008), “Industry Ignores ITI Students,” Published in News Paper ‘The Tribune’, for ITI (W), Mohali, Students of information technology at the local Government Industrial Training Institute (ITI) face bleak job prospects, thanks to the uncooperative attitude of the industry. Despite the ITI, meant exclusively for women students, being upgraded to a “centre of excellence” (COE) in information technology under a Central Government scheme, the local industry has been ignoring its students. At least, 19 industrial units in the Mohali-Chandigarh area were approached by the ITI for training and help, but none agreed to entertain its students for the specialised training module in IT. The CII, Chandigarh, too, has not responded to the institute’s requests for cooperation. The ITI has, therefore, been compelled to send its IT students to local small entrepreneurs in the unorganised sector for the purpose. The two-year course at the Phase V institute extends over broad-based basic IT training (first year) after which students can opt for a six-month advanced module in specific areas. The advanced module is followed by six months’ training in the industry. Head of the institute R. P. Singh says the whole objective of the COE scheme to produce a multi-skilled workforce of world standards gets defeated. A huge amount of Rs. 1.60 crore was allocated to the institute out of which Rs. 92 lakh has been spent—Rs. 20 lakh on the building and the rest on the infrastructure, including the latest computers and tools. Most of the 115 IT students, he says, are from the rural areas. It is a pity that the industry is not fulfilling its corporate social responsibility. There is no backing at all from the industry in the matter of training and jobs, he adds. The ITI was started in 1979 under the aegis of the Directorate of Technical Education and Industrial Training, Punjab. It started with conventional courses with new ones being added with the changing times. It now has 300 women students. At present, three schemes - the COE, the craftsman training (CTS) and the hi-tech - are running at the institute. The CTS scheme is the oldest at the institute and it covers courses like cutting and sewing, embroidery and needlework, secretarial practice and draughtsman (civil). The hi-tech scheme was started in 1998 to impart training to skilled manpower in the industry, helping them upgrade their skills.
3.7 QUALITY/EFFECTIVENESS OF TEACHING LEARNING PROCESS WITH INDUSTRY INSTITUTE INTERACTION

Venkateswaran (2003), “Case study of model for interaction with industry through ‘Practice School’ in BITS”. The senate of BITS (which is the highest academic decision-making body) authorized the conduct of any of its on campus programmes off-campus for the manpower development of industries. In addition, the institute has also designed specific educational programmes to suit the requirements of specific industries. As already mentioned above, internship programmes for students belong to the most traditional type of linkage, but as mentioned above, they often encounter manifold if they are not well organized and managed. BITS India has developed an innovative programme of so-called ‘practice schools’ (PS). Practice schools are established in a number of enterprises, which agree to collaborate with BITS staff on a regular basis. BITS faculty posted at the industries starts identifying these projects by having discussions with various persons in the industry almost four months before the students arrive at the station. The student will be working under his guidance throughout the period of his stay at the PS station. Since the students are contributing to the professional well being of the organization and consequently to the productivity, every student is paid an out-of-pocket allowance during the practice school programme.

Kulkarni, Coordinator “Technical Education Quality Improvement Programme (TEQIP)”. The Technical Education Quality Improvement Programme (TEQIP) of the MHRD, Government of India funded by the World Bank is aimed to upscale and support the efforts of Government of India for improvement in quality of technical education and enhance existing capacity of the Institute to become dynamic, demand driven, efficient and responsive to economic and technological development.

Srisa-an Umaly & Pinyonatthagarn (2003), “Model of Co-operative education at Suranaree University of Technology, Thailand”. The aspect of education combines the academic experience of the students in industry. The student work as a full-time employee at the work site. After beginning studies in his or her major field, he or she is required to take two trimesters of co-operative study, each worth six trimester credits, resulting in a total of 12 trimester credits. More importantly, the university’s curriculum can be adapted to society in this age of increasing academic realization of global requirements.

Plonski (2003), “Case Study of Model Interaction in Operation at Universidade De Sao Paulo, Brazil”, Union of Small Industries in the State of Sao Paulo (known by the acronym in
Portugues as SIMPI), USP created in September 1991 a new user-friendly interface to facilitate access of small companies and entrepreneurs to its body of knowledge. This interface has become highly successful service, called Disque-Tecnologia. It is interesting to note that undergraduate and graduate students provide a sizeable portion of the support. The so-called ‘junior enterprises’- a model by which students of a certain course or school establish and operate a professional services company focused on their area of expertise. Some of these enterprises have developed a wide range of projects to industrial clients.


Industry-University collaboration is common at GMI Engineering & Management Institute, a fully co-op institution which requires students to write a fifth-year thesis on a project relevant to an industrial sponsor. While the undergraduate link between GMI and its industrial sponsors is strong, collaborating on higher level research projects is somewhat new. This paper documented the phases of a relationship, described the activity itself, listed acquired benefits, made recommendations towards continuing cooperation, and proposed ideas for other institutions interested in developing similar programs.


Over the years it has delivered insights, techniques and thoughts to trainers and educators worldwide. European unification has brought unprecedented trading and business opportunities, together with a growing need to develop a well-trained workforce to cope with the increasing demands of fierce competition.

To provide all those involved in research and practice in training with ideas, news, research findings, case examples and discussion on training and development. It focuses primarily on activity in Europe, although draws on insights from the rest of the world where they are seen to make an appropriate contribution. Contributors should always endeavor to spell out the practical implications of their work for those involved in training.
Chidambram P. Union Finance Minister (2007), Nearly 400 Industrial Training Institutes (ITIs) in India will be upgraded and made more vocation oriented with $ 280 million assistance from the World Bank, a cabinet committee decided Thursday.

The Cabinet Committee on Economic Affairs (CCEA) presided over by Prime Minister Manmohan Singh decided to implement the Vocational Training Improvement project in 400 ITIs, said Union Finance Minister P. Chidambaram.

'The centre had announced this programme for all the 500 ITIs in the country in the 2004-05 union budget,' the minister said, adding, 'of these, 100 ITIs, in collaboration with private sector, have been upgraded with indigenous resources'.

Chidambaram explained the objective of the project as 'improving the quality of vocational training, promoting systemic reforms and innovation, project management and monitoring and evaluation'.

He said ITIs were being upgraded and reformed in consultation and cooperation with industry keeping in mind 'all aspects of training and development of curriculum'. He said the decision would help provide greater empowerment, flexibility, and reforms in administrative procedure to the institutes. Chidambaram hoped that 'this approach will bring significant improvement in internal and external efficiency of the training centres including employment prospects for ITI certificate holders'.


Technology development alone is not enough. It has to achieve a maturity level, which is capable of application in the industrial domain in a competitive environment. To do that it has to be transferred from the laboratory, where it has been developed, to an industrial organisation, from where it could go to the market place. Through proper management of technology and in-house technology transfer, DAE has now blossomed into research centres, industrial units, corporations and fully aided autonomous institutions.

Nasscom (2007), "Building win-win partnerships" IIT industry communique for the Academia Intel launched a programme in January 2006 to cherry-pick top Tier I institutes, which will develop and deliver courses on multi-core. The selected institutes
will then be encouraged to share their course design documents as well as any other information that could foster the growth of these courses to other universities, primarily the Tier II institutes in India. The implementation: In the beginning of 2006, Intel invited proposals for developing course curriculum and teaching course(s) around multi-core technology for post graduate and undergraduate students of computer science and engineering. IIT Kanpur and IISC submitted a proposal, which was approved by Intel. Intel conducted a three-day training programme for the participating faculty members during the 1st week of April 2006.