CHAPTER 2
REVIEW OF RELATED LITERATURE

2.1 LITERATURE SURVEY


The authors list and describe various types of collaborative learning styles. They emphasize that wanting to be a facilitator of collaborative learning and being good at it are very different things. As with all kinds of teaching, designing and guiding group work takes time to learn and practice. For students, learning to learn well in groups doesn’t happen overnight. Most teachers start with modest efforts. Many work with colleagues, designing, trying and observing each other’s approaches. At their best, collaborative classrooms stimulate both students and teachers. In the most authentic of ways, the collaborative learning process models the means to question, learn and understand in concert with others. Learning collaboratively demands responsibility, persistence and sensitivity, but the result can be a community of learners in which everyone is welcome to join, participate and grow.

2. Problem Based Learning; helping your students gain the most from PBL, 3rd edition, Instructor’s guide for Problem Based Learning: How to gain the most from PBL”, ISBN0-9698725-0-X, Donald R. Woods, March 1996.

The Author has elaborated upon the assessment and evaluation methods for Problem Based Learning.

3. Group Decision Support System for assessment of Problem Based Learning, Jian Ma, City University of Hong Kong, Kowloon tong, Hong Kong, IEEE transaction on education, vol39, no.3, August 1996.
The authors have developed a group decision support system used for assessing the outcomes of PBL. The system uses the method of decision theory in fuzzy mathematics for the assessment, and it invites students as well as lecturers to nominate the assessment criteria and to contribute their corresponding weights. It also stores students’ details in the database and assists the lecturers in assessing students’ projects using the agreed criteria. The system improves the quality of PBL as well as the efficiency of assessing students’ projects. It also creates a no threatening environment for learning and provides a fair method of assessment.


This article starts by summarizing the paradigm we’re leaving behind at various rates in colleges and universities across the country. It then presents the authors’ take on the paradigm the teaching-learning process is entering into, explore implications of the changing paradigm for students and faculty, and close by offering some suggestions for fostering change. The aim of this article is to stimulate thinking about the changing nature of engineering education and to encourage the reader to engage in reflection and conversation. The favorite means of shifting to the new paradigms of teaching in the college classroom is to use cooperative learning. Cooperative learning provides the means of implementing the new paradigm of college teaching and provides the context within which the development of student talent is encouraged. Carefully structured cooperative learning ensures that students are cognitively, physically, emotionally, and psychologically actively involved in constructing their own knowledge and is an important step in changing the passive and impersonal character of many college classrooms. Cooperative learning among students in the classroom, and among faculty in departments, colleges and universities is central to achieving positive and constructive change in higher education.


This paper describes a 25 year old project in which the authors defined problem solving identified effective methods for developing students’ skill in problem solving,
implemented a series of four required courses to develop the skill, and evaluated the effectiveness of the program. Controlled Studies showed significant increase in marks of a chemical engineering course by those who concurrently took the MPS program compared with students who did not take the MPS program. Students’ confidence in their problem solving ability improved by 1 to 2 standard deviations whereas students in the control group changed negligibly over the same three year period.


The paper discusses the current development of undergraduate and postgraduate engineering education in India and presents two case studies detailing the engineering education programs of two nationally and internationally leading institutes. A unique and innovative industry-linked engineering education and training system adopted by BITS, Pilani is also presented. This paper reveals that the leading institutes have adopted standard competitive research and object oriented engineering study programs. The main benefits for the students can be summarized as: gaining confidence in decision making, relating theory and practice, increased job opportunities, realization of responsibilities, opportunity to know one’s weaknesses and strengths, and opportunity to work with modern equipments and of problems of current importance. Finally it can be concluded that other universities and institutes should adopt more job and object oriented engineering education curricula linked with industries and research organizations to meet the present and future challenges of rapid technologies changes and industrial development in India.


The authors have developed the subject as a multidisciplinary cooperative problem based learning programs offered by the School of Engineering at James Cook University. Initial results show that cooperative problem based learning can be used to develop problem solving, teamwork, and lifelong learning skills as well as producing a level of technical knowledge beyond that of individual achievement. The results, after
conduct of the course, show an improvement in the design skills and a willingness to learn and progress, which was not seen or not seen to a lesser extent, in previous courses. The PBL course provided a basis for developing team skills in engineering classes and improved both student and staff morale.

8. **Comparing Entering Freshman Engineers: Institutional Differences in Student Attitudes**, outcomes of research supported by a grant from the Engineering Information Foundation, 98-4 and National Science Foundation grant, EEC-9872498, Engineering Education: Assessment Methodologies and Curricula Innovations. Mary Besterfield-Sacre and Magaly Moreno University of Texas – El Paso, Larry J. Shuman, University of Pittsburgh Cynthia J. Atman, University of Washington. This research report is supported by a grant from the Engineering Information Foundation, 98-4 and National Science Foundation grant, EEC-9872498.

The study described here is an initial beginning to an extensive in-depth analysis to determine those critical student characteristics and attitudes, and those institutional factors (including type, curriculum, and pedagogy) that are related to student’s performance and retention in engineering. The analysis presented here provides a new perspective on the characteristics of freshman engineering students, as measured by the choice of institution they attend and their attitudes. One finding is clear – students have different characteristics depending on their choice of an engineering school.


An online Problem Based Learning was employed with a group of students learning undergraduate university course. The paper explores practical issues associated with teaching and learning in this fashion and describes the perceptions and responses from the learners. The students responded very positively to the changed learning environment despite the fact that it caused them to spend more time in these courses doing different things to which they were accustomed. In particular the students’ perceived that the various problem based activities contributed substantially to their learning and enjoyment in the course. The students also frequently indicted that they valued inputs from the teacher and saw this component as a valuable part of teaching.
and learning. The results suggest the need to remember the importance place of teacher in any learning process and the need to ensure that the students have adequate access to and lines of communication with their teachers.


The authors have stated the fact that even after decades of increased emphasis on engineering science, engineering undergraduate education was becoming largely disassociated from the practice of engineering. The emphasis on analysis had outpaced the incorporation of synthesis and design as well as a number of broader educational and intellectual imperatives that were becoming increasingly evident. There was a common call for retaining the basic elements of mathematics, natural sciences, engineering sciences, and fundamental concepts of analysis and design. However, there was also a common call for increased emphasis on synthesis and design; maintenance of depth and strength in technical subject matters; a greater emphasis to deeper inquiry and open ended problem solving; stronger emphasis on non-technical education to develop the historical and societal perspectives; development of management and communication skills; interdisciplinary exposure; international exposure; and preparation for continuing professional development and career-long learning. The authors emphasized to adopt a five-point strategy as:

- Identify the desired characteristics of our graduates for the 21st century,
- Identify the focus areas of the program, necessary to develop these characteristics,
- Assess the present program's effectiveness in these new terms,
- Identify new program components and characteristics such as content, structure, and methodologies to create these new areas of emphasis,
- Develop a strategy to implement required changes while retaining existing strengths.

They defined the set of characteristics as:

- A strong foundation in basic sciences, mathematics and engineering fundamentals,
• A capacity to apply these fundamentals to a variety of problems,
• Knowledge and experience in experimental methods,
• Knowledge and skills in the fundamentals of engineering practice,
• Advanced knowledge of selected professional-level technologies,
• Strong oral and written communication skills,
• A sense of corporate and business basics,
• A sense of social, ethical, political and human responsibility,
• A historical and societal perspective of the impact of technology,

The authors have found that the educational enterprise and faculty in particular, have been very creative in addressing the challenge for change. They found that design, the essence of creative process, has become a motivator and driver from the freshman year forward, thus pushing higher order vision and creative thinking in our emerging engineering professionals. The environment ahead is one for vibrancy and innovation in which the professional discipline of engineering has become the centerpiece of the undergraduate intellectual debate and for which a significant and sustainable cultural change and paradigm shift is taking place in engineering education.


Aalborg University, Aalborg, Denmark, has organized the first year of studies at the Faculty of Engineering and Science in such a way as to meet the special needs of students when they enter a new education system. The students are introduced to the so-called Aalborg Model of Problem-Based Learning (PBL). The article gives an overview of the structure of the first two semesters, showing examples on how students’ basic technical skills can be developed, as well as introducing the students to the philosophy of the Aalborg Model of PBL. Further, it is illustrated how students can acquire general and transferable skills when collaborating, and how they can evaluate a technical solution in a particular context. The established platform for academic methods of work and study is also presented and elaborated on.

In the paper the authors describe the steps taken at Iowa State University to realize a sophomore level course in embedded system by addressing the type and context of problem learning used in the course. The authors present the 3C5I model, which creates an educational context based on concepts within courses within a curriculum (3C), and in each progressing along the 5 “Is” of Introduction, Illustration, Instruction, Investigation, and Implementation. The authors have examined the student learning and experiences with the thematic lab. They also studied the effects of several other changes such as competitive programming exercises and alternative evaluation methods. The paper describes how the authors have integrated classroom / laboratory experiences and brought new system design concepts and technologies into an introductory course.

13. The integration of Problem Based Learning and Problem Solving Tools to support distributed Education Environment, Robert S. Fridman and Fadi P. Deek, Boston, MA, 32nd ASEE/ Frontiers in Education Conference, Session F3E-17, Nov. 6-9, 2002.

This paper examines how the design and implementation of problem solving tools used in programming instruction are complementary with both the fundamental theories of problem-based learning (PBL) and the pedagogy and practices of distributed education environments. The ways of how such learning tools can be used to bridge the constructivist foundation of PBL with the needs of distributed education, are suggested. The authors then showed how combining PBL, web based distributed education and problem solving environment can create effective learning environments in a variety of disciplines and modes.


This paper describes detailed analysis of a problem based learning group to understand how an expert facilitator supports collaborative knowledge construction. The study examines the questions and statement that students and the facilitator generated as they
traversed a complex conceptual space. The author details that expert facilitation provides four major lessons about constructive teaching. The first set of issues relate to how facilitators with varying levels of expertise can be trained and supported to be more like experts. The second is to provide guidance to offload facilitation functions on to an asynchronous PBL system. The third issue relates to embodying the goals and strategies of the expert facilitator into the visual representation that are available in the system. The fourth issue addresses how the facilitation in asynchronous and face–to–face discussions differ.

15. Empowerment to Learn in Engineering: Preparation for an urgently- needed paradigm shift, Chris M. Amson, Leonhard E. Bernold, North Carolina State University, USA, Global Journal of Engineering Education, vol7, no.2, UICEE, 2003. This article describes a study funded by the National Science Foundation (USA) that seeks to understand the relationships between engineering students’ ways of learning and their professors’ and instructors’ ways of teaching. Phase 1 of the study involves an investigation of the learning styles, preferences and study habits of approximately 1,000 first-year engineering students at a large, research-oriented, public university in the USA. A battery of learning style inventories, surveys and questionnaires, and weekly journal-like responses to focused questions provides the basis for correlations between these dimensions of students’ experiences and their academic success and retention. Focus-group interviews with randomly selected participants provide qualitative exploration of the statistical results. In Phase 2, teachers’ instructional preferences, assumptions and ideologies are studied in order to find matches and mismatches between engineering students’ profiles and the curricular and pedagogical experiences they have in college. The results of the study provide information for the revision of engineering curricula, the pedagogical training of engineering faculty and the preparation of engineering students for the academic challenges of higher education in the field.

In North America and in other parts of the globe, a student-centered PBL approach is being utilized in many schools of nursing and medicine and is gradually being integrated into engineering programs. The paper discusses the research evidence regarding PBL in health sciences and engineering literature, its applications to engineering schools and potential impact on the global workplace. The authors have emphasized that the curriculum revolution does not happen overnight. They have emphasized the need for change. Graduates and undergraduates, if subjected to self-directed, lifelong learning using PBL, will add value to their workplace by being adaptable to changes and being better able to help their companies compete in the global workplace.


This guide is divided into two parts – at the front, there is a collection of 12 case studies, real-world examples from active academics, using PBL in their courses. The second part is a collection of guidelines for using project-based learning within curricula. Each section – except for the case studies - starts with an introduction, and ends with a brief summary.

Within the chapters there are examples drawn from the case studies. By going through the guide, it is possible to access detailed information about particular approaches.


This paper describes the experience of teaching power systems basics to undergraduate engineering students using a pedagogical approach that is based upon computer-mediated and problem-based learning in an integrated way. In this approach, an interactive learning environment based on web technologies replaces the traditional lectures. The pedagogical project behind this approach is focused on the problem-based learning paradigm, where the students are instigated to construct the knowledge required to solve the problem (constructivist learning). The paper addresses the technological aspects, such as how to create simulators using Java applets and animation, as well as the pedagogical aspects, such as student performance and knowledge acquisition. The
experience of using this approach at the State University of Campinas, Brazil, during the years 2001/2002 is described in detail. Advantages and disadvantages of this approach are also addressed and finally the students’ points of view are presented based on surveys.


The author and his department at MIT recognized the need of changing not only what the teachers teach but also how they teach. He conducted a course using collaborative learning and conducted a survey on the students’ opinion on the current and changed teaching pedagogy. He used concept-based lectures with real time feedback, weekly homework on material given prior to being discussed in the class, a semester long, team based analysis and design of an aircraft and added oral examinations in the last. The effectiveness of changed pedagogy is adjudged by feedback taken from the students. Overall a positive feedback was received from the students.


In this article, the author addresses the reasonably difficult topic on how to plan for implementing Project-Oriented and Problem-Based Learning (POPBL); this incorporates the development of students’ personal skills and abilities, which are to be considered equally important to developing students’ technical or professional competences. The author presents a series of reflections, which are based on a formulated vision, providing a possible model to develop a successful adaptation of a change process. Furthermore, through illustrative figures, the author advances the process in a logical way before presenting a profile that is based on decisions drawn from the reflection process. The author seeks to provide, in a clear and pedagogical manner, the results that can be used in adapting the process prior to implementing a new educational model at an institution. In the concluding section, the author supports his method by giving examples on recent comparisons of students’ learning outcomes between a project oriented learning model and a conventional teaching model.

In this paper the authors have proposed a design framework for supporting students’ collaborative learning by making use of technologies of the information sharing mechanism in problem-based learning. The backbone of this mechanism is open, dynamic and evolving resources, repository composed of instruction resources, group-gathering materials and personal learning references. Learners are able to navigate through various resources in learning the curriculum via sharing information within and among groups, and to gain better understanding of the relationships, issues, relevant information sources and people, thus enabling them to achieve more informed group discussions and high quality of collaborations. The authors propose the next step of this study to implement evaluation and analysis, to extend the scale of understanding learners, group learning behaviours and attitudes toward the information sharing mechanism integrated with PBL curriculum. The authors propose to develop a complete problem-based learning system and evaluate it integrally for clarifying the effects of each single module towards problem-based learning.

22. Developing a Web-based environment in supporting students team working and learning in a problem based learning approach, Hsiu-Ping Yuesh, Proceedings of the 3rd International Conference on creating, connecting and collaborating through computing (C5’05), IEEE, 2005.

The paper presents a case study of applying problem-based learning in the format of web-based environment. It first describes the features and rationale behind problem-based learning approach and then introduces the development of web – based environment as well as its implementation of a university classroom in facilitating students’ team working. Findings show that most of the students have positive attitude towards this application, and the system can help their team – working in the problem based learning process. Also the students’ feedbacks demonstrate that their learning from the web – based problem – based learning approach is significantly improved.

The Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, deployed a flexible learning scheme for selected pilot courses in engineering education. In such a scheme, traditional lectures and written exercises are combined with additional Web-based learning resources. The main objective of this initiative is to sustain the evolution from traditional teaching to active learning and to better integrate the increasing number of educational resources available online. In engineering education, a key activity to sustain the learning process is hands-on experimentation carried out using either simulation tools or real equipment. This paper describes how a collaborative Web-based experimentation environment has been introduced at the EPFL for providing more flexibility to students performing laboratory experiments in automatic control, biomechanics, and fluid mechanics. It particularly describes the e-Journal, a Web service integrated in the proposed learning environment that enables the collection and sharing of preparatory notes and experimental results with both peers and teaching assistants.


The paper describes the course for teaching basic robotics at the undergraduate level with several didactical and technical contributions, helping the students to learn in a more effective way. The first part of the course uses an intelligent tutoring system coupled to a virtual laboratory for mobile robots, which constitute a semi–open learning environment. The ITS keeps track of the students’ knowledge at different levels of granularity, combining the performance and exploration behavior in several experiments, in order to decide the best way to guide and to re-categorize the student. The system is evaluated with an initial group of students. The results show that the students who explore the virtual environment with the help of the tutor have a better performance, and students with intelligent support improved significantly their knowledge level of the targeted knowledge objects.
25. Problem Based Learning as an effective tool for teaching computer Network Design, Nigel Linge and David Parsons, University of Salford, UK, IEEE transactions on education vol.49, no.1, Feb 2006.

This paper describes the experience and philosophy behind the introduction of PBL to facilitate the teaching of network design to students working toward the M.Sc. degree in data telecommunications and networks at the University of Salford, Salford, Greater Manchester, U.K. Teaching students how to undertake practical “design” represents a challenge. A two-threaded approach was adopted in which a lecture thread was used to develop the students’ general understanding of network technology and its operation and performance, and a PBL thread that was used to develop design skills. The design of the PBL thread exploited the practical experience of the module facilitators and allowed the students to take on the role of network design consultants, working on a total of three scenarios that had a strong practical dimension and realism. Evaluation of this PBL thread has indicated generally strong support from the student cohort, reflected in an encouraging set of results obtained from the network design assignment. Based on the experience of introducing PBL to this new M.Sc. module and the feedback obtained from the students, the intention is to move to phase 2 of the strategic adoption of PBL. For the 2004–2005 academic year, the wholesale adoption of PBL was used as the tool by which the module was delivered and all of its learning outcomes achieved.


The authors present a brief history of PBL at university of Delaware, then the essential features of PBL. They suggest ways for adapting PBL to undergraduate settings. Various problems associated with PBL are discussed, such as monitoring multiple groups; assessment issues and implementing PBL in large classes, are discussed at length.


The paper describes the efforts to develop pedagogical environment that seeks to influence experiences of students as mobile applications end users, developers and decision makers using collaborative effort involving industry sponsors, university
technology services and multi-user engaged in information technology education, a graduate level course called Mobile Application Development (MAD) was created. The paper describes, how Problem based learning principles guided the design and implementation of MAD.


The paper describes the approach used by the authors to deliver the course of elementary circuit analysis to undergraduate students. The learning experiences in the two course forms are compared via a questionnaire response and exam results. The result suggests that the PBL method is a better way of imparting education in circuit analysis. The PBL students appear to grasp better the details and overall picture of the issues taught. In addition to the subject matter the PBL students learn social skills through interaction in small groups, how to identify and define a problem and how to look for and filter out relevant information. Presentation skills are also practiced.


A teamwork survey was conducted at Oakland University, Rochester, MI, in 533 engineering and computer science courses over a two-year period. Of the 6435 student respondents, 4349 (68%) reported working in teams. Relative to the students who only worked individually, the students who worked in teams were significantly more likely to agree that the course had achieved its stated learning objectives. Regression analysis showed that roughly one-quarter of the variance about whether the objectives were met could be explained by four factors: 1) student satisfaction with the team experience; 2) the presence of instructor guidance related to teamwork; 3) the presence of slackers on teams; and 4) team size. Pearson product–moment correlations revealed statistically significant associations between agreement that the course objectives had been fulfilled and the use of student teams and between satisfaction with teams and the occurrence of instructor guidance on teamwork skills. These and other results suggest that assigning
work to student teams can lead to learning benefits and students’ satisfaction, provided
that the instructor pays attention to how the teams and the assignments are set up.

30. Effective Teaching Practices: Preliminary Analysis of Engineering Educators,
Susan M. Lord and Michelle Madsen Camacho Engineering Department and Sociology
Department, University of San Diego San Diego, Milwaukee, WI 37th ASEE/IEEE
This survey was conducted on unique population of engineering educators, attending
FIE, who have a demonstrated interest in pedagogy, probably beyond that of the typical
engineering faculty member who is focused on technical research. Thus, this population
afforded a rich source of data to begin to answer the research questions of what
engineering educators believe are effective teaching practices and what they actually do
in the classroom. Participants were asked to describe what they believed were effective
teaching practices. They were also asked to consider a list of teaching practices and rank
these according to what they believed were most effective and which they actually
utilized. The results demonstrated that there is a significant amount of agreement among
sample population on what they believe is the most effective teaching practices. Out of
ten items listed, nine were placed in the top ten by more than fifty percent of the
respondents. Of those, four items were ranked in the top ten by more than seventy
percent of the respondents (inquiry / inductive learning, building community, self-
awareness of professor and small group work). Three themes - inquiry / inductive
learning, building community, and small group work, were ranked in the top ten by
seventy-six percent or more of the participants. Although there was variability in the
latter portion of the rankings, among the top items, there is broad consensus among this
sample for beliefs in effective teaching practices.

31. Engineering Education in India, Draft Final report, Rangan Banerjee, Vinayak
P. Muley, Sponsored by Observer Research Foundation, Energy Systems Engineering,
In India, engineering is one of the preferred choices for good students at the 10+2 level.
The competition for the top institutions is intense with students spending a lot of time
and money in coaching classes to get the added advantage for the competitive entrance
tests. This demand for engineering has resulted in a mushrooming of a large number of
engineering colleges in the country. Despite this, the industry complains of an absence of trained quality engineers. When approached by the Observer Research Foundation to examine engineering education in India, the authors felt that this may be an interesting and useful exercise. The data have been built up from primary and secondary sources for engineering education in India and have been focused on a few sample engineering colleges to understand the trends. A list of conclusions and policy recommendations has been made and a set of alternative future scenarios for engineering education in India has been developed. It was believed that there is a need for strategic policy interventions by industry, government and academia to strengthen engineering education in the country. This report is instrumental in initiating debate and discussion and helps catalyze changes that benefit engineering education in India.


The spatial radiance measurement systems from students have been developed through the enhanced PBL. One can see that their knowledge and skills for electronic systems and instrumentation have been enhanced by the progressive design approach. Through this project, students have experienced the processes of electronic hardware / software design, simulation, implementation, system integration, testing, and verification, according to the progressive design. In addition, this project has offered students the opportunity to practice their communication skills, to collaborate in groups, and to do some project management. Furthermore, this approach has been designed to motivate students’ learning and develop the required knowledge and skills for a future professional capacity.


This paper describes the use of the blended e-learning model, based on a mixture of independent learning, online discussions and PBL, in a course “Teaching Methods in Information Science.” This model is realized as a combination of f2f environment and
online learning via a LMS. Educational activities, use of technology, and final results are illustrated. The results give reason for satisfaction: not only were the students in favor of this approach to learning, but their academic achievements were improved, compared to the previous offerings of the course when the teaching was conducted in a classical manner. It is particularly important that the dropout rate was greatly diminished, which could be related to students’ satisfaction with the support received from the instructor and the system.


This paper describes the pilot project conducted in Chitkara Institute of Engineering ad Technology, Punjab, India, in which, a unique way of integrating PBL with the evaluation strategy of University was initiated, implemented and evaluated. The knowledge evaluation conducted on the students, in terms of end-of-semester exams and internal written theory papers, show that there was significant difference in the knowledge gain of the TG and CG students, with the TG students performing better in knowledge tests. The skill set acquired by the students in the TG was greater than that acquired by the students in the CG, as was demonstrated by the results of the skill test conducted at the end of the semester. That PBL students spent more time in the class than did the traditional class students can have more than one interpretation. With respect to better knowledge gain, this difference may imply that the students in the TG had to spend more time in the class to gain a better level of knowledge. On the other hand the extra time spent in the PBL class could be attributed to a greater level of the motivation in these students


Designing the problems for PBL courses in engineering has always been a challenging task, especially, in environments, where the only method of imparting technical education has been through traditional Lecture/Tutorial/Practical (L/T/P) approach. This paper describes the cognitive and pedagogical issues involved in conducting PBL course
in Analog Electronics, designing of problems, analyses of solutions submitted by the student groups, detailing how learning objectives were achieved in PBL class. It also presents a detailed analysis of the problem statements designed and open-ended metacognitive triggers built on PBL students thinking, to understand how the facilitator supported the collaborative knowledge construction. The knowledge and skill tests scores of both the traditional and PBL threads are presented and compared.


Problem Based Learning (PBL) has proved to be a highly successful pedagogical model in many educational fields, although it is comparatively uncommon in technical education. It goes beyond the typical teaching methodology by promoting student interaction. This paper presents a PBL trial applied to the course of Digital Electronics - a course at undergraduate level in Electronics and Communication Engineering (ECE) program at Chitkara Institute of Engineering and Technology, affiliated to Punjab Technical University (PTU), India. Also included in this paper is the approach to design quasi – open –ended problems for the PBL trial in the basic course of Digital Electronics and the delivery of the course. It also includes the comparison of the results for the PBL and traditional pedagogies. Encouraging results in support of PBL were obtained.


This paper details the survey done on various Human Resource Heads who came for campus placements in Chitkara Institute of Engineering and Technology, and relates to how Problem Based Learning can help develop, if not all, but many of the traits sought by the industry.

The survey done on HR heads of different companies suggested that major changes in the education system are required not only in terms of curriculum design, but also the way knowledge is imparted to the students. The knowledge and skill test scores of the PBL students vis-à-vis those of traditional students have already given encouraging results. If incorporated on a larger footing with more faculties being trained on the skills
of becoming facilitators, PBL can be one of the tools to produce better “Industry Ready” engineers.


The method of Problem based learning was used for the first time to teach couple of courses to undergraduate students of Electronics and Communication Engineering, in one of the private institutes of Punjab, affiliated to PTU. This paper highlights the selection, preparation of students for PBL, the methodology adopted, and designing of problems, performance and the feedback of students using PBL. It also shows how Problem based Learning helped them to not only understand the technical concept but also developed their soft skills, which their counterparts could not develop while attending lectures the traditional way.

2.2 SUMMARY OF LITERATURE SURVEY:

1. In Health Sciences the approach of PBL is quite common and a lot of published work is available, which shows better results achieved by use of PBL.

2. The engineering students differ in their cognitive styles and the way they learn the theoretical concepts and apply them to practice.

3. Worldwide newer methods of imparting instructions are being tried out and the results are being measured.

4. Newer environment of classroom teaching are being created and being experimented with. A few of them are collaborative learning, project based learning, problem based learning and project oriented learning.

5. A great deal of work has also gone into incorporating PBL in Engineering Education – most of it in Australia, Singapore and United States of America. However, no instances or published work in the area of PBL are found in India. Yet, the need for a paradigm shift has long been strongly felt in India too.

Based on above summary of literature survey and principal research questions (section 1.13), Hypotheses statements are framed and listed in Section 2.3.
2.3 HYPOTHESES STATEMENTS

The null hypothesis indicated that for the control and treatment groups:

HO1: There will be no significant difference in knowledge scores between the Traditional (Control) group and Problem Based Learning (Treatment) group.

HO2: There will be no significant difference in skill scores between the Control Group (CG) and the Treatment group (TG).

HO3: There will be no significant difference in the attitudes of CG and TG.

HO4: There will be no significant difference in knowledge scores between males and females.

HO5: There will be no significant difference in skill scores between males and females.

HO6: There will be no significant difference in knowledge scores between Field Dependent and Field Independent students.

HO7: There will be no significant difference in skill scores between Field Dependent and Field Independent students.

HO8: There will be no significant interaction between gender and pedagogy on knowledge scores.

HO9: There will be no significant interaction between gender and pedagogy on skill scores.

H10: There will be no significant interaction between cognitive style and pedagogy on knowledge scores.

H11: There will be no significant interaction between cognitive style and pedagogy on skill scores.

H12: There will be no significant interaction between gender, pedagogy and cognitive style on knowledge scores.

H13: There will be no significant interaction between gender, pedagogy and cognitive style on skill scores.